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EXAMINING THE STATUS OF GULF WAR RESEARCH AND INVESTIGATIONS ON GULF WAR ILLNESSES

HEARING

BEFORE THE

SUBCOMMITTEE ON NATIONAL SECURITY, EMERGING THREATS AND INTERNATIONAL RELATIONS

OF THE

COMMITTEE ON GOVERNMENT REFORM

HOUSE OF REPRESENTATIVES

ONE HUNDRED EIGHTH CONGRESS

SECOND SESSION

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EXAMINING THE STATUS OF GULF WAR RESEARCH AND INVESTIGATIONS ON GULF WAR ILLNESSES

TUESDAY, JUNE 1, 2004

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON NATIONAL SECURITY, EMERGING THREATS AND INTERNATIONAL RELATIONS,
COMMITTEE ON GOVERNMENT REFORM,
Washington, DC.

The subcommittee met, pursuant to notice, at 1:05 p.m., in room 2154, Rayburn House Office Building, Hon. Christopher Shays (chairman of the subcommittee) presiding.

Present: Representatives Shays, Turner, Sanders, Ruppersberger and Tierney.

Staff present: Lawrence Halloran, staff director and counsel; Kristine McElroy, professional staff member; Robert Briggs, clerk; Jean Gosa, minority assistant clerk; and Andrew Su, minority professional staff member.

Mr. SHAYS. Please be seated. Thank you. A quorum being present, the Subcommittee on National Security, Emerging Threats and International Relations hearing entitled, "Examining the Status of Gulf War Research and Investigations of Gulf War Illnesses," is called to order.

Last weekend, in dedicating the World War II monument and celebrating Memorial Day, we acknowledged our profound obligation to those of past generations who made noble sacrifice in the service of liberty. That same duty to remember demands our focus today on another overdue national remembrance. The living warriors of this generation who fought in Operations Desert Shield and Desert Storm need just one thing written in stone, a sustained commitment to research and treatments for the mysterious maladies and syndromes triggered by battlefield exposures. And they cannot wait 60 years for their deserved testimonial to become a reality.

This subcommittee, with oversight purview of the Department of Veterans Affairs [VA], and the Department of Defense [DOD], today convenes our 17th hearing on Gulf war veterans' illnesses. Over the last decade, we followed the hard path traveled by sick Gulf war veterans as they bore the burdens of their physical illnesses and the mental anguish caused by official skepticism and intransigence. It was their determination that overcame entrenched indifference and bureaucratic inertia, their persistence, and a home video of chemical weapons munitions being blown up at

Khamisiyah eventually persuaded DOD and VA that postwar illnesses are linked to wartime exposures.

But characterizing the subtle linkage between low-level toxic assaults and very chronic health consequences remains a dauntingly complex research challenge. As we will hear in testimony today, efforts to map uncharted neurological pathways between sarin-induced brain damage and diverse manifestations of illnesses are made even more difficult by unreliable exposure data. The dimensions of Gulf war syndromes may be obscured by epidemiological conclusions, based on unreliable exposure estimates and plume models. And promising research hypotheses and treatment concepts still face institutional obstacles to Federal support as both funding and momentum behind Gulf war illness research appear to be waning.

So we asked our witnesses to give us their assessment of the status and future direction of Gulf war research. As in the past, we ask veterans to testify first. Their perspectives always inform and enrich our subsequent discussion, and we sincerely appreciate the patience and forbearance of our government witnesses in agreeing to sit on our second panel.

Just as the liberation of Kuwait was an international mission, the search for postwar causes and cures has been a coalition effort as well. Over the years we have been fortunate to be able to form a close collaboration with our counterparts in the United Kingdom. Continuing that transatlantic partnership, we are joined today by the Right Honorable Lord Morris of Manchester. Lord Morris is a leading advocate for Gulf war veterans in Britain and a strong voice behind the breakthrough research needed to solve the mysteries of exposure-related diseases.

This is not the first time Lord Morris has joined us. Two years ago, he and his colleague from the House of Commons, Mr. Bruce George, added invaluable insight and focus to our discussion, so much so that their obvious depth of knowledge and rhetorical flare made some of us feel a little intimidated and, believe it or not, tongue-tied. They were just so witty and engaging. So when we invited Lord Morris this year, we commoners asked if he would be just a little less lordly today, and he graciously agreed. He is a valued colleague of ours and a true friend to Gulf war veterans of all nations.

Welcome, Lord Morris. You honor this subcommittee again with your presence, and we look forward to your continued contribution to our work.

And we welcome all the panelists, all the individuals in both panels. We thank them for being here as well.

[The prepared statement of Hon. Christopher Shays follows:]

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Statement of Rep. Christopher Shays
June 1, 2004

Last weekend, in dedicating the World War II monument and celebrating Memorial Day, we acknowledged our profound obligation to those of past generations who made noble sacrifice in the service of liberty. That same duty to remember demands our focus today on another overdue national remembrance.

The living warriors of this generation who fought in operations Desert Shield and Desert Storm need just one thing written in stone – a sustained commitment to research and treatments for the mysterious maladies and syndromes triggered by battlefield exposures. And they cannot wait sixty years for their deserved testimonial to become a reality.

This Subcommittee, with oversight purview of the Department of Veterans Affairs (VA) and the Department of Defense (DOD), today convenes our seventeenth hearing on Gulf War veterans' illnesses. Over the last decade, we've followed the hard path traveled by sick Gulf War veterans as they bore the burdens of their physical illnesses and the mental anguish caused by official skepticism and intransigence. It was their determination that overcame entrenched indifference and bureaucratic inertia. Their persistence, and a home video of chemical weapons munitions being blown up at Khamisiyah, eventually persuaded the Departments of Defense and VA that post-war illnesses are linked to wartime exposures.

But characterizing the subtle linkage between low-level toxic assaults and varied chronic health consequences remains a dauntingly complex research challenge. As we will hear in testimony today, efforts to map uncharted neurological pathways between sarin-induced brain damage and diverse manifestations of illness are made even more difficult by unreliable exposure data. The dimensions of Gulf War syndromes may be obscured by epidemiological conclusions based on unreliable exposure estimates and plume models. And, promising research hypotheses and treatment concepts still face institutional obstacles to federal support as both funding and momentum behind Gulf War illnesses research appear to be waning.

So we asked our witnesses to give us their assessment of the status and future direction of Gulf War research. As in the past, we asked veterans to testify first. Their perspectives always inform and enrich our subsequent discussion, and we appreciate the patience and forbearance of our government witnesses in agreeing to sit on our second panel.

Just as the liberation of Kuwait was an international mission, the search for post-war causes and cures has been a coalition effort as well. Over the years, we have been fortunate to be able to form a close collaboration with our counterparts in the United Kingdom. Continuing that transatlantic partnership, we are joined today by the Rt. Hon. Lord Morris of Manchester. Lord Morris is a leading advocate for Gulf War veterans in Britain, and a strong voice behind the breakthrough research needed to solve the mysteries of exposure-related diseases.

This is not the fist time Lord Morris has joined us. Two years ago he and his colleague from the House of Commons, Mr. Bruce George, added invaluable insight and focus to our discussion. So much so that their obvious depth of knowledge and rhetorical flair made some of us feel a little intimidated and tongue-tied. So when we invited him this year, we commoners asked if he would be just a bit less Lordly today and he graciously agreed. He is a valued colleague of ours, and a true friend to Gulf War veterans of all nations.

Welcome Lord Morris. You honor the Subcommittee again with your presence and we look forward to your continued contributions to our work.

Mr. SHAYS. And at this time I would recognize Mr. Sanders, who has been at the forefront of this issue at probably all 17 hearings and probably some hearings I didn't even know about. Mr. Sanders.

Mr. SANDERS. Thank you very much, Chris. And congratulations to you and your staff for doing something that is very important, and that is reminding the men and women who are suffering from Gulf war illness that we have not forgotten and we are not going to give up on this issue.

I think in many ways when we look back on the history of how our country has treated veterans, whether it is exposure to radiation after World War II, whether it is Agent Orange from Vietnam, or whether it is Gulf war illness, I think many veterans understand that the U.S. Government, DOD and the VA, have not done all that they could to protect veterans who come home from war with one or another illness. And it's no secret if one reads the transcripts that I have been less than impressed by the work of the VA and DOD in responding to the pain.

What Chris has just said is that time after time, meeting after meeting, we have heard people coming up here talking about terrible ailments. I have held a number of meetings in the State of Vermont, a small State that did not send huge numbers of people over to the first Gulf war, and we heard from hundreds of people who had one or another serious problems.

Also, what is important about this whole debate is if we can get a better understanding of the causation of Gulf war illness and the impact that chemical exposure has on human health, we are going to learn a heck of a lot in terms of civilian problems as well. This is not just a military problem. There is a lot to be learned about how people in this country who are not in the military become ill as well. So there is a great deal of work to be done.

We are very pleased that our friends from the United Kingdom are here, and we thank the guests who are going to testify and our friends in the military for being here as well. So thank you very much. And I am pleased to be here.

Mr. SHAYS. Thank you, Mr. Sanders.

At this time the Chair would recognize the vice chairman of the committee, Mr. Turner, who has been a real gift to this subcommittee, and we thank him for being here.

Mr. TURNER. Thank you, Mr. Chairman. I appreciate your convening this hearing today and for your continuing effort on focusing on the Gulf war illness. I know that your work is to ensure the veterans receive the treatment and medical care they deserve, and also that there are some very important correlations between the work and study of the Gulf war illness and the issues that this committee faces in homeland security and national security.

We all know that the men and women of the U.S. Armed Forces fought bravely in the Gulf war, and they worked to disarm Iraq. Many ammunition bunkers and warehouses were destroyed by coalition forces, and many times the forces did not know what they were destroying. Only years after the war did we learn that some of these bunkers may have contained chemical nerve agents, thus exposing these troops to various levels of toxins.

The science and modeling that is being utilized in determining the root causes of this illness, I think, is very important to us as

we look to our attempts at protecting both civilian populations and our military populations as we face not only further conflicts in the Middle East, but in protecting our homeland.

It is interesting to me how many times we sit in hearings where with great certainty people tell us what the effects will be of a certain type of terrorist attack or a certain use of weapon, but in this instance we struggle in trying to determine what had occurred and what the effects would be in determining what the outcome had been. We have a lot to learn from this process not just in looking at protecting our veterans, but also in the future of protecting our men and women in uniform and also our communities. Thank you.

Mr. SHAYS. I thank the gentleman.

At this time the Chair would recognize Mr. Ruppersberger.

Mr. RUPPERSBERGER. Yes. Also, Mr. Chairman, thank you for your continued dedication of this issue and all members on this committee who have worked hard to keep this issue alive.

There were many veterans of the Gulf war fighting an uphill battle here at home to get their symptoms recognized and diagnosed, and to get service-connected disability ratings, and to get the support they needed to move forward with their lives. Now, I am grateful that the Congress was able to respond and enact legislation to complete research to speed up ratings and to compensate veterans. I am also encouraged that we are continuing to hold hearings like this one to make sure that these veterans are properly cared for, and to make sure we learn the lessons we as a Nation need to learn to prevent future veterans from facing the same health care battles.

I realize the main focus for today's hearing will be on continued research, the money promised and invested in research. Research is certainly an important part of the puzzle here, but as the newcomer to the issue and one who prefers to get to the bottom line, I am most interested in three specific areas: One, after spending time and money on research for many years, now what have we learned? Two, where are we in relation to treatment? Are we helping the veterans, and are any of them getting better? Three, what lessons have we learned? Is our recordkeeping better? Are our troops getting better physicals prior to deployment and followup? Do we have the right people on the ground conducting the experiments needed should an event occur so we have the science needed to diagnose and treat them?

I think today's hearing is important for many reasons. First and foremost, the veterans of the Gulf war answered the call of duty, and many of them came home sick. We owe them the best we can to find out why and to help them feel better.

Second, we have troops today in the same part of the world for much longer periods of time.

After so many hearings on disparity of health care for National Guard and Reserves versus active military personnel, I am worried we have not learned enough from the Gulf war lessons, illnesses to prevent another situation on a grander scale. I look forward to hearing.

Unfortunately I have another hearing; I will be back, but I want to make sure for the record that my questions will be presented.

And I also want to acknowledge Lord Morris. The U.K. has been a great ally to the United States throughout history, and it is an honor for you to be sitting at the same dais. Thank you, Lord.

Mr. SHAYS. I thank you, Mr. Ruppersberger, and thank you for those questions. I think both panelists can know that they have already been asked and can respond maybe even in their statements. They are very important questions.

[The prepared statement of Hon. C.A. Dutch Ruppersberger follows:]

Congressman C.A. Dutch Ruppersberger
Subcommittee on National Security, Emerging Threats, and International Relations Hearing
Examining the Status of Gulf War Research
and Investigations of Gulf War Illness
Opening Remarks
06.01.04

Thank you Mr. Chairman. And thank you for your continued dedication to the very important issue of Gulf War Veterans Illnesses.

I would like to begin by thanking my colleagues on this subcommittee and the witnesses for their hard work in this area for so many years. There were many veterans of the Gulf War fighting an uphill battle here at home to get their symptoms recognized and diagnosed, to get service connected disability ratings, and to get the support they needed to move forward with their lives.

I am grateful Congress was able to respond and enact legislation to complete research, to speed up ratings, and to compensate veterans. I am also encouraged that we are continuing to hold hearings like this one to make sure these veterans are properly cared for, and to make sure we learn the lessons we as a nation need to learn to prevent future veterans from facing the same health care battles.

I realize the main focus for today's hearing will be on continued research - the money promised and invested in research. Research is certainly an important part of the puzzle here.

But as the newcomer to the issue and one who prefers to get to the bottom line, I am most interested in three specific areas:

1. After spending time and money on research for many years now, what have we learned?
2. Where are we in relation to treatment? Are we helping the veterans and are any of them getting better?
3. What lessons have we learned? Is our record keeping better? Are soldiers and marines getting better physicals prior to deployment and in follow up? Do we have the right people on the ground to conduct the experiments needed should an event occur so we have the science needed to diagnose and treat them?

I think today's hearing is important for many reasons. First and foremost, the veterans of the Gulf War answered the call of duty and many of them came home sick. We owe them the best we can to find out why and to help them feel better. Second, we have troops today in the same part of the world for much longer periods of time. After so many hearings on disparity of health care for National Guard and Reserves vs. Active duty military personnel, I am worried we have not learned enough from the Gulf War Veterans Illness to prevent another situation on a grander scale.

I look forward to hearing from the witnesses and learning more about this very important topic. Thank you Mr. Chairman.

Mr. SHAYS. Before recognizing the panel, I ask unanimous consent that all members of the committee be permitted to place an opening statement in the record, and that the record remain open for 3 days for that purpose. Without objection, so ordered.

I ask further unanimous consent that all witnesses be permitted to include their written statement in the record, and without objection, so ordered.

I further ask unanimous consent that the Right Honorable Lord Morris of Manchester be extended the Parliamentary privilege of sitting with the subcommittee today and participating, and without objection, so ordered. And in fact, before I recognize the panel, I would now recognize Lord Morris.

STATEMENT OF THE RIGHT HONORABLE LORD MORRIS OF MANCHESTER

Lord MORRIS. Congressman Shays, I count it an honor as well as a privilege to have been invited again to join members of the subcommittee on the dais for a hearing of profound significance for veterans, United States and British alike, of the first Gulf conflict. Troops from our two countries fought shoulder to shoulder in liberating Kuwait, and it is highly appropriate that members of our two Parliaments should be seen acting together in addressing the problems and needs of veterans of the conflict now in broken health.

I have served in the British Parliament since 1964, first in the House of Commons for 33 years, representing the city of Manchester—not Manchester, NH, but Manchester in Lancashire, England, the mother of all Manchesters, all nine of them all over the world. And since 1997, I have been in the House of Lords as Lord Morris of Manchester.

My involvement in Gulf war illnesses arose from my role as honorary Parliamentary adviser over many the years of the Royal British Legion and as a founding member in 1994 of the Legion's Interparliamentary Gulf War Group, which comprises Parliamentarians of the main political parties in the U.K., distinguished medical specialists, researchers, legal experts, and representatives of the ex-service organizations, as well as servicemen and women who fought in the conflict. The Ministry of Defense is also represented.

The Gulf conflict was on a scale bigger than any British troops had been involved in since the Korean War 40 years before. It was also the first since 1918 against an enemy known to have chemical weapons readily available for deployment. Thus, the Ministry of Defense had to prepare for the liberation of Kuwait on the assumption that such weapons would be used. Indeed, millions of people across the world had seen for themselves in TV reporting the stark effects of Saddam Hussein's use of chemical weapons against the civilian population of a neighboring Muslim country only months before the invasion of Kuwait. On November 9, 2001, George W. Bush said of al Qaeda that they were, "seeking chemical, biological, and nuclear weapons." Eleven years before then, British troops deploying to the Gulf faced an enemy who not only possessed, but had already used some of these weapons, first for the massacre of Kurds in Halabja in 1988, and then against the civilian population of Iran in 1990.

Aware of the weapons facing the coalition troops in the Gulf, the Ministry of Defense gave high priority to doing all they could to safeguard them against the effects of their use. They correctly assessed the threats facing British troops, but not all the health risks or the measures taken to protect them.

Congressman Shays, while these measures were thought to be in their best interests, over 5,000 of the British troops deployed, all of them medically A–1 in 1990 and 1991, have reported illnesses that they and their medical advisers are convinced were related to their service in the Gulf.

The jury has now been out for nearly 14 years on the causes of the still medically unexplained illnesses of our veterans, and I believe this hearing can take us nearer to resolving some of the issues involved, not least that of the scale of the effects of the destruction by coalition forces of the huge Iraqi stockpile of chemical weapons at Khamisiyah in March 1991, releasing sarin and cytosarin, as undoubtedly it did.

The Legion describes veterans with still undiagnosed illnesses as having had, "a long, hard fight to have them accepted as war-related." Although epidemiological studies initiated by the MOD confirm that our troops who served in the Gulf were more likely to be unwell than their peers who didn't, full official recognition of their needs has been, in the words of the Legion, difficult to achieve. And while they and other associations have had many successes in promoting veterans' interests, there is continuing concern in Britain's ex-service community that too many lessons of the first conflict are still to be resolved.

In seeking a full public inquiry into the issues raised by the illness, the Legion could not be accused of acting precipitately. It did so in May 1997, 6 years after the conflict ended, not only in fairness to those afflicted, but to maximize public confidence that our troops would be fully prepared and protected in future deployments. But we still await an independent inquiry, and this, too, makes the subcommittee's hearings so important to British as well as American veterans.

Congressman Shays, the Legion is acting in keeping with its highest traditions in continuing to press for an independent inquiry. They fully accept the mistakes made in 1990–1991 were not deliberate; they know as well as anyone in executive government that decisions about protective measures often have to be made on a "needs must" basis. But they rightly insist and go on insisting and believe that any independent inquiry worthy of the name would strongly insist that the Nation as a whole, not just its sick veterans and their families, must play its part in meeting the cost of such decisions.

None of us at Westminster any more, I am sure, than anyone in Congress or executive government in the United States wants to see the afflicted and bereaved of the Gulf conflict made to suffer the strain and hurtful and demeaning indignities that protracted delay in dealing with their concerns can impose. Yet, sadly, many veterans feel that such delay has occurred, and their public representatives on both sides of the Atlantic must go on pressing for the truth about their illnesses.

Colleagues, of all the duties it falls to Parliamentarians to discharge, none is more compelling than to act justly to citizens who were prepared to lay down their lives for their country and the dependents of those who did so. There was no delay in the response of our troops to the call of duty in 1990–1991, nor should there be any further delay now in discharging in full our debt of honor to them. For Parliamentarians, you could say, every day should be a Memorial Day.

Mr. SHAYS. I thank the gentleman very much.

[The prepared statement of Lord Morris follows:]

The Rt Hon The Lord Morris Of Manchester's Written Statement
for inclusion in the record of the
Oversight Hearing of the US Congressional Subcommittee on National Security, Emerging Threats and International Relations
Entitled
Examining the Status of Gulf War Research and Investigations on Gulf War Illnesses

I was delighted to be asked once again – as a fellow parliamentarian and former British Minister for War Pensions – to join members of the Subcommittee in their oversight hearing to examine the status of Gulf War research and investigations on Gulf War illnesses, and also to study the findings of the Harvard School of Public Health showing an increased risk of Amyotrophic Lateral Sclerosis (ALS) – known in the UK as Motor Neurone Disease – in veterans as opposed to non-veterans.

I have been involved in debates in the British Parliament on medically unexplained illnesses among veterans of the 1990-91 Gulf War for the past 12 years; first in the House of Commons, and, since 1997, in the House of Lords. My involvement arose from my role as Honorary Parliamentary Advisor to The Royal British Legion, and I was a founding member, in 1994, of the Legion's Inter-Parliamentary Gulf War Group.

The Group comprises parliamentarians of the UK's main political parties, distinguished medical specialists and researchers, legal experts and representatives of the ex-service charities, as well as service men and women who fought in the conflict. The Ministry of Defence (MoD) is also represented.

SCALE OF THE CONFLICT: PROTECTIVE MEASURES TAKEN

The Gulf conflict was on a scale bigger than any that British troops had been involved in since the Korean War forty years before. It was also the first since 1918 against an enemy known to have chemical weapons readily available for deployment. Thus the MoD had to prepare for the liberation of Kuwait on the assumption that such weapons would be used. Indeed millions of people across the world had seen for themselves in TV reporting the stark effects of Saddam Hussein's use of chemical weapons against the civilian population of a neighbouring Muslim country only months before his invasion of Kuwait. On 9 November 2001, President George W Bush said of al-Qaeda:

> "They are seeking chemical, biological and nuclear weapons."

Eleven years before then, British troops deploying to the Gulf faced an enemy who not only possessed but had *already used* some of these weapons, first for the massacre of Kurds in Halabja in 1988 and then against the civilian population of Iran in 1990.

Aware of the weapons facing coalition troops in the Gulf, the MoD gave high priority to doing all they could to safeguard them against the effects of their use. It correctly assessed the threat facing British troops, but not all the health risks of the measures taken to protect them could be assessed. These measures comprised a multiple immunisation programme of up to 14 inoculations – a veritable *blitzkrieg* on the immune system – that included protection against anthrax, then known to be stockpiled in Iraq; the first-ever issue of nerve agent pre-treatment sets (NAPS) tablets as antidote against chemical weapons; the deployment of toxic sensors; and a heavy use of pesticides – including organophosphates – to prevent fly-borne diseases.

While accepting that these measures were thought to be in their best interests, British Gulf veterans who are now in broken health – many with severely debilitating but still undiagnosed illnesses – trace some of the worst of their problems to the MoD's efforts to protect them in facing the reality of living within range of Iraqi weapons believed to be capable of carrying chemical, biological and nuclear warheads.

To date over 5,000 of the British troops deployed, all of them medically A1 in 1990-91, have reported illnesses they attribute to service in the Gulf. They are mostly convinced, as are their medical consultants, that their illnesses are directly linked to gravely damaging effects of combining NAPS tablets – often indiscriminately taken – with an immunisation programme of unprecedented range and intensity. As of today all they (and the British Parliament) can be told officially is that studies on the "possible adverse health effects" of that combination are continuing at the Government's science and technology research centre at Porton Down. Final results were due to be available at the beginning, middle and end of 2003, but today we are still waiting.

The jury has now been out for 14 years on this issue: one of deep concern the British ex-service community and one, moreover, that begs important questions about the protection of troops engaged in later conflicts.

Like many others in our ex-service community, Field Marshal Lord Bramall – a former Chief of the Defence Staff and now my colleague in the House of Lords – is in no doubt about the importance of this issue in terms both of explaining many still undiagnosed

illnesses among Gulf War veterans and safeguarding the well-being of troops now on active service.

Speaking in a debate on Gulf War illnesses I initiated in the House of Lords on 15 January 2001, Lord Bramall said that

> "...one glaring question stands out above all others. Was the cocktail of inoculations... liable to cause, in some individuals, a harmful chemical or physiological reaction that would lead to loss of future immunity?" [Official Report, House of Lords, January 15 2001, col. 10014.]

In the same debate he went on to describe the combination of NAPS tablets and vaccines, all administered at the same time, as

> "...by far the most likely common factor in causing subsequent indisposition or worse among Gulf veterans".

OTHER POSSIBLE CAUSES OF ILLNESS

The Gulf conflict - a short but ferocious one, aptly named *Desert Storm* – resulted in fewer fatalities than expected, but is still taking its toll on the health of those who returned. The adverse effects of vaccines interaction is but one possible cause. Others likely to have contributed to the incidence of "Gulf War illnesses" to a greater or lesser extent include:

Atmospheric pollution from fired oil wells

Among the most striking recollections of the Gulf conflict is that of Squadron Leader Philip Congdon of the Royal Air Force, who led the British training team sent to Saudi Arabia after the Iraqi invasion of Kuwait to train expatriate Saudi Arabian military and civil defence personnel in chemical and biological warfare defence

> "We now know" he said "that after the oil fields were set on fire the atmosphere was saturated with pollutants of the most profoundly life-destroying type".

He describes the result as

> "...passive smoking of the most deadly type."

It was passive smoking inflicted not only on US and British troops but also on the civilian population of Kuwait many of whom – as I was informed by ministers, including the Minster of Health, on a visit there in 1999 – succumbed to its deadly effects. My visit to Kuwait left me in no doubt that much of value to the study of Gulf War illnesses could have been gained from increasing our knowledge of the effects of the conflict on public health there, more especially those of firing its oil fields.

The destruction of Iraqi rockets containing nerve agents

In March 1991, US troops demolished 122-millimetre rockets stored adjacent to Iraqi ammunition bunkers at Khamisiyah in southern Iraq. UNSCOM inspectors later identified the site as an Iraqi chemical weapons storage plant and found there ammunition containing the nerve agents sarin and cyclosarin. Originally it was said that only one British serviceman could have been affected; but in the ministerial response to a recent parliamentary question from Paul Tyler MP, the House of Commons has now been told that the figure could be as high as 9000.

What is more, the MoD is aware that the US Secretary for Veterans Affairs has released statistics showing dramatically higher death rates among US veterans exposed to the release of nerve agents by the Khamisiyah explosions and now treats such deaths as Gulf War-related. This is still not conceded in the UK but in reply to a Parliamentary Question which I tabled in the House of Lords on 21 March, the Minister stated that

> "...the statistics recently released by the US Veterans Benefits Administration are believed to be based on remodelling the theoretical plume of nerve agent which may have been released by the demolitions...
>
> The MoD is seeking to establish from the US authorities the full scientific basis for the remodelling. Once this has been obtained and analysed, I will write to The Lord Morris and place a copy of my letter in the Library of the House."

I still await the Minister's letter, but meanwhile I expect to be updated in Washington DC at the hearing on 1 June.

Post traumatic stress disorder (PTSD)

This is also seen as a cause of Gulf War illnesses by British veterans and doctors. The general expectation of a high death toll, awareness of the range of weaponry available to the Iraqi forces and recollection of the effects of its use against the Kurds and in the war between Iraq and Iran, made it probable from the outset that PTSD and other stress-related disorders would afflict at least some of our troops deployed to the Gulf.

Although in the event the number of fatal British casualties during the conflict was low, many of our troops witnessed events that were psychologically highly disturbing. The horrendous injuries sustained by Iraqi soldiers had a marked traumatic effect on some of those who came in close contact with them and particularly on service men and women responsible for treating their injuries. The relief of stress was not assisted when the civilian doctors of many of our troops, not least of Reservists, were inadequately briefed about their experiences in the conflict when they returned home.

The extent of suffering caused by PTSD was first brought home to me by the case of a young soldier – Gunner Tom Ford – from a locality close to my former electorate in

Manchester who served in the Gulf with the Royal Artillery. Such was the deterioration in his health after the conflict that he became subject to severe depression, panic attacks and acute breathing difficulties. On two desperate occasions he tried to end his own life and, like many other Gulf veterans with PTSD, is now classified as permanently disabled.

The use of organophosphate substances in locally purchased pesticides

This was a further possible cause of still undiagnosed illnesses. Had we known then what we know now about the health hazards associated with organophosphates, our troops would certainly not have used them to the extent that they did in 1990-91.

The tented accommodation occupied by British forces in the Gulf was regularly sprayed with pesticides to prevent fly-borne diseases. Initially most of the pesticides used were free of organophosphates, but when it became necessary to make purchases from local suppliers there was widespread and substantial use of them.

Veterans employed in spraying speak of being soaked to the skin in organophosphates and undoubtedly that level of exposure has to be seen as a highly likely cause of Gulf War illnesses.

The effects of Depleted Uranium

Gulf War illnesses are rarely discussed now without mention of the very heavy use of depleted uranium (DU) during the conflict. Notwithstanding all that has been said about the "minimal risk" posed by DU on the battlefield, there is widespread belief among veterans that the effect of spent DU munitions was the cause of their ill-health.

They believe that dust from by the impact of DU shells, when inhaled, was the cause of illnesses, in particular among rescue workers and field staff involved in the clean-up and decommissioning of vehicles and sites attacked by DU weapons.

Responding to their concern the MoD is now undertaking a DU screening programme to establish whether exposure to its effects is linked to ill-health among veterans. But we shall not know the outcome until some indeterminate future date.

After a delay of two years, I understand the MoD has now agreed to fund the study of cancer in Gulf War veterans. Yet disturbingly, even although there are very strong indications of incidences of lymphomas in Italian Peace Keepers in Bosnia and apparently a true cancer cluster has been discovered, there is no reported intention to undertake a similar study among our troops who served in the Balkans. And in the view of veterans' organisations – with their fears about the effects of the use of depleted uranium – this is a grave omission.

WHERE WE ARE NOW

The Royal British Legion describes veterans with still undiagnosed illnesses as having had "a long hard fight" to have them accepted as war-related. Although epidemiological studies initiated by the MoD confirmed that our troops who served in the Gulf were more likely to be unwell than their peers who did not, full official recognition of their needs has been – in the words of the Legion – "difficult to achieve". And while they and other associations have had many successes in promoting veterans' interests, there is

continuing concern in Britain's ex-service community that too many lessons of the first Gulf conflict have still to be learned.

In seeking a full Public Inquiry into the issues raised by Gulf War illnesses, the Legion recalled that:

> "... in the United States a Presidential Commission was established very soon after the conclusion of the war",

and that a Public Inquiry of comparable standing in Britain

> "...would be providing our veterans and service people with no more than parity of treatment".

With thousands of the men and women we deployed to the Gulf, then fit and well, now stricken by undiagnosed illnesses, no one could argue that the Legion acted precipitately in calling for a Public Inquiry. It did so in May 1997 – six years after the conflict ended – not only in fairness to those affected but to maximise public confidence that our troops "would be fully prepared and protected in future deployments".

The reason given for rejecting a Public Inquiry was the traditional one that nothing would be gained; but more recently, in words clearly chosen with clinical care, Parliament has been told that

> "...the possibility that a Public Inquiry might become an appropriate mechanism is not excluded".

This is seen as modest progress by an ex-service community that just cannot believe that if there had been a Public Inquiry work on, for example, the interactive effects of all the

tablets and inoculations given to our Gulf War troops in 1990-91 would not have been completed before 2004. Again they think it inconceivable that a Public Inquiry would not have increased our knowledge of the effects of the Gulf conflict on public health in Kuwait; and that it would not have reported on complaints about the MoDs Medical Assessment Programme and why veterans were not given copies of their medical records on discharge to assist their civilian doctors in early diagnosis of illnesses that could be attributable to their service.

Nor is the ex-service community in any doubt that a Public Inquiry would have looked very carefully at the relatively high prevalence of Motor Neurone Disease among Gulf War veterans. Among US veterans, the disease is twice as prevalent as in the population at large. The MoD is aware of this finding but has yet to accept it.

This is a double tragedy for the family of Gulf War veteran Nigel Thompson. He died of Motor Neurone Disease at the age of 44 having striven for 11 years to have his condition treated as Gulf War-related. Sadly, he died on the very day on which the American Veterans Affairs Department recognised the disease in US veterans as attributable to service in the Gulf.

In the House of Lords on 25 February, Lord Bach, a Defence Minister, said of Nigel that he was:

> "… a man of remarkable courage, humanity and great cheerfulness in the face of considerable adversity. Our thoughts are with his widow, family and friends."

He went on:

> "The Government are aware of the recent US announcement regarding the prevalence of Motor Neurone Disease in US veterans of the Gulf conflict... The researcher's findings have yet to be published in peer reviewed scientific journals; when they are we will consider carefully the implication for UK veterans."

Samantha, Nigel's widow, who very bravely gave evidence to the Congressional Inquiry Hearing held in the British Parliament, is rightly admired by the ex-service community as a whole for her constancy and abiding commitment to continuing the campaign for parity of treatment with the bereaved families of US Gulf War veterans.

The Legion acted in keeping with its highest traditions in calling for a Public Inquiry into all aspects of the handling of Gulf War illnesses; and there are those on both sides of both Houses of the British Parliament who believe that the question now is not whether but when an Inquiry will be held. They fully accept that mistakes made in 1990-91 were not deliberate. They know as well as anyone in executive government that decisions about protective measures often have to be made on a "needs must" basis; but they rightly insist – and believe - that any Public Inquiry worthy of the name would strongly insist that the nation as a whole must play its part in meeting the cost of such decisions.

None of us at Westminster, least of all British ministers – any more than anyone in Congress or executive government in the United States – wants to see the afflicted and bereaved of the Gulf conflict made to suffer the strain and hurtful and demeaning indignities that protracted delay in dealing with their concerns can impose. Yet sadly many veterans feel that such delay has occurred and their public representatives must go on pressing for the truth about their illnesses.

Of all the duties it falls to parliamentarians to discharge, none is of more compelling priority than to act to justly to citizens who are prepared to lay down their lives for their country, and the dependants of those who do so. There was no delay in the response of our troops to the call of duty in 1990-91. Nor should there be any further delay now in discharging in full our debt of honour to them.

- E N D -

Mr. SHAYS. And at this time I will just recognize the panel. We have Mr. Jim Bunker, chairman, Veteran Information Network, Gulf war veteran, Topeka, KS; Dr. Derek Hall, Gulf war veteran, United Kingdom; Dr. Janet Heinrich, Director, Health Care-Public Health Issues, U.S. General Accounting Office; Dr. Keith Rhodes, Chief General Accounting Office Technologist, U.S. General Accounting Office; Mr. Jim Binns, chairman, Research Advisory Committee on Gulf War Veteran Illnesses; Mr. Steve Robinson, executive director, National Gulf War Resource Center, Inc.

I would ask the panelists to stand, and at this time I will swear them in. Raising your right hands, please.

[Witnesses sworn.]

Mr. SHAYS. Note for the record our witnesses have responded in the affirmative, and I thank them for that.

I think we have been somewhat generous in comment time. We do a 5-minute and then we trip over another 5 minutes. I am going to really ask you to stick a little closer to the 5 minutes because we have a lot of panelists, and we also have two panels.

And also, Mr. Turner, your mic is not working, so we need you to shift down one or come on the other side of Bernie here, I think.

So at that time, Mr. Bunker, you have the floor. And we have a light system which goes from green to yellow. It's kind of on the other side of Dr. Hall. Green to yellow to red. And if you run a speck over 5 minutes, we won't lose sleep, but not much over. Thank you all for being here.

STATEMENTS OF JAMES A. BUNKER, CHAIRMAN, VETERAN INFORMATION NETWORK, GULF WAR VETERAN, TOPEKA, KS; DEREK HALL, GULF WAR VETERAN, UNITED KINGDOM; JANET HEINRICH, DIRECTOR, HEALTH CARE-PUBLIC HEALTH ISSUES, U.S. GENERAL ACCOUNTING OFFICE; KEITH RHODES, CHIEF GENERAL ACCOUNTING OFFICE TECHNOLOGIST, U.S. GENERAL ACCOUNTING OFFICE; JIM BINNS, CHAIRMAN, RESEARCH ADVISORY COMMITTEE ON GULF WAR VETERAN ILLNESSES; AND STEVE ROBINSON, EXECUTIVE DIRECTOR, NATIONAL GULF WAR RESOURCE CENTER, INC.

Mr. BUNKER. Mr. Chairman, Lord Morris, members of the committee, on behalf of the Veterans Information Network and myself, I would like to thank you for giving me time to address the issues of Gulf war illness and the research problems.

I have formed the Veterans Information Network with a group of veterans to help get legislation passed within the State of Kansas. This legislation led to the creation of the Veterans Health Initiative and also the funding of a research study within Gulf war veterans of the State of Kansas. The unprecedented study was done by Dr. Lea Steele and is best known as the Kansas Study.

The Kansas Study is the first to identify a clear link between Gulf war veterans' health problems and the time and place in which they served. Results suggest that the unexplained health problems may be due to multiple factors. The study is also significant in that it showed that for one-tenth of 1 percent of the money that the VA had spent on Gulf war research to that date, that the State of Kansas had came up with more answers and was able to

show more on the illnesses affecting the Gulf war veterans than the VA or DOD ever did.

This also shows that a State program that is set up can better utilize the research funding versus DOD and the VA. This study also made Kansas the clear leader when it came to Gulf war illness research.

The funding in this study also shows that there are several issues that need to be addressed with regards to the care and the health of the troops. The following are my recommendations based on the work done in Kansas.

One, separate research away from the VA and DOD. It seems as though it takes an independent entity before meaningful results and studies will be conducted, as the Kansas Study and other independent study research has shown significantly the problems within the Gulf war veterans versus those from the DOD or the VA. These independent studies have shown that we need to take the research away from the VA and DOD and let State or private researchers do the work.

The VA's Research Advisory Committee [RAC], Board could potentially work as a bridge that could be responsible for the funding of independent research. This needs to be done, for far too often they ask the VA to fund studies to help the veterans, only that the studies are never funded by the VA itself. The RAC is in a unique position to hear about new and innovative studies from the researchers, and have the potential abilities to guide exploration into previously unaddressed areas of research into the illness of Gulf war veterans while having a historical perspective of what research has already begun. I suggest this in the hope that we would not continue funding research that has already been done.

Essentially, the RAC would still have to work as it is now, but with the added power of being able to direct the spending of the VA, not just recommending research.

Further, they would be the overseers of the money that has been spent in the studies. They would have access to the interim data of the studies and the power to withdraw the funding or terminate the study if the study is not following the protocol which it was submitted—protocol as written in the proposal for the funding that the researcher wanted.

Get the illnesses that are being diagnosed at a higher rate in Gulf war veterans presumptive service-connected for these veterans. This is needed now, because many of the veterans are having claims denied for many of these illnesses even though research has shown a higher rate of Persian Gulf veterans having these types of illnesses versus non-Persian Gulf war veterans. We need your help to change Title 38 so that we can take care of those who fought for our country.

With most everyone looking at what is causing Gulf war illness, it seems they are looking at the high rate of illnesses that veterans are diagnosed with and how getting them treatment for them will make their lives a lot better.

Table 3 of the Kansas Study as well as other studies showed some of the illnesses and the rates that they occur within Gulf war veterans over non-Gulf war veterans.

Three, there needs to be a closer look at birth defects within children of Gulf war veterans, more so looking at just female veterans versus nonveterans of females. OK. The studies conducted both inside and outside the VA and DOD have shown a higher number of birth defects in children of Gulf war veterans. Further research should be conducted into the types and severities of these defects, with attention given to the incidence of neurological, behavioral, learning—excuse me, I'm sorry—difficulties as well as just the physical abnormalities. I am sure that the Executive Director of the Association of Birth Defects would be able to cover this area more than I would.

Track down disease groupings within the Gulf war veterans. One example of this would be multiple sclerosis, since over 400 Gulf war veterans have gone to the VA to get help with MS. Many of the recognized illnesses found in the civilian population such as MS have higher incidence within a veterans population. DOD and VA should be working with the civilian entities of these types of agencies who receive civilian diagnosis for conditions due to the fact that many veterans do not use the VA or DOD health care system, and at that time tracking these veterans would be—at the current time, the only health tracking of these veterans would be through the VA and DOD. So the number of veterans affected with MS is grossly underestimated. One way to ensure all affected veterans are counted would be to correlate Social Security numbers of the veterans with applications for Social Security disability applications for different types of diseases.

Mr. SHAYS. Can you just wrap up here?

Mr. BUNKER. OK. The last two information here is base further research on proposed model of phase 2 of the Kansas Study, which has gone into great details within my written statement to you. And the third one is to have the DOD and the VA to give out better information on the exposures to nerve gas and sarin.

And then so in conclusion, I would like to say is that the only way we are going to get good research, and that is to take it away from the DOD and the VA, and let people like the State of Kansas do the research.

Mr. SHAYS. Thank you very much. As you know, your full statement will be part of the record, and it was a well written statement. Thank you.

[The prepared statement of Mr. Bunker follows:]

Testimony of James A. Bunker

To the SUBCOMMITTEE ON NATIONAL SECURITY, EMERGING THREATS, AND INTERNATIONAL RELATIONS, Christopher Shays, Connecticut Chairman

June 1, 2004

Dear Committee Chair and members of the committee, on behalf of the Veterans Information Network (a grass roots organization of Kansas and Missouri Veterans) and myself, I would like to thank you for giving me time to address you about the issues of Gulf War illness and research problems.

First, let met take a moment to briefly provide background about my involvement and interest in Persian Gulf Illness.

I deployed to the Gulf War with the Fourth Battalion – Fifth Field Artillery Regiment as a First Lieutenant, stationed at Fort Riley Kansas. While in the war zone, the Big Red One blew up a large Iraqi ammunition storage area. At the time of this demolition, I became ill. I was treated for all of the classic symptoms of nerve agent poisoning, including convulsions. Then, I was given the antidote for the nerve agent and medically evacuated. Over time I completely lost the use of my arms and hands. I have recovered some use in them, although some numbness, weakness, and tingling continues. The problems I have with my legs have subsequently been identified as a problem with my sciatic nerve and often require the use of crutches. Although I have had an abnormal EEG, it is not considered to be seizure activity. Additionally, I deal with headaches and cognitive dysfunction during the day. All of these greatly limit my activities and contribute to my desire to ensure that this issue is addressed and a cure is found.

Returning home, I saw other troops getting sick and being forced out of the service, much the same way I was. No one seemed to care what was making us sick; they only wanted us out to meet a draw down level. On 19 June 1992, I was discharged from the army. For a career soldier, a medical discharge is not an easy way to lose one's life long dream, and with no hope of a job due to my illness, life was going to get even harder. At that time, I still could not use my arms and I was barely able to walk without the use of crutches. The army told me the VA would help me; the VA said it was all in my head

Within a short time, I received my service-connected disability rating from the VA. I began contacting and working with other veterans to find out what happened to us. The first person I talked to was Vic Sylvester, out of Texas who introduced me to online groups whose mission was to find other veterans, uncover common illnesses, and relay information concerning doctors we could go to and any treatments that might help.

As a grass root group, we all worked to pass the first Gulf War Health Bill in November of 1994. At the time I worked with the other groups on the first self-help guide for gulf war veterans. When they were completed, I bought over 300 of the self-help guides to give out in the state of Kansas. This resulted in many fellow gulf war veterans calling me

to get understanding about their illnesses and advice with their VA claim for benefits. My involvement gradually led me to my becoming the point of contact for media outlets

In February of 2001, I put together the 'Project Honor' a daylong tribute held at the Kansas Capital honoring all those that have served. We ended the day with the reading of the names of those who served and died in the Gulf War theatre. Following this we played taps and gave a 21-gun salute.

I formed a group called Veterans Information Network to help get several things passed in Kansas to help our fellow veterans. The most important piece of legislation we worked on was the creation of the Kansas Persian Gulf War Health Initiative which created the advisory board and study of Kansas veterans which then produced a significant piece of research into Gulf War Illness. The study was done by Dr. Lea Steele and is best known as 'The Kansas Study.'

The Kansas study was the first to identify clear links between Gulf veterans' health problems and the time and places in which they served. Results suggest that the unexplained health problems may be due to multiple factors. The study, conducted by telephone interview, compared the health of Kansas Gulf War Theatre veterans to non theatre veterans who served during the same period. A scientific article describing the study results was published in the November 15, 2000, issue of The American Journal of Epidemiology.

The study found B types of symptoms connected with Gulf War service: neurological symptoms, pain symptoms, gastrointestinal problems, respiratory problems, problems associated with fatigue and sleep difficulties, and skin problems.

About a third of Gulf veterans affected overall, 34% of Kansas veterans who served in Desert Shield or Desert Storm had symptoms of Gulf War illness. The severity of these problems varied widely. Some veterans had relatively mild symptoms; others were so ill they could no longer work.

The study also found that veterans who did not serve in the Persian Gulf, but reported getting shots from the military during the war, may have some of the same health problems as Gulf War veterans. Gulf War illness symptoms were found in 12% of non-Gulf veterans who said they got vaccines during the war, compared to less than 4% of veterans who did not get vaccines.

The study is significant because it showed that a state could use 1/10 of 1% of the money that the VA spent on GWI and come up with answers that the VA or DOD never did regarding the true status of the health of Veterans within the state. This study made Kansas the leader when it came to Gulf War Illness research.

The findings in this study also showed that there are several issues that still need to be addressed with regard to the care and health of the troops. While the 1994 legislation covering undiagnosed illnesses facing Gulf War Veterans was significant and ground breaking at the time, the legislation is incomplete.

The reason I say that it is incomplete is because it does not address the illnesses that are diagnosed in veterans of the Gulf War at a statistically higher rate than in other veterans or controls.

The following are my recommendations based on the work done in Kansas:

1. Get the illnesses that are being diagnosed at a higher rate in gulf war veterans presumptive service connected for them.

This is needed now because many of the veterans are having clams denied for many of these illnesses, even though research has shown a higher rate in PGW veterans. We need your help to change PL103-446.

The Secretary of Veterans Affair, two years ago, added ALS as presumption of service-connection for gulf war veterans. He did this with the rate of ALS being at 2 times the rate of non-gulf war veterans. As you will see below, there are some illnesses here that are being seen in Gulf War Veterans either at the same rate or an even higher rate than the ALS.

The Secretary of Veterans Affair can add them himself and that is one route we could take, but in this time of budget concerns, I feel that legislation is going to be the only effective method to address this in a meaningful way.

With most everyone looking at what is causing Gulf War Illness, it seems that they are over looking the high rates of illness that veterans are diagnosed with.

Table 3 of the 'Kansas Study' that was printed in American Journal of Epidemiology (vol.152.no10, Nov. 2000) shows some of the illnesses and the rates they occur in gulf war veterans over non-gulf war vets.

The illnesses that we need to get presumption of service-connection for are:

Condition(s)	PGW* (n=1	,545)	Non-PGW* (n	= 435)	OR*,t
	No.	%t	No.	%t	
Skin condition(s) (other than skin cancer)	299	21	26	6	3.83
Stomach or intestinal condition(s)	219	15	32	8	2.13
Depression	179	12	30	7	1.85
Arthritis	161	11	24	6	1.99
Migraine headaches	160	11	21	5	2.25
High cholesterol	155	11	36	9	1.24
Chronic fatigue syndrome	142	9	5	1	8.70
Bronchitis	138	10	19	5	2.61

High blood pressure	134	9	33	8	1.24
Allergies	119	10	23	7	1.41
Posttraumatic stress disorder	98	6	6	1	4.74
Asthma	63	4	9	2	2.08
Alcohol or drug dependence	43	3	8	2	1.47
Heart disease	37	2	7	2	1.56
Lung disease	37	2	2	<0.5	4.77
Thyroid condition	30	2	4	1	2.32
Fibromyalgia	24	2	2	<0.5	3.69
Skin cancer	23	2	7	2	1.17
Diabetes	21	1	5	1	1.22
Cancer (other than skin cancer)	18	1	4	1	1.21
Seizures	15	1	1	<0.5	4.17

As one can see, skin conditions is very high at 3.83 time the rate of non-deployed veterans, and the reliability of this study is high too; but there needs to be more work done to show the types of conditions that one is seeing nation wide, not just in Kansas.

Some of the illness, like bronchitis, asthma, and lung disease, are closely related and can lead to less productive lives for the veterans due to their service. VA compensations is given to sick veterans for their loss of earning power. With so many illnesses continuing to show up in the veterans we need to work at getting the VA to compensate them.

Look closely at the full study provided to you by Dr. Steele. In the full study you will see we do not only need to get these illnesses on a list for presumptive service connection; but we also need to do more research into this area to positively identify nation wide trends in the illnesses of Gulf War Veterans.

2. Track known disease groupings within the veterans' populations in correlation with civilian entities to include death rates.

One example of this would be Multiple Sclerosis. Because many of the recognized illnesses found in civilian populations have a higher incidence within the veterans' populations, DoD and the VA should be working with the civilian entities that work with persons who receive civilian diagnosis of these conditions due to the fact that many veterans do not use the VA system for their health care.

At the current time, the only health tracking being done is related to those who do use the VA for their health care, leaving many veterans uncounted.

There are veterans who are aware of statistically higher incidents of degenerative neurological issues within the Gulf War Veterans community. These veterans feel the true numbers of veterans with these problems is underrepresented in the current illness counts due specifically to the fact that because many veterans are not service connected

and do not use the VA for care, their numbers are not included in the illness reporting system as it stands now. One such veteran is Julie Mock who can be reached at jmock@ngwrc.org

One way to ensure that all affected veterans are counted would be to correlate social security numbers of veterans with applications for social security disability applications, as well as social security records on deaths.

Another way would be to make a concerted effort to contact organizations such as National Multiple Sclerosis Society, or American Heart Association to make sure that veterans who request help from these agencies or who apply for national registries are counted separately from their civilian counterparts in an effort to truly determine who is ill, and with what.

3. There needs to be a closer look at the birth defects in children of veterans more so at the female veterans.

Studies conducted both inside and outside the VA and DOD have shown a higher number of birth defects in children born to the veterans of the gulf war. Further research should be conducted into the types and severity of these defects, with attention given to the incidence of neurological, behavioral, and learning deficits as well as just the physical abnormalities. I am sure that Betty Mekdeci, executive director of the Association for Birth Defects Children will cover this area more thoroughly than I am. She came to the last National Gulf War Conference to talk about the birth defects.

4. Work to get all the data on the other NBC sites we blew up out and a new death rate table done using these sites too.

Being one that became sick right after we blew up an ammo stock- pile, I feel it is very important that the DoD openly show all the sites that we blew up that contributed in any way to the chemical gas and fallout that troops in the theater of operations were exposed to. I have personally seen photos by Paul Lyons, president of Desert Storm Justice Foundation, Inc. that showed the 1st AD in an area filled with chemical munitions, yet the information about the demolition of those munitions remains classified, and is not part of the modeling done regarding potential exposure levels in theater.

The problem with this withholding or denial of exposure is that the troops cannot receive appropriate medical care for the long-term symptomology of this kind of exposure if they do not know they were exposed. Further, without the other chemical munitions demolitions being addressed, we have no clear picture or accurate data concerning the true rates of illnesses and deaths due to this kind of exposure, and we continue to perpetrate the same kind of injustice we have seen in the past.

I do believe that it is the job of the VA and DOD to work at finding out what is wrong and what will make the veterans better in an honest and systematic way; but repeatedly we have seen that it not the case. We have seen that with the veterans of WWII and the

A-bomb tests. We have seen it with the Viet Nam vets and Agent Orange. Only now are we learning about how our troops have been used as guinea pigs with things like Project SHAD.

In all of these, our federal government should have acted to help the veterans, but, for whatever reason, it did not. It takes projects like what we have done in the great State of Kansas to bring changes that will help our veterans.

5.Separate research funding from the entity responsible for providing care and compensation funds to the Veterans.

It seems as though it takes having an independent entity to allot research funding based on the merits and potential findings of that research to handle the money before meaningful results and studies will be conducted such as the Kansas study and other independent research that has shown significantly different results than that of the VA and DoD studies.

These independent studies have shown that we need to take the research funding away from the VA and let state or private researchers do the work. One entity that could potentially work as the entity responsible for funding independent research is the RAC.

Because the RAC is in a unique position to hear about new and innovative studies from the researchers both within the DoD and VA system as well as from the civilian sector. The RAC has the potential ability to guide exploration into previously unaddressed areas of research into the illnesses of the Gulf War Veterans, while having a historical perspective of what research has already been done. I suggest this in the hope that we would not continue to fund redundant studies, or studies simply designed to refute what has already been shown to be accurate.

Essentially, the RAC would still work as it is now, but with the added power of being able to direct the spending the VA's gulf war research money. Further, they would be overseeing the studies and would have access to the interim data, and have the power to withdraw funding or terminate the studies if the study is not following the protocol written in the proposal.

By taking control of the research and funding for research away from the VA, one will reduce conflict of interest that is inherent in the current situation. This conflict is clearly due to the need for the VA to both save money and limit costs to the government due to veterans claims for compensation and health care; while simultaneously being responsible for finding out if health problems exist due to service to this nation, and if the VA should compensate for them.

While in the service, we are trained that the mission comes first. We were also trained to take care of our men to make sure the mission was done. That is why even now the DoD will be giving troops pretreatments, to help them if they are exposed to NBC agents on the battlefield. There are some that will point to a 1999 study by the RAND Corporation

and a 2000 report from a panel of experts convened by the Institute of Medicine, both of which concluded PB, could not be ruled out as causing Gulf War Syndrome. This set of symptoms includes fatigue, cognitive problems, muscle pain and weakness, and sleep disturbances experienced by some Gulf War vets who served in Iraq in 1990-1991.

Now that we are no longer in the service, the mission of the government is to make sure that veterans have the best treatment for anything that happens to them while serving our country. This treatment should not be denied or held up simply because of cost, or research that has not been done due to conflicts of interest.

6. Base future research on a model similar to the following in the hope of not only finding out what caused the veterans to be ill, but with concern for making the lives of the veterans better.

This is the model for phase two of the Kansas study. The three major research components for this type of study is:
1. Evaluating Practical and Objective Clinical Markers for Illness Detection and Classification
2. Determining Veterans Progress Over Time
3. Identifying Treatments & Activities Associated with Improved Health

These components are summarized below:

1. Evaluating Practical and Objective Clinical Markers for Illness Detection and Classification.

Background: There are currently no well-accepted, objective or practical tests available to diagnose and classify Gulf War Illness. Since this illness appears to actually be a family of syndromes, evaluating the value of a particular test depends upon properly classifying individuals when evaluating specific tests. Based upon the current Kansas database, it is possible to identify individuals with different constellations of symptoms, who would be expected to react differently to different tests.

Methodology: This study will assess whether biological, biochemical, and physiologic measures previously suggested to be associated with Gulf War illnesses are useful in distinguishing between groupings ill veterans and ill from healthy veterans. It will involve small multiple trials which utilize sub-sets of the existing database, initially drawing upon those Veterans most clearly falling into specific categories. It will emphasize only those measures that either use existing technology or technology that could be made readily available in a non-research clinical setting.

Potential Benefits: Veterans who are suffering will stand an improved chance of being correctly diagnosed, receive assistance and potentially receive appropriate treatment when it is available.

Identified markers will allow both clinicians and researcher to better understand the nature of Gulf War illnesses, and guide them in developing and providing effective treatments.
Objective biological markers lift the burden from those suffering Veterans who are still fighting the battle with those skeptics who do not recognize their suffering.

2. Determining Veterans Progress over Time

Background: Building on the foundation laid in earlier and current research, the Kansas Gulf War Veterans Project is in a unique position to find answers to outstanding questions about Gulf War-related conditions. This is possible both because of the large number of Kansas Gulf veterans for whom baseline data already exist and because of the reputation of the Kansas program for conducting credible research in an even-handed manner.

Data collected since 1998 by the Kansas Commission on Veterans Affairs on over 2,000 Kansas Veterans provided a unique snapshot of their health. It does not show progress over time. Since this data has already revealed that there are sub-sets of illness within this group, following these Veterans over time could provide valuable insight into the course of illness for these sub-groups. It may help identify whether specific findings are associated with Veterans health improving, declining or remaining stable. Additional data, not determined in the 1998 study could also be obtained.

Methodology: This study will utilize the entire database from the 1998 study. Data gathering will be similar to that utilized for the initial research, but further research questions will be added. Morality data on study participants will also be collected through appropriate means. It will continue to utilize sophisticated epidemiological analysis to identify associations and trends. If warranted by results from Research Component # 1(regarding markers and tests), it will attempt to correlate objective findings with prognosis. By identifying who gets better and who gets worse, it will serve as a basis for Research Component #3 (Identifying treatment that works).

Potential Benefits: Determining for Veterans, their families and the Government what to expect over time
Discovering whether certain groups of Veterans are getting better or worse as a guide to treatment and further research. Providing a background rate for potential spontaneous recovery to help identify when treatment has actually aided recovery
Maintaining an invaluable research resource, the Kansas database, that will be a foundation for future research benefiting Veterans

3. Identifying Treatments & Activities Associated with Improved Health

Background: Although both the Institute of Medicine and the Department of Veterans Affairs have attempted to issue treatment guidelines for Gulf War Syndrome, these have proved of minimum value clinically. Rather then being based upon treatments that have

been demonstrated to work in this group of Veterans, these instead are a compendium of treatments for diseases that have some similarity of appearance but have not been subjected to testing in this group.
Anecdotally, there are sporadic reports of treatment attempts that are claimed to be effective in small groups of Veterans, but these have proven elusive to replicate in other groups of Veterans. Historically, it is worth noting that in other "mystery diseases" (such as Legionnaire's' Disease) the important breakthrough occurred not in an expensive laboratory, but in the hands of a single clinician who tried something that turned out to work.

Currently, there is no established methodology or registry that could provide a clue as to whether a specific treatment, rendered outside the bounds of a clinical trial, might be of value. Furthermore, without a scheme for classifying the subset that a Veteran falls into, treatments that might work for one particular group would appear ineffective if tried on the entire population of sick Veterans.

Methodology: The first phase of this research would be a component of Research Component #2 (Determining Progress over Time), correlating any changes in Veterans health status with both subgroup and any form of treatment. Intensive analysis and follow-up information gathering will be required regarding any treatment purported to work. This will not constitute a clinical trial in any form, but may provide information regarding potential therapies that could later undergo clinical trials.

Potential Benefits: May identify potentially worthwhile treatment options that would otherwise have not been noticed.
Provide a basis for future treatment trials.
Make information about potential treatment efficacy available to Veterans, their physicians and researchers.

Background on the Kansas Persian Gulf War Health Advisory Board

The Kansas Persian Gulf War Health Advisory Board is an unpaid advisory group, appointed by the State of Kansas to provide recommendations regarding research, services and outreach to the Kansas Commission on Veterans Affairs. The nature of the research outlined here is complex, combining medical, epidemiological and laboratory research. It exceeds the capabilities of a single individual, department or institution to accomplish alone. Fortunately, within the State of Kansas there exist individuals who have cooperated and have made themselves available accomplish these goals. It is foreseen that, with the guidance of Kansas Persian Gulf War Health Advisory Board, this project can be accomplished as a joint venture involving multiple individuals and institutions.

This research project shall rely upon the full cooperation and coordination with the Kansas Commission on Veterans Affairs. However, no portion of the research funding shall be used to support any activities of that organization, except for the direct costs of participation in research.

The time frame for this overall project is estimated to be 3 years from the onset of funding availability and appropriate institutional agreements. Work products of some individual components may become available earlier. Because of the potential clinical value of the findings and the benefit to Veterans, findings should be widely disseminated through peer-review journals and other available means.

The following individuals have indicated their willingness to provide their support and cooperation in this project:

Lea Steele, PhD is an epidemiologist formerly employed by the Kansas Commission on Veterans Affairs. She is now a Senior Health Researcher with Kansas Health Institute in Topeka. Dr. Steele also serves as a member of the Veterans Administration Research Advisory Committee.

Beginning in 1997 Dr. Steele directed and conducted the research on Kansas Veterans, funded by the State without outside support, that conclusively demonstrated that;
Many Kansas Persian Gulf Veterans are sick
Their symptoms could be logically grouped into several syndromes
These groupings could be associated with geographical location and time of service as well as exposure to suspected risk factors (such as military immunization programs).

This research was published November 15, 2000 in the American Journal of Epidemiology {152(10):992-1002}. This frequently cited research has spurred other research across the country. Dr. Steele is now a co-investigator in ongoing research at the Midwest Research Institute of Kansas City, Missouri looking at certain patterns and biologic markers in these Veterans. Other states are also interested in studying conducting similar studies of their own Veteran populations.

Frederick W. Oehme DVM, PhD is a research scientist at Kansas State University in Manhattan, where he chairs the Department of Toxicology and the Comparative Toxicology Laboratories at the College of Veterinary Medicine. Dr. Oehme is a member of the Kansas Persian Gulf War Health Advisory Board.

Beginning in 1994 Dr. Oehme directed and conducted research into the toxic synergism between Pyridostigmine Bromide (the nerve gas pill) and common insect repellents or insecticides used by our troops. This research, in an animal model, clearly demonstrated those toxic effects. His findings were published in 1996 in both the Fundamentals of Applied Toxicology {1996 Dec;34(2):201-22} and the Journal of Toxicology and Environmental Health. {1996 May;48(1):35-56}.

Irving A. Cohen, MD, MPH is a physician formerly with the Veterans Administration Medical Center in Topeka. He is currently retired and is assisting this effort as a volunteer. Dr. Cohen is a member of the Kansas Persian Gulf War Health Advisory Board.

Beginning in 1993, Dr. Cohen noticed that Persian Gulf Veterans were suffering physical and psychiatric symptoms unlike those suffered by Veterans of earlier conflicts. He discovered that they had been exposed to pyridostigmine bromide as well as simultaneously exposed to myriad other factors, including pesticides, immunizations, and suspected low-level nerve gas, all of which could combine to disrupt the regulation of acetylcholine, an important neurotransmitter within the human nervous system. He noted that syndromes of acetylcholine disruption were previously documented in separate exposures to low-level nerve gas as well as chronic insecticides.

Genetic differences in the regulation of acetylcholine among individuals also had been documented in the medical literature. His warning and call for further evaluation in 1994 at the National Institute of Health Technology Assessment Workshop on Persian Gulf, is documented in the May 25,1994 Journal of the American Medical Association {271(20):1559-1561}.

Charles T. Hinshaw, Jr., MD is a physician formerly in practice as a pathologist and specialist in Environmental Medicine in Wichita. He is currently retired and is assisting this effort as a volunteer.

Because of his experience treating patients with Multiple Chemical Sensitivity, he was sought out in 1994 by Veterans who noticed similarities between that syndrome and the symptoms some of them suffered from. In 1995, he proposed research into environmental medicine factors effecting exposed Veterans.

Conclusion:

While in the service, I was trained that the mission came first. I was also trained to take care of our men to make sure the mission was done.

Now that I and many like me are no longer in the service, and knowing that we were injured by our service, my personal mission is to ensure as many veterans as possible receive just and proper care and compensation for their injuries and illnesses. The mission of our government should the veteran and making sure they have the best treatment for anything that happened to them while answering the call of our country. The mission we have can be best accomplished by:

1. Getting the illnesses that are being diagnosed at a higher rate in gulf war veterans presumptive service connected for them.

2 Track known disease groupings within the veterans' populations in correlation with civilian entities to include death rates.

3.Taking a closer look at the birth defects in children of veterans more so at the female veterans.

4. Work to get all the data on the other NBC sites we blew up out and a new death rate table done using these sites too.

5. Separate research funding from the entity responsible for providing care and compensation funds to the Veterans.

6. Base future research on a model similar to phase two of the Kansas Study in the hope of not only finding out what caused the veterans to be ill, but with concern for making the lives of the veterans better.

Thank you,

James A. Bunker

Mr. SHAYS. Dr. Hall.

Dr. HALL. Thank you. I shall keep this as brief as possible; you have my full statement. I shall merely draw attention to some salient points.

I was fully vaccinated and immunized, but not deployed. And the current feeling in U.K. veterans is that we have a hidden reservoir of nondeployed sick people who have been vaccinated unwisely, but have developed illness, and, because they haven't been deployed, have failed to associate the onset of that illness with the vaccinations that they were given.

My personal illnesses have been purely physical, have been a cascade of one set of organ failures after another, and I am currently awaiting now chemotherapy to try and arrest the decline in my health.

As of March 7th this year, I went to the annual general meeting of our NGFA in Blackpool. There were 92 people with identical physical histories to me, the same physical symptoms, in the same chronological order, and in the same timeframe, none of whom have been deployed. That surely speaks out very loudly that there was something wrong with the vaccination schedule. My own feeling is that it was probably the combination of pertussis with anthrax that was the root of the problem, the pertussis being the major problem. There was no clinical need for this to be given whatsoever; it was given merely to speed up the immune acceleration because of the lack of perceived notice to get troops ready for deployment. The pertussis that was given, to my knowledge, was strictly forbidden to be given to adults, yet it was administered nonetheless.

In terms of questions asked, how is treatment coming along? In Britain the answer is very badly. There is no specific magic bullet has been found. Nothing is obvious. And we are still looking into that.

In response to the question, what have we learned? In Britain I fear the answer is nothing. It would seem that the lessons we should have learned from GW–1 have not been learned, and the same mistakes have been made in GW–2. There are now individuals reporting the same illnesses now as were being reported in 1991.

What can we do for the future? I come with a message, which is sincere and from heart, and it is quite simple: To say that we don't appear to be able to fight the battle on our own. And our earnest request is that we would wish our American colleagues to continue to give us their admirable support in trying to find an answer to this terrible affliction. Thank you.

Mr. SHAYS. Thank you very much, Dr. Hall.

[The prepared statement of Dr. Hall follows:]

Dr. DEREK HALL
MB ChB FRCSEd MRCGP DRCOG

THE BUNGALOW
REAR OF GRANBY TERRACE
WINGATE TS28 5HZ

~~Kristine McElroy / Bob Briggs~~

Note: This is somewhat lengthy for sake of accuracy but can easily be abridged if required to be delivered orally in a 5-minute statement.

PERSONAL STATEMENT

I had a happy & healthy childhood, enduring the (then) almost universal infectious including "Whooping Cough", which has turned out to be an unexpected major influence in my adult life.
In June 1972 I enlisted as an Officer Cadet in the Royal Air Force Medical Branch. I had never been of an athletic disposition but I was passed fit as A2G1Z1 – the 'normal standard of fitness' beaten only by A1G1Z1 which was, and still is, reserved for extremely fit candidates for Service who are suitable for deployment as 'Special Services', of which enough said. I was 5'11" tall, weight 180lbs, chest 38", waist 36", collar size 15.5", cap size 7.25, hand size 7.5 & shoe size 8 – all in UK measurements & which I was to maintain without effort for 23 years…,
In January 1991 I was ordered to attend a medical parade at RAF Brize Norton for the singular reason that this airbase had been designated as an 'official' Vaccinations & Immunisations centre to "accelerate" the immunological status of personnel expected to be deployed to the impending GWI theatre of conflict.
In the space of one morning I was ordered to submit to multiple vaccinations & immunisations, a mixture of active, passive, live & attenuated agents, including some classified as Secret. I knew for sound scientific reasons that this was totally wrong and I demanded to make representation to the Senior Medical Officer available on base. After communicating my angst to his superiors, he informed me curtly that Headquarters considered advice was that 'it would be in my best interests to comply with the order, and would I kindly set an Officerly example to the Troops!' I left him in no doubt at all that I considered the combination of Pertussis (Whooping Cough) and Anthrax was particularly risky to adults in general and to me in particular – I already had lifelong natural immunity to it…, I was further angered that only the Anthrax shot was recorded in my personal medical documents.

Predictably, the Ministry of Defence claim that all my relevant documents from the time have become 'mislaid'.

In the event, I wasn't deployed to the Gulf but found myself in Gambia instead throughout the duration of the conflict.

6 weeks after the multiple shots, I awoke to find that I had lost central vision in both of my eyes. I had been stricken with bilateral Posterior Uveitis, an extremely rare condition which required treatment with high doses of steroids to suppress, over a period of several weeks. As the condition settled, my specialist had the unenviable task of telling me that I appeared to have developed a Malignant Melanoma in my only 'good-seeing' eye, treatment for which involved permanent loss of sight – I opted for cautious long-term monitoring. Thankfully, the tumour has not yet proven to be malignant.

In late '91 & throughout '92 (as I discovered only 1 year ago!) comments were being made in my Annual Confidential Assessments that I was exhibiting signs of Paranoia. Strangely, this marked the beginning of my colleagues' studious indifference to the rapid decline in my health which didn't prevent me from being posted overseas into an area where adequate medical treatment facilities were just not available to me.

In early '93 I suffered a severe atypical pneumonia and in the convalescent phase developed an aggressive migratory polyarthritis which just would not respond to conventional treatment. Thereafter followed, in rapid sequence, altered bowel habit, painless frank haematuria (passing of blood in the water), multiple episodes of renal/ureteric colic, unresponsive (to treatment) iron-deficient anaemia (later diagnosed as the anaemia of chronic disease), combined hepato-renal failure (due to an impacted stone in my ureter) and **still the Ministry of Defence refused to allow me access to adequate treatment &/or to repatriate me.** It was as if I didn't exist.

In a matter of months, I was reduced from a 'scratch' 10-pin bowler to a shambling wreck…,

By 1996 I had left uniformed service, and by force majeur had to relinquish my profession of surgery. At this stage I could no longer climb or descend stairs, nor dress/undress myself without assistance.

I re-located to become a Family Doctor again but my health continued to decline. Clinically, I became Acromegalic & Myxoedematous. The myxoedema responded well to treatment (as did my joints temporarily) but the growth in my skeleton is permanent. I am now >250lbs with an 18' neck. My cap & glove size has increased, my shoe size is now 10.5, my chest 44' & my waist 42'. The last bone in the human body to complete ossification is the Clavicle and it should attain maximum size at the latest by age 25yrs. I was aged 43 when my skeletal growth started again and my Government continue to deny that this is so.

In March 2000 I was obliged to cease work permanently – I had severe secondary osteoarthritis. In July 2002 I suffered a combined sub-arachnoid & sub-dural haemhorrage with associated multiple injuries, in circumstances which are yet to be adequately explained.

Throughout all of this, I have felt that even my own colleagues have been in denial of what happened to me after the pre-GW1 'shot' parade.

It took me until February 2004 to convince the authorities that I have disabilities attributable to service. 13 years later and they still seek to deny responsibility!

As for me, all I have lost is my career & my health – no amount of money can ever compensate me for that. Currently, after much insistence on my part, I have been assessed recently by a specialist & I am now awaiting the start of a course of chemotherapy in the vain hope that this will arrest the course of an illness which my elected representatives deny exists even to this day…,

Dr Derek Hall

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~~Kristine McElroy/ Bob Briggs~~

RESEARCH STATEMENT

I believe that the current state of independent research into Gulf War Syndrome in the UK is both heavily suppressed by government agencies and also sparks little interest in most free-thinking clinicians.

I am not and never have been anything other than a pure clinician but this has not so far prevented me from pondering the questions which need to be addressed. Insofar as GWS is concerned there is much confusion, I believe, caused simply by the failure of all concerned to acknowledge the obvious:

Something wrong happened in the build-up to GWI, and it appears the same mistake(s) may have been made again in GWII. Why should this be so? – History records very simple & very obvious truths – From the time of your own country's Civil War through the Falklands Campaign to 1990 **the major** cause of non-effective fitness in theatre & afterwards has been **TOOTHACHE!** So why the recent change in morbidity?

I'm afraid the obvious answer **just has** to be rooted in the vaccination & immunisation schedules adopted for both GW conflicts.

Let us consider three long-proven historical philosophical precepts:

1. 'Occam's Razor':- The most obvious explanation is likely to be correct.
2. 'Pascal's Principle':- In the presence of multiple physical symptoms, it is more likely that there shall be just **one** cause rather than many.
3. 'Cain's Axiom':- If all else fails, read the instructions!

As far as I am concerned, these 3 have yet to be disproven…,

If we examine the cases of afflicted service personnel (and I may only speak with authority on behalf of UK personnel) it is quite clear that the onset of GWS is related to the vaccination schedule, i.e. deployment into theatre is **not a sine qua non** to develop the condition.

GWS remains an amorphous condition, largely due to disagreement (?misinformation ?studious ignorance) about diagnosis amongst our colleagues. There seems to me to be at least 4 types of GWS symptoms:-

1. 'Hard' symptoms, i.e. easily proven physically: e.g. Arthritis, Anaemia, multiple organ failure etc.
2. 'Intermediate' symptoms, not quite so easily proven: e.g. CNS symptoms rather conveniently grouped into diagnostic areas such as 'ME' 'CFS' 'Fibromyalgia' & the like.
3. 'Soft'symptoms, maybe debatable, such as mood swings, irritability, bowel disturbance etc.
4. Clearly florid psychiatric disturbances.

It strikes me that the original body insult just has to lie with the enforced vaccination schedule. It may well be that subsequent exposure in field to other noxious agents accentuated the original immunological insult, but for purpose of future enquiry I should like to ask the following questions:-

a) Although I believe immunity to pertussis to be lifelong, it is not at all beyond the bounds of probability that such immunity may be a slowly-declining phenomenon. If so, did anybody study the anti-pertussis antibody levels in humans before administering a further dose of vaccine later in life?

b) As a logical Sequitur, did those personnel with residual high antibody levels suffer worse than those with low levels?

And now the 64K question – Exactly who made the decision to override all conventional guidelines and issue the order to administer a pertussis vaccine which was expressly forbidden by regulation to be used in adults?

Yours Sincerely,

Dr Derek Hom

Mr. SHAYS. Dr. Heinrich.

Dr. HEINRICH. Mr. Chairman, members of the subcommittee, I am pleased to be here today as you consider the current status of the Federal Government's research into the health concerns of Gulf war veterans. My remarks will summarize findings on the status of research on Gulf war illnesses based on the report we are issuing today at your request.

Following the Persian Gulf war in 1991, approximately 80,000 veterans have reported various symptoms such as fatigue, muscle and joint pains, rashes, headaches, and memory loss. Scientists have agreed that many veterans have unexplained illnesses referred to as Gulf war illnesses that do not conform to a standard diagnosis. Possible exposures to several known and potential health hazards have prompted numerous Federal research projects funded by Veterans Administration, Department of Defense, and Health and Human Services to examine possible causes for these symptoms as well as potential treatments. VA is the lead agency for all Federal efforts and activities on the health consequences of service in the Gulf war.

Federal research efforts have been guided by a set of 21 research questions that cover the extent of various health problems, exposures among the veteran population, and the differences in health problems between Gulf war veterans and controlled populations. Developed by an interagency research working group, the questions cover a range of issues, such as altered immune function and neurological deficits, or possible exposure to petroleum combustion products or other agents such as insecticides.

Since 1991, 240 federally funded projects have been initiated to address these health concerns. These projects covered several different focus areas, such as brain and nervous system research, and used a variety of methodologies.

From 1994 to 2003, the total dollars expended were about $247 million. Between fiscal year 2000 and 2003, overall funding for Gulf war illnesses research has decreased by about $20 million. This overall decrease in funding was paralleled by a shift in VA's and DOD's research priorities, which expanded to include all hazardous deployments. For example, in 2002, VA issued a program announcement for research in the long-term health effects in veterans who served in the Gulf war or in any hazardous deployment such as Afghanistan and Kosovo.

Although about 80 percent of the projects are now complete, VA has not reassessed the extent to which the collective findings of completed Gulf war illnesses research have addressed the 21 questions that I noted before. The only assessment was published in 2001, when only about half of the studies were completed. This assessment was somewhat limited in that it did not identify gaps or promising areas for future studies. Without such an assessment, many underlying questions about cause, course of development, and treatments remain unanswered.

In 2002, VA established the congressionally mandated Research Advisory Committee to provide advice to the Secretary of the VA on proposed research relating to the health consequences of military service in the Gulf war. This advisory committee is charged with assisting VA in research planning by exploring the entire

body of Gulf war illness research, identifying gaps, and identifying potential areas for future study.

According to advisory committee officials, VA's poor information sharing and limiting collaboration with the committee about research initiatives has made it difficult for the committee to fulfill its mission.

VA recently has stated that they will be involving advisory committee members in developing VA program announcements.

In the report being issued today, we also describe the few studies that have been funded to examine cancer incidence in Gulf war veterans. Thus far no unusual patterns have been detected, but it is too early to be definitive about cancer incidence in this population. We are also making several recommendations which the Secretary of the VA concurs with, that being the Secretary of the Veterans Affairs conduct a reassessment of the Gulf war illness research strategy to determine whether the 21 research questions have been answered, whether they are relevant, and whether they are promising areas for future study; that a liaison who is knowledgeable about Gulf war illnesses research is appointed to routinely share information with the advisory committee and ensure that VA's research offices collaborate with the advisory committee.

Mr. Chairman, that completes my prepared statement.

Mr. SHAYS. Thank you very much, Dr. Heinrich.

[NOTE.—The GAO report entitled, "Department of Veterans Affairs, Federal Gulf War Illnesses Research Strategy Needs Reassessment," may be found in subcommittee files.]

[The prepared statement of Dr. Heinrich follows:]

United States General Accounting Office

GAO

Testimony

Before the Subcommittee on National Security, Emerging Threats, and International Relations, Committee on Government Reform, House of Representatives

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GULF WAR ILLNESSES

Federal Research Efforts Have Waned, and Research Findings Have Not Been Reassessed

Statement of Janet Heinrich
Director, Health Care—Public Health Issues

GAO-04-815T

June 1, 2004

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Highlights

Highlights of GAO-04-815T testimony before the Subcommittee on National Security, Emerging Threats, and International Relations, Committee on Government Reform, House of Representatives

GULF WAR ILLNESSES

Federal Research Efforts Have Waned, and Research Findings Have Not Been Reassessed

Why GAO Did This Study

More than a decade after the 1991 Persian Gulf War, there is continued interest in the federal response to the health concerns of Gulf War veterans. Gulf War veterans' reports of illnesses and possible exposures to various health hazards have prompted numerous federal research projects on Gulf War illnesses. This research has been funded primarily by the Department of Veterans Affairs (VA), the Department of Defense (DOD), and the Department of Health and Human Services (HHS). In 1993, the President named the Secretary of VA as the responsible party for coordinating research activities undertaken or funded by the executive branch of the federal government on the health consequences of service in the Gulf War. In 2002, a congressionally mandated federal advisory committee—the VA Research Advisory Committee on Gulf War Veterans' Illnesses (RAC)—was established to provide advice on federal Gulf War illnesses research needs and priorities to the Secretary of VA.

This statement is based on GAO's report entitled *Department of Veterans Affairs: Federal Gulf War Illnesses Research Strategy Needs Reassessment* (GAO-04-767). The testimony presents findings about the status of research on Gulf War illnesses and VA's communication and collaboration with RAC.

www.gao.gov/cgi-bin/getrpt?GAO-04-815T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Janet Heinrich at (202) 512-7119.

What GAO Found

The federal focus on Gulf War-specific research has waned, but VA has not yet analyzed the latest research findings to identify whether there were gaps in research or to identify promising areas for future research. As of September 2003, about 80 percent of the 240 federally funded medical research projects for Gulf War illnesses had been completed. In recent years, VA and DOD have decreased their expenditures on Gulf War illnesses research and have expanded the scope of their medical research programs to incorporate the long-term health effects of all hazardous deployments. Interagency committees formed by VA to coordinate federal Gulf War illnesses research have evolved to reflect these changing priorities, but over time these entities have been dissolved or have become inactive. In addition, VA has not reassessed the extent to which the collective findings of completed Gulf War illnesses research projects have addressed key research questions or whether the questions remain relevant. The only assessment of progress in answering these research questions was published in 2001, when findings from only about half of all funded Gulf War illnesses research were available. Moreover, it did not identify whether there were gaps in existing Gulf War illnesses research or promising areas for future research. This lack of a comprehensive analysis of research findings leaves VA at greater risk of failing to answer unresolved questions about causes, course of development, and treatments for Gulf War illnesses.

RAC's efforts to provide advice and make recommendations to the Secretary of VA on Gulf War illnesses research may have been hampered by VA senior administrators' poor information sharing and limited collaboration on research initiatives and program planning. For example, VA failed to inform RAC about its 2002 major research program announcement that included Gulf War illnesses research. VA and RAC are exploring ways to improve information sharing and collaboration, including VA's hiring of a senior scientist who would both guide VA's Gulf War illnesses research and serve as the agency's liaison for routine updates to the advisory committee. However, most of these changes had not been finalized at the time of GAO's review.

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today as you consider the current status of the federal government's research into the health concerns of Gulf War veterans. In the years following the 1991 Persian Gulf War, approximately 80,000 veterans have reported various symptoms including fatigue, muscle and joint pains, headaches, memory loss, skin rash, diarrhea, and sleep disturbances. Scientists have agreed that many veterans have unexplained illnesses—commonly referred to as Gulf War illnesses—that are characterized by one or more symptoms that do not conform to a standard diagnosis. Gulf War veterans' reports of illnesses and possible exposures to several known and potential health hazards have prompted numerous federal research projects on the nature, extent, and treatment of Gulf War illnesses. Federal Gulf War illnesses research projects have been funded primarily by the Department of Veterans Affairs (VA), the Department of Defense (DOD), and the Department of Health and Human Services (HHS). In 1993, the President named the Secretary of VA as the responsible party for coordinating research activities undertaken or funded by the executive branch of the federal government on the health consequences of service in the Gulf War. In 2002, a congressionally mandated federal advisory committee—the VA Research Advisory Committee on Gulf War Veterans' Illnesses (RAC)—was established to provide advice on federal Gulf War illnesses research needs and priorities to the Secretary of VA. The committee is made up of members of the general public, including non-VA researchers and veterans' advocates.

My remarks will summarize our findings on the status of federal research on Gulf War illnesses and VA's communication and collaboration with RAC. My statement is based on our report entitled *Department of Veterans Affairs: Federal Gulf War Illnesses Research Strategy Needs Reassessment* (GAO-04-767), which will be issued today. The report also includes a description of the status of DOD's investigations on potential exposures of service members and veterans to health hazards, such as chemical and biological agents, and efforts that have been made by VA and DOD to monitor cancer incidence among Gulf War veterans.

Our findings are based on interviews with senior officials within VA and DOD and senior managers within each agency's relevant research offices. We analyzed pertinent agency documents, including annual reports to congressional committees describing research priorities, ongoing and completed projects, and agency funding. Additionally, we interviewed RAC officials, attended a RAC meeting, and reviewed RAC reports and recommendations. We conducted our work from September 2003 through

May 2004 in accordance with generally accepted government auditing standards.

In summary, the federal focus on Gulf War-specific research has waned, and VA—the agency with lead responsibility for coordination of Gulf War illnesses issues—has not yet analyzed the latest research findings to identify whether there were gaps in research or to identify promising areas for future research. As of September 2003, about 80 percent of the 240 federally funded medical research projects for Gulf War illnesses had been completed. In recent years, VA and DOD have decreased their expenditures on research specifically for Gulf War illnesses and have expanded the scope of their medical research programs to incorporate the long-term health effects of all hazardous deployments. Interagency committees formed by VA to coordinate federal Gulf War illnesses research evolved to reflect these changing priorities, but over time these entities have been dissolved or have become inactive. In addition, VA has not reassessed the extent to which the collective findings of completed Gulf War Illnesses research projects have addressed key research questions or whether the questions remain relevant. The only assessment of progress in answering these research questions was published in 2001, when findings from only about half of all federally funded Gulf War illnesses research were available. Moreover, the summary did not identify whether there were gaps in existing Gulf War illnesses research or promising areas for future research. The lack of a comprehensive analysis leaves VA at greater risk of failing to answer unresolved questions about causes, course of development, and treatments for Gulf War illnesses.

RAC's efforts to provide advice and make recommendations on Gulf War illnesses research may have been hampered by VA senior administrators' incomplete or unclear information sharing and limited collaboration on Gulf War illnesses research initiatives and program planning. For example, VA failed to inform RAC about its 2002 major research program announcement that included Gulf War illnesses research. However, VA and RAC are exploring ways to improve information sharing, including VA's hiring of a senior scientist who would guide VA's Gulf War illnesses research and serve as the agency's liaison for routine updates to RAC. However, most of these changes had not been finalized at the time of GAO's review.

Background

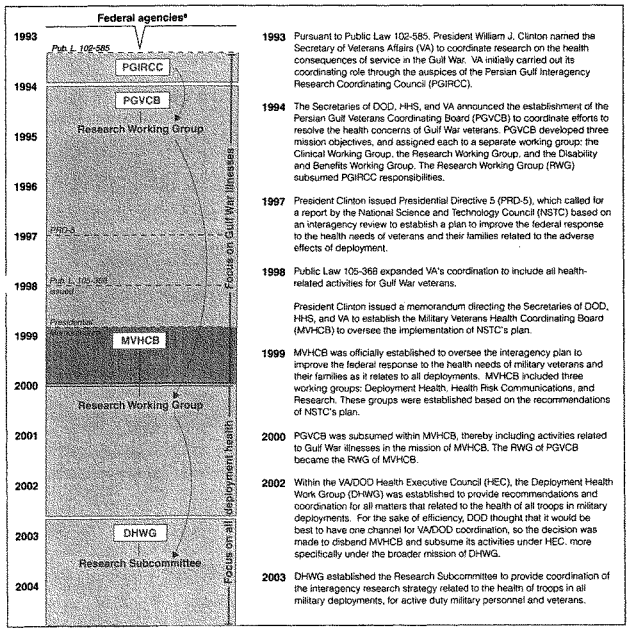
Although about 700,000 U.S. military personnel were deployed to the Gulf War in the early 1990s, casualties were relatively light compared with those in previous major conflicts. Some veterans began reporting health

problems shortly after the war that they believed might be due to their participation in the conflict. VA, DOD, HHS, and other federal agencies initiated research and investigations into these health concerns and the consequences of possible hazardous exposures.

VA is the coordinator for all federal activities on the health consequences of service in the Gulf War. These activities include ensuring that the findings of all federal Gulf War illnesses research are made available to the public and that federal agencies coordinate outreach to Gulf War veterans in order to provide information on potential health risks from service in the Gulf War and corresponding services or benefits. The Secretary of VA is required to submit an annual report on the results, status, and priorities of federal research activities related to the health consequences of military service in the Gulf War to the Senate and House Veterans' Affairs Committees. VA has provided these reports to Congress since 1995. In May 2004, VA issued its annual report for 2002.[1] VA has carried out its coordinating role through the auspices of interagency committees, which have changed over time in concert with federal research priorities and needs. Specifically, the mission of these interagency committees has evolved to include coordination for research on all hazardous deployments, including but not limited to the Gulf War. (See fig. 1.)

[1]See Deployment Health Working Group Research Subcommittee, Department of Veterans Affairs, *Annual Report to Congress: Federally Sponsored Research on Gulf War Veterans' Illnesses for 2002* (Washington, D.C.: 2004).

Figure 1: Evolution of Interagency Committees That Coordinated Federal Gulf War Illnesses Research from 1993 to 2004



Source: VA.

Note: GAO analysis of VA data, public laws, and presidential directives.

*Federal agencies are VA, DOD, and HHS.

Federal research efforts for Gulf War illnesses have been guided by questions established by the interagency Research Working Group (RWG), which was initially established under the Persian Gulf Veterans Coordinating Board (PGVCB) to coordinate federal research efforts. Between 1995 and 1996, the RWG identified 19 major research questions related to illnesses in Gulf War veterans. In 1996, the group added 2 more questions regarding cancer risk and mortality rates to create a set of 21 key research questions that have served as an overarching strategy in guiding federal research for Gulf War illnesses. (See app. I for the list of key questions.) The 21 research questions cover the extent of various health problems, exposures among the veteran population, and the difference in health problems between Gulf War veterans and control populations. In 1998, the RWG expanded federal Gulf War illnesses research priorities to include treatment, longitudinal follow-up of illnesses, disease prevention, and improved hazard assessment; however, no new research questions were added to the list of 21 key questions. With regard to veterans' health status, the research questions cover the prevalence among veterans and control populations of

- symptoms,
- symptom complexes,
- illnesses,
- altered immune function or host defense,
- birth defects,
- reproductive problems,
- sexual dysfunction,
- cancer,
- pulmonary symptoms,
- neuropsychological or neurological deficits,
- psychological symptoms or diagnoses, and
- mortality.

With regard to exposure, the research questions cover

- Leishmania tropica (a type of parasite),
- petroleum,
- petroleum combustion products,
- specific occupational/environmental hazards (such as vaccines and depleted uranium),
- chemical agents,
- pyridostigmine bromide (given to troops as a defense against nerve agents), and

- psychophysiological stressors (such as exposure to extremes of human suffering).

In 2002, VA established RAC to provide advice to the Secretary of VA on proposed research relating to the health consequences of military service in the Gulf War.[2] RAC, which is composed of members of the general public, including non-VA researchers and veterans' advocates, was tasked to assist VA in its research planning by exploring the entire body of Gulf War illnesses research, identifying gaps in the research, and proposing potential areas of future research. VA provides an annual budget of about $400,000 for RAC, which provides salaries for two full-time and one part-time employee and supports committee operating costs. RAC's employees include a scientific director and support staff who review published scientific literature and federal research updates and collect information from scientists conducting relevant research.[3] RAC's staff provide research summaries for discussion and analysis to the advisory committee through monthly written reports and at regularly scheduled meetings. RAC holds public meetings several times a year at which scientists present published and unpublished findings from Gulf War illnesses research. In 2002, RAC published a report with recommendations to the Secretary of VA. It expects to publish another report soon.

Federal Research on Gulf War Illnesses Has Decreased, and VA Has Not Collectively Analyzed Research Findings to Determine Research Needs

As of September 2003, about 80 percent of the 240 federally funded research projects on Gulf War illnesses have been completed. Additionally, funding for Gulf War-specific research has decreased, federal research priorities have been expanded to incorporate the long-term health effects of all hazardous deployments, and interagency coordination of Gulf War illnesses research has diminished. Despite this shift in effort, VA has not collectively reassessed the research findings to determine whether the 21 key research questions have been answered or to identify the most promising directions for future federal research in this area.

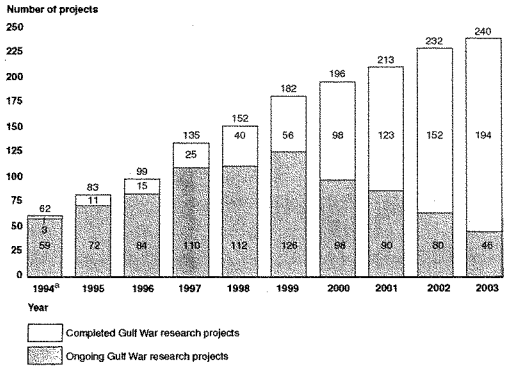
[2]VA was required to establish RAC by the Veterans Programs Enhancement Act of 1998, Pub. L. No. 105-368, § 104, 112 Stat. 3315, 3323 (1998).

[3]RAC's scientific director, a research associate professor, is also an appointed member of RAC.

Most Federal Gulf War Illnesses Research Projects Are Complete, and Funding Is Decreasing as Research Priorities Evolve

Since 1991, 240 federally funded research projects have been initiated by VA, DOD, and HHS to address the health concerns of individuals who served in the Gulf War. As of September 2003, 194 of the 240 federal Gulf War illnesses research projects (81 percent) had been completed; another 46 projects (19 percent) were ongoing.[4] (See fig. 2.)

Figure 2: Cumulative Number of Ongoing and Completed Federal Gulf War Illnesses Research Projects by Year



Source: VA.

Note: GAO analysis of VA data.

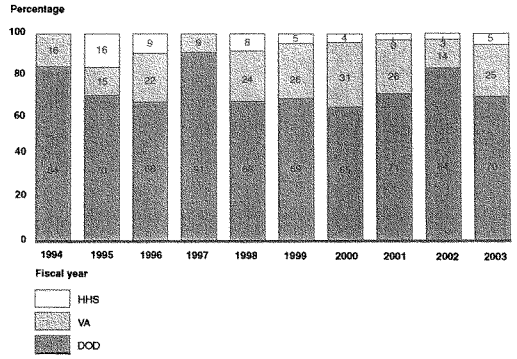
[a]This total includes ongoing projects from 1991 through 1994.

From 1994 to 2003, VA, DOD, and HHS collectively spent a total of $247 million on Gulf War illnesses research. DOD has provided the most funding for Gulf War illnesses research, funding about 74 percent of all federal Gulf War illnesses research within this time frame. Figure 3 shows

[4]Annual reports to congressional committees submitted by VA on federally sponsored research on Gulf War veterans' illnesses identify projects as completed when total project funding has concluded.

the comparative percentage of funding by these agencies for each fiscal year since 1994.

Figure 3: Funding Share for Gulf War Illnesses Research by Agency and Fiscal Year

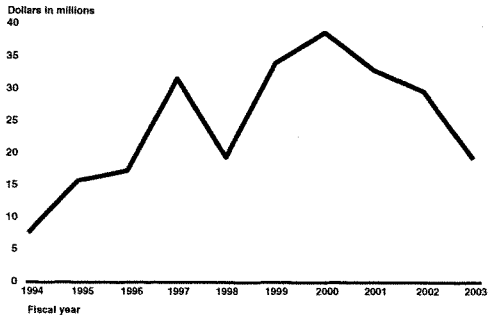


Source: VA.

Note: GAO analysis of VA data. Percentages may not add to 100 percent because of rounding.

After fiscal year 2000, overall funding for Gulf War illnesses research decreased. (See fig. 4.) Fiscal year 2003 research funding was about $20 million less than funding provided in fiscal year 2000.

Figure 4: Funding for Gulf War Research Projects, Fiscal Years 1994-2003



Source: VA.

Note: GAO analysis of VA data. Dollars include only direct costs (actual research activities and materials) for each agency and have not been adjusted for inflation.

This overall decrease in federal funding was paralleled by a change in federal research priorities, which expanded to include all hazardous deployments and shifted away from a specific focus on Gulf War illnesses. VA officials said that although Gulf War illnesses research continues, the agency is expanding the scope of its research to include the potential long-term health effects in troops who served in hazardous deployments other than the Gulf War. In October 2002, VA announced plans to commit up to $20 million for research into Gulf War illnesses and the health effects of other military deployments. Also in October 2002, VA issued a program announcement for research on the long-term health effects in veterans who served in the Gulf War or in other hazardous deployments, such as Afghanistan and Bosnia/Kosovo.[5] As of April 2004, one new Gulf War illnesses research project, for $450,000, was funded under this program announcement.

[5]The October 2002 research program announcement on deployment health research remains open for researchers to submit proposals.

Although DOD has historically provided the majority of funding for Gulf War illnesses research, DOD officials stated that their agency currently has no plans to continue funding new Gulf War illnesses research projects. Correspondingly, DOD has not funded any new Gulf War illnesses research in fiscal year 2004, except as reflected in modest supplements to complete existing projects and a new award pending for research using funding from a specific appropriation. DOD also did not include Gulf War illnesses research funding in its budget proposals for fiscal years 2005 and 2006. DOD officials stated that because the agency is primarily focused on the needs of the active duty soldier, its interest in funding Gulf War illnesses research was highest when a large number of Gulf War veterans remained on active duty after the war—some of whom might develop unexplained symptoms and syndromes that could affect their active duty status.[6] In addition, since 2000, DOD's focus has shifted from research solely on Gulf War illnesses to research on medical issues of active duty troops in current or future military deployments.[7] For example, in 2000, VA and DOD collaborated to develop the Millennium Cohort study, which is a prospective study evaluating the health of both deployed and nondeployed military personnel throughout their military careers and after leaving military service. The study began in October 2000 and was awarded $5.25 million through fiscal year 2002, with another $3 million in funding estimated for fiscal year 2003.

VA's Coordination of Federal Gulf War Illnesses Research Has Lapsed, and VA Has Not Determined Whether Key Research Questions Have Been Answered

VA's coordination of federal Gulf War illnesses research has gradually lapsed. Starting in 1993, VA carried out its responsibility for coordinating all Gulf War health-related activities, including research, through interagency committees, which evolved over time to reflect changing needs and priorities. (See fig. 1.) In 2000, interagency coordination of Gulf War illnesses research was subsumed under the broader effort of coordination for research on all hazardous deployments. Consequently, Gulf War illnesses research was no longer a primary focus. The most recent interagency research subcommittee, which is under the

[6]DOD officials also told us that there are about 100,000 Gulf War veterans currently on active military duty but these veterans generally are in good health.

[7]DOD refers to medical research related to current or future military deployments as its Force Health Protection Research Program. This program focuses on prevention of illness, reduction of injuries or the severity of injury, faster evacuation of casualties, and enhancements to general medical capabilities.

Deployment Health Working Group (DHWG), has not met since August 2003, and as of April 2004, no additional meetings had been planned.

Additionally, VA has not reassessed the extent to which the collective findings of completed Gulf War Illnesses research projects have addressed the 21 key research questions developed by the RWG. (See app. I.) The only assessment of progress in answering these research questions was published in 2001, when findings from only about half of all funded Gulf War illnesses research were available. Moreover, the summary did not identify whether there were gaps in existing Gulf War illnesses research or promising areas for future research. No reassessment of these research questions has been undertaken to determine whether they remain valid, even though about 80 percent of federally funded Gulf War illnesses research projects now have been completed. In 2000, we reported that without such an assessment, many underlying questions about causes, course of development, and treatments for Gulf War illnesses may remain unanswered.[8]

RAC's Efforts to Provide Advice May Be Hindered by VA's Limited Information Sharing and Collaboration, but Several Changes to Address These Issues Have Been Proposed

RAC's efforts to provide advice and make recommendations on Gulf War illnesses research may have been impeded by VA's limited sharing of information on research initiatives and program planning as well as VA's limited collaboration with the committee. However, VA and RAC are exploring ways to improve information sharing, including VA's hiring of a senior scientist who would both guide the agency's Gulf War illnesses research and serve as the agency's liaison to provide routine updates to RAC. VA and RAC are also proposing changes to improve collaboration, including possible commitments from VA to seek input from RAC when developing research program announcements. At the time of our review, most of these proposed changes were in the planning stages.

[8]U.S. General Accounting Office, *Gulf War Illnesses: Management Actions Needed to Answer Basic Research Questions*, GAO/NSIAD-00-32 (Washington D.C.: Jan. 6, 2000).

RAC Officials Cite VA's Poor Information Sharing and Limited Collaboration as Impediments in Meeting Its Mission

According to RAC officials, VA senior administrators' poor information sharing and limited collaboration with the committee about Gulf War illnesses research initiatives and program planning may have hindered RAC's ability to achieve its mission of providing research advice to the Secretary of VA. RAC is required by its charter to provide advice and make recommendations to the Secretary of VA on proposed research studies, research plans, and research strategies relating to the health consequences of service during the Gulf War. (See app. II for RAC's charter.) RAC's chairman and scientific director said that the recommendations and reports that the advisory committee provides to the Secretary of VA are based on its review of research projects and published and unpublished research findings related to Gulf War illnesses.

Although RAC and VA established official channels of communication, VA did not always provide RAC with important information related to Gulf War illnesses research initiatives and program planning. In 2002, VA designated a liaison to work with RAC's liaison in order to facilitate the transfer of information to the advisory committee about the agency's Gulf War illnesses research strategies and studies. However, RAC officials stated that most communication occurred at their request; that is, the VA liaison and other VA staff were generally responsive to requests but did not establish mechanisms to ensure that essential information about research program announcements or initiatives was automatically provided to the advisory committee. For example, according to RAC officials, VA's liaison did not inform RAC that VA's Office of Research and Development was preparing a research program announcement until it was published in October 2002. Consequently, RAC officials said that they did not have an opportunity to carry out the committee's responsibility of providing advice and making recommendations regarding research strategies and plans. In another instance, RAC officials stated that VA did not notify advisory committee members that the Longitudinal Health Study of Gulf War Era Veterans—a study designed to address possible long-term health consequences of service in the Gulf War—had been developed and that the study's survey was about to be sent to study participants. RAC officials expressed concern that VA did not inform the advisory committee about the survey even after the plans for it were made available for public comment.

Information sharing about these types of issues is common practice among advisory committees of the National Institutes of Health (NIH), which has

more federal advisory committees than any other executive branch agency.[9] For example, a senior official within NIH's Office of Federal Advisory Committee Policy said that it is standard practice for NIH advisory committees to participate closely in the development of research program announcements. In addition, NIH's advisory committee members are routinely asked to make recommendations regarding both research concepts and priorities for research projects, and are kept up-to-date about the course of ongoing research projects.

VA and RAC Are Exploring Methods to Improve Information Sharing and Collaboration

In recognition of RAC's concerns, VA is proposing several actions to improve information sharing, including VA's hiring of a senior scientist to lead its Gulf War illnesses research and improving formal channels of communication. In addition, VA and RAC are exploring methods to improve collaboration. These would include possible commitments from VA to seek input from RAC when developing research program announcements and to include RAC members in a portion of the selection process for funding Gulf War illnesses research projects. As of April 2004, most of the proposed changes were in the planning stages.

Since the February 2004 RAC meeting, VA and RAC officials said they have had multiple meetings and phone conversations and have corresponded via e-mail in an attempt to improve communication and collaboration. VA officials said they have already instituted efforts to hire a senior scientist to guide the agency's Gulf War illnesses research efforts and to act as liaison to RAC. According to VA officials, this official will be required to formally contact RAC officials weekly, with informal communications on an as-needed basis. In addition, this official will be responsible for providing periodic information on the latest publications or projects related to Gulf War illnesses research.

In an effort to facilitate collaboration with RAC, VA has proposed involving RAC members in developing VA program announcements designed to solicit research proposals, both specifically regarding Gulf War illnesses and in related areas of interest, such as general research into unexplained illnesses. RAC officials stated that throughout March and April 2004, they worked with VA officials to jointly develop a new research

[9]NIH is the largest funder of medical research in the United States and maintains more than 140 chartered advisory committees. NIH has four types of advisory committees—for the purposes of this report, we refer to practices among two of these types: program advisory committees and national advisory councils.

program announcement for Gulf War illnesses. In addition, VA has proposed that RAC will be able to recommend scientists for inclusion in the scientific merit review panels. VA also plans to involve RAC in review of a project's relevancy to Gulf War illnesses research goals and priorities after the research projects undergo scientific merit review. This could facilitate RAC's ability to provide recommendations to VA regarding the projects that the advisory committee has judged are relevant to the Gulf War illnesses research plan.

Concluding Observations

Although about 80 percent of federally funded Gulf War illnesses research projects have been completed, little effort has been made to assess progress in answering the 21 key research questions or to identify the direction of future research in this area. Additionally, in light of decreasing federal funds and expanding federal research priorities, research specific to Gulf War illnesses is waning. Without a comprehensive reassessment of Gulf War illnesses research, underlying questions about the unexplained illnesses suffered by Gulf War veterans may remain unanswered.

Since RAC's establishment in January 2002, its efforts to provide the Secretary of VA with advice and recommendations may have been hampered by VA's incomplete disclosure of Gulf War illnesses research activities. By limiting information sharing with RAC, VA will not fully realize the assistance that the scientists and veterans' advocates who serve on the RAC could provide in developing effective policies and guidance for Gulf War illnesses research. VA and RAC are exploring new approaches to improve information sharing and collaboration. If these approaches are implemented, RAC's ability to play a pivotal role in helping VA reassess the future direction of Gulf War illnesses research may be enhanced. However, at the time of our review most of these changes had not been formalized.

Mr. Chairman, this completes my prepared statement. I would be happy to respond to any questions you or other Members of the Subcommittee may have at this time.

Contact and Staff Acknowledgments

For further information about this testimony, please contact me at (202) 512-7119 or Bonnie Anderson at (404) 679-1900. Karen Doran, John Oh, Danielle Organek, and Roseanne Price also made key contributions to this testimony.

Appendix I: Key Gulf War Illnesses Research Questions

Between 1995 and 1996, the Research Working Group (RWG) of the interagency Persian Gulf Veterans' Coordinating Board identified 19 major research questions related to illnesses in Gulf War Veterans. The RWG later added 2 more questions to create a set of 21 key research questions that serve as a guide for federal research regarding Gulf War illnesses. (See table 1.)

Table 1: 21 Key Gulf War Illnesses Research Questions

Research Question Number	Key Research Questions
1	What is the prevalence of symptoms/illnesses in the Persian Gulf veterans population? How does this prevalence compare to that in an appropriate control group?
2	What was the overall exposure of troops to Leishmania tropica?
3	What were the exposure concentrations to various petroleum products, and their combustion products, in typical usage during the Persian Gulf conflict?
4	What was the extent of exposure to specific occupational/environmental hazards known to be common in the Persian Gulf veteran's experience? Was this exposure different from that of an appropriate control group?
5	What were the potential exposures of troops to organophosphate nerve agent and/or sulfur mustard as a result of allied bombing at Muhammadiyat and Al Muthannna, or the demolition of a weapons bunker at Khamisiyah?
6	What was the extent of exposure to chemical agent, other than at Khamisiyah, Iraq, in the Persian Gulf as a function of space and time?
7	What was the prevalence of pyridostigmine bromide use among Persian Gulf troops?"
8	What was the prevalence of various psychophysiological stressors among Persian Gulf veterans? Is the prevalence different from that of an appropriate comparison population?
9	Are Persian Gulf veterans more likely than an appropriate comparison group to experience nonspecific symptoms and symptom complexes?
10	Do Persian Gulf veterans have a greater prevalence of altered immune function or host defense when compared with an appropriate control group?
11	Is there a greater prevalence of birth defects in the offspring of Persian Gulf veterans than in an appropriate control population?
12	Have Persian Gulf veterans experienced lower reproductive success than an appropriate control population?

Research Question Number	Key Research Questions
13	Is the prevalence of sexual dysfunction greater among Persian Gulf veterans than among an appropriate comparison population?
14	Do Persian Gulf veterans report more pulmonary symptoms or diagnoses than persons in appropriate control populations?
15	Do Persian Gulf veterans have a smaller baseline lung function in comparison to an appropriate control group? Do Persian Gulf veterans have a greater degree of nonspecific airway reactivity in comparison to an appropriate control group?
16	Is there a greater prevalence of organic neuropsychological and neurological deficits in Persian Gulf veterans compared to appropriate control populations?
17	Can short-term, low-level exposures to pyridostigmine bromide, the insect repellent DEET, and the insecticide permethrin, alone or in combination, cause short-term and/or long-term neurological effects?
18	Do Persian Gulf veterans have a significantly higher prevalence of psychological symptoms and/or diagnoses than do members of an appropriate control group?
19	What is the prevalence of leishmaniasis and other infectious diseases in the Persian Gulf veteran population?
20	Do Persian Gulf veterans have a greater risk of developing cancers of any type when compared with an appropriate control population?
21	Are Persian Gulf veterans experiencing a mortality rate that is greater than that of an appropriate control population? Are specific causes of death related to service in the Persian Gulf?

Source: VA.

*Pyridostigmine bromide (PB) is a drug that was supplied to troops for use as a pretreatment for potential exposure to nerve agents.

Appendix II: Charter For the VA Research Advisory Committee On Gulf War Veterans' Illnesses (RAC)

DEPARTMENT OF VETERANS AFFAIRS
CHARTER OF THE
RESEARCH ADVISORY COMMITTEE ON
GULF WAR VETERANS' ILLNESSES

A. OFFICIAL DESIGNATION: Research Advisory Committee on Gulf War Veterans' Illnesses (RACGWVI).

B. OBJECTIVES AND SCOPE OF ACTIVITY: The Department of Veterans Affairs (VA) Research Advisory Committee on Gulf War Veterans' Illnesses shall provide advice and make recommendations to the Secretary of Veterans Affairs on proposed research studies, research plans, and research strategies relating to the health consequences of military service in the Southwest Asia theater of operations during the Persian Gulf War. The Committee shall not conduct scientific research.

The guiding principle for the work of the Committee shall be the premise that the fundamental goal of Gulf War-related government research, either basic or applied, is to ultimately improve the health of ill Gulf War veterans, and that the choice and success of research efforts shall be judged accordingly. The Committee shall assess the overall effectiveness of government research to answer central questions on the nature, causes, and treatments of Gulf War-associated illnesses.

C. PERIOD OF TIME NECESSARY FOR THE COMMITTEE TO CARRY OUT ITS PURPOSE(S): The Committee was established in compliance with statutory instructions contained in Section 104 of Public Law 105-368. It has no termination date.

D. OFFICIAL TO WHOM THE COMMITTEE REPORTS: The Committee shall report to the Secretary of Veterans Affairs.

E. OFFICE RESPONSIBLE FOR PROVIDING THE NECESSARY SUPPORT TO THE COMMITTEE: The Department of Veterans Affairs will provide support for the Committee. A VA employee selected by the Secretary of Veterans Affairs shall be the Designated Federal Officer, under the direction of the Committee chair. Technical support for the Committee shall be provided by a staff that reports to the Committee chair, who may appoint a technical director for the staff to supervise its operation. Staff members may be VA employees, employees of other government agencies, or independent agents employed as temporary VA employees.

F. DUTIES FOR WHICH THE COMMITTEE IS RESPONSIBLE: The Committee shall provide to the Secretary of Veterans Affairs, not later than December 1 of each year, an annual report summarizing its activities for the preceding year. The Committee is authorized to develop additional reports and recommendations regarding relevant research. During its review of such research and in compliance with governing law, the Committee shall have access to all VA documents and other information sources it finds relevant to such review. Recommendations contained within a formal Committee

report shall be submitted to the Secretary and other appropriate officials, as directed by the Secretary.

The Committee shall be comprised of members of the general public, including Persian Gulf War veterans, representatives of such veterans, and members of the medical and scientific communities representing appropriate disciplines such as, but not limited to, biomedicine, epidemiology, immunology, environmental health, neurology, and toxicology. The Secretary of Veterans Affairs may appoint non-U.S. citizens as Committee members.

Members shall be appointed for two- or three-year terms. The Secretary of Veterans Affairs may renew the terms of members. The Secretary shall appoint the chair of the Committee. The term of office for the chair shall be two years, also renewable by the Secretary.

The Committee may establish subcommittees to carry out specific projects or assignments. The Committee chair shall notify the Secretary upon the establishment of any subcommittee, including its function, members and estimated duration.

The Secretary of Veterans Affairs may establish a panel of experts representing appropriate medical and scientific disciplines to assist the Committee in its work. Panelists may be called on by the Secretary for advice and consultation, and may advise the Committee on research or conduct other appropriate activities for the Committee, at the request of the Committee chair. Panelists shall report directly to the chair or such Committee members designated by the chair, but they shall not be members of the Committee.

G. ESTIMATED ANNUAL OPERATING COSTS IN DOLLARS AND STAFF-YEARS: The estimated annual cost for operating the Committee and its support staff is $400,000 and 4 FTE. All members will receive travel expenses and a per diem allowance in accordance with the Federal Travel Regulations for any travel made in connection with their duties as members of the Committee.

H. ESTIMATED NUMBER AND FREQUENCY OF MEETINGS: Meetings of the Committee shall occur not less than twice annually at the call of the chair. Meetings of the subcommittee(s) shall be convened as necessary. A federal government official shall be present at all meetings.

I. COMMITTEE TERMINATION DATE: None.

J. DATE CHARTER IS FILED:

APPROVED: Signed by Anthony J. Principi
Secretary of Veterans Affairs

Date: 1/14/2004

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Mr. SHAYS. Dr. Rhodes. And I would just point out that this is unusual to have two folks from GAO on the same panel, but you both have different perspectives that impact this story a little differently, and that's why we felt it was necessary to have both of you here. Thank you.

Dr. RHODES. Mr. Chairman, members of the subcommittee, Lord Morris, I am pleased to participate in this international hearing by presenting our assessment of plume modeling conducted by the Department of Defense and the Central Intelligence Agency to determine the number of U.S. troops that might have been exposed to the release of chemical warfare agents during the Gulf war in 1990. I presented our preliminary results to you in a testimony on June 6, 2003. My statement today is based on our final report entitled, "Gulf War Illnesses, DOD's Conclusions About U.S. Troops Exposure Are Unsupported," which is being issued today.

In summary, DOD and the United Kingdom's Ministry of Defense's conclusions based on DOD's plume modeling efforts regarding the extent of United States and British troops' exposures to chemical warfare agents cannot be adequately supported. Given the inherent weaknesses associated with the specific models DOD used and the lack of accurate and appropriate meteorological and source term data in support of DOD's analyses, we found five major reasons to question DOD and the U.K. Ministry of Defense's conclusions.

First, the models were not fully developed for analyzing long-range dispersion of chemical warfare agents as an environmental hazard.

Second, assumptions regarding source term data used in the modeling such as the quantity and purity of the agent were inaccurate since they were based on uncertain and incomplete information and data that were not validated.

Third, the plume heights from the Gulf war bombings were underestimated in DOD models.

Fourth, postwar field testing at the U.S. Army Dugway Proving Ground to estimate the source term data did not reliably simulate the actual conditions of either the bombings or the demolition at Khamisiyah.

Fifth, there is a wide divergence in results among the individual models DOD selected as well as in the unselected DOD and non-DOD models with regard to the size and path of the plume and the extent to which troops were exposed.

Given these inherent weaknesses, DOD and MOD cannot know which troops were and which troops were not exposed.

You had asked about the total costs for the various plume modeling efforts. The total costs for the various plume modeling efforts to analyze the potential exposure of U.S. troops from the demolition at Khamisiyah and the bombing of several other sites in Iraq cannot be estimated. DOD organizations and other entities involved with the plume modeling efforts could provide only direct costs, that is, contractor costs, which totaled about $13.7 million. However, this amount does not include an estimate of the considerable indirect costs associated with the salaries of DOD, VA, and contractor staff, or costs of facilities, travel, and equipment. We requested, but DOD could not provide, this estimate.

In addition, the CIA would not provide direct and indirect costs for Gulf war plume modeling because, in its view, our request constituted oversight of an intelligence matter beyond the scope of GAO authority. The CIA's contractor, the Science Applications International Corp., also did not respond to our request for cost data.

DOD's and VA's conclusions there that there is no association between exposure to chemical warfare agents from demolitions at Khamisiyah and rates of hospitalization and mortality among U.S. troops also cannot be adequately supported. DOD and VA based these conclusions on two government-funded epidemiological studies, one conducted by DOD researchers, the other by VA researchers. In each of these studies, flawed criteria were used to determine which troops were exposed. These flaws may have resulted in large-scale misclassification of the exposure groups; that is, a number of exposed veterans may have been classified as nonexposed, and a number of nonexposed veterans may have been misclassified as exposed.

In addition, in the hospitalization study, the outcome measure, number of hospitalizations, would not capture the chronic illnesses that Gulf war veterans commonly report, but which typically do not lead to hospitalization. Several published scientific studies of exposure involving the Gulf war suggest an association between low-level exposure to chemical warfare agents and chronic illnesses.

In our report we are recommending that the Secretary of Defense and the Secretary of Veterans Affairs not use the plume modeling data for future epidemiological studies of the 1991 Gulf war since VA and DOD cannot know from the flawed plume modeling who was and who was not exposed. We are also recommending that the Secretary of Defense require no further plume modeling of Khamisiyah and the other sites bombed during the 1991 Gulf war in order to determine troops' exposure. Given the uncertainties in the source term and metereological data, additional modeling of the various sites bombed would most likely result in additional costs while still not providing any definitive data on who was and was not exposed.

That concludes my summary. I am willing to answer any questions you may have.

Mr. SHAYS. Thank you, Dr. Rhodes.

[NOTE.—The GAO report entitled, "Gulf War Illnesses, DOD's Conclusions About U.S. Troop's Exposure Cannot be Adequately Supported," may be found in subcommittee files.]

[The prepared statement of Dr. Rhodes follows:]

United States General Accounting Office

GAO

Testimony

Before the Subcommittee on National Security, Emerging Threats, and International Relations, Committee on Government Reform, House of Representatives

For Release on Delivery
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GULF WAR ILLNESSES

DOD's Conclusions About U.S. Troops' Exposure Cannot Be Adequately Supported

Statement of Keith Rhodes, Chief Technologist
Center for Technology and Engineering, Applied Research and Methods

GAO-04-821T

June 2004

GAO
Accountability-Integrity-Reliability
Highlights

Highlights of GAO-04-821T, a report to Subcommittee on National Security, Emerging Threats, and International Relations, Committee on Government Reform, House of Representatives

GULF WAR ILLNESSES

DOD's Conclusions about U.S. Troops' Exposure Cannot Be Adequately Supported

Why GAO Did This Study

Since the end of the Gulf War in 1991, many of the approximately 700,000 U.S. veterans have experienced undiagnosed illnesses. They attribute these illnesses to exposure to chemical warfare (CW) agents in plumes—clouds released from bombing of Iraqi sites. But in 2000, the Department of Defense (DOD) estimated that of the 700,000 veterans, 101,752 troops were potentially exposed. GAO was asked to evaluate the validity of DOD, the Department of Veterans Affairs (VA), and British Ministry of Defense (MOD) conclusions about troops' exposure.

This testimony summarizes a report GAO is issuing today.

What GAO Recommends

GAO is recommending that the Secretary of Defense and the Secretary of Veterans Affairs not use the plume-modeling data for any other epidemiological studies of the 1991 Gulf War. VA concurred with our recommendation. DOD did not concur but we have clarified the recommendation to address DOD's concerns as we understand them. GAO also recommends that the Secretary of Defense require no additional plume modeling of Khamisiyah and other sites. DOD concurred with our recommendation.

The Central Intelligence Agency (CIA) did not concur with our report, stating it could not review the draft report in the time allotted.

www.gao.gov/cgi-bin/getrpt?GAO-04-821T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Keith Rhodes at (202) 512-6412 or rhodesk@gao.gov.

What GAO Found

DOD's and MOD's conclusion about troops' exposure to CW agents, based on DOD and CIA plume modeling, cannot be adequately supported. The models were not fully developed for analyzing long-range dispersion of CW agents as an environmental hazard. The modeling assumptions as to source term data—quantity and purity of the agent—were inaccurate because they were uncertain, incomplete, and nonvalidated.

The plume heights used in the modeling were underestimated and so were the hazard area. Postwar field testing used to estimate the source term did not realistically simulate the actual conditions of bombings or demolitions. Finally, the results of all models—DOD and non-DOD models—showed wide divergences as to the plume size and path.

DOD's and VA's conclusion about no association between exposure to CW agents and rates of hospitalization and mortality, based on two epidemiological studies conducted and funded by DOD and VA, also cannot be adequately supported because of study weaknesses. In both studies, flawed criteria—DOD's plume model and DOD's estimation of potentially exposed troops based on this model—were used to determine exposure. This may have resulted in large-scale misclassification.

Troops under the path of the plume were classified as exposed; those not under the path, as nonexposed. But troops classified as not exposed under one DOD model could be classified as exposed under another DOD model. Under non-DOD models, however, a larger number of troops could be classified as exposed. Finally, as an outcome measure, hospitalization rate failed to capture the types of chronic illnesses that Gulf War veterans report but that typically do not lead to hospitalization.

June 1, 2004

Mr. Chairman and Members of the Subcommittee:

We are pleased to participate in this international hearing by presenting our assessment of the plume modeling, conducted by the Department of Defense (DOD) and the Central Intelligence Agency (CIA), to determine the number of U.S. troops that might have been exposed to the release of chemical warfare agents during the Gulf War in 1990. We presented our preliminary results to you in our testimony on June 2, 2003.[1] My statement today is based on our final report, entitled *Gulf War Illnesses: DOD's Conclusions about U.S. Troops' Exposure Are Unsupported,* which is being issued today.[2]

As you know, many of the approximately 700,000 veterans of the Persian Gulf War have experienced undiagnosed illnesses since the war's end in 1991. Some fear they are suffering from chronic disabling conditions because of wartime exposures to vaccines, as well as chemical warfare agents, pesticides, and other hazardous substances with known or suspected adverse health effects. When the issue of the possible exposure of troops to low levels of chemical warfare agents was first raised, during the summer of 1993, DOD and the CIA concluded that no U.S. troops were exposed because (1) there were no forward-deployed Iraqi chemical warfare agent munitions and (2) the plumes—clouds of chemical warfare agents—from the bombing that destroyed the Iraqi chemical facilities could not have reached the troops.

This position was maintained until 1996, when DOD publicly disclosed that U.S. troops destroyed a stockpile of chemical warfare agent munitions after the Gulf War in 1991, at a forward-deployed site, Khamisiyah, in Iraq. Consequently, DOD and the CIA conducted several analyses using computer modeling, in an effort to estimate the number of troops that might have been exposed to chemical warfare agents. Recognizing that actual data on the source term—such as the quantity and purity

[1]U.S. General Accounting Office, *Gulf War Illnesses: Preliminary Assessment of DOD Plume Modeling for U.S. Troops' Exposure to Chemical Agents,* GAO-03-883T (Washington, D.C.: June 2, 2003). www.gao.gov.

[2]U.S. General Accounting Office, *Gulf War Illnesses: DOD's Conclusions about U.S. Troops Exposure Cannot Be Adequately Supported,* GAO-04-159(Washington, D.C.: June 1, 2004). www.gao.gov.

(concentration) of the agent—and the meteorological conditions—such as the wind and the weather patterns—were not available,[3] in 1996 and 1997, DOD and the CIA conducted field-testing and modeling of the demolition of Khamisiyah, to determine the size and path of the plume, as well as the number of U.S. troops exposed to chemical warfare agents within the area of the modeled plume's path. During these initial modeling efforts, DOD also asked the Department of Energy's (DOE) Lawrence Livermore National Laboratories (LLNL) to conduct modeling. In 1997, DOD and the CIA also combined the results of five different meteorological and dispersion models into a composite simulation of the plume area. They conducted additional simulations, using meteorological and dispersal models, to estimate the path of exposure from plumes during the bombings of sites other than Khamisiyah—Al Muthanna, Muhammadiyat, and Ukhaydir. In 2000, DOD revised its modeling estimates for the destruction of chemical warfare agents at Khamisiyah, and estimated that 101,752 U.S. troops had potentially been exposed.

In response to your request, we evaluated how well conclusions—about the extent of exposure of U.S. troops and the association between CW exposure and troops' hospitalization and mortality rates—are supported by available evidence. Specifically, we have assessed the following:

1. How valid is the DOD and MOD conclusion—based on CIA and DOD plume-modeling results—about U.S. and British troops' exposure to CW agents?

2. What were the costs for the CIA's and DOD's various plume modeling efforts?

3. How valid are the DOD and Department of Veterans Affairs (VA) conclusions from epidemiological studies, based on DOD's plume modeling results, that there was no association between CW exposure at Khamisiyah and the troops' hospitalization and mortality rates?

[3]Observations were few because Iraq stopped reporting weather station measurement information to the World Meteorological Organization in 1981. As a result, data on the meteorological conditions during the Gulf War were sparse. The only data that were available were for the surface wind observation site, 80 to 90 kilometers away, and the upper atmospheric site, about 200 kilometers away.

Scope and Methodology

To determine the validity of DOD's conclusion—that U.S. troops' exposures to chemical warfare agents were as DOD estimates suggested—based on its plume-modeling analysis, we examined the meteorological and dispersion models DOD used to model chemical warfare agent releases from the U.S. demolition of Khamisiyah and Coalition bombings of Al Muthanna, Muhammadiyat, and other sites in Iraq during the Gulf War deployment period. We evaluated the basis for the technical and operational assumptions DOD made in (1) conducting the modeling for the bombing and demolition of Iraqi sites and
(2) estimating the specific data and information used in the modeling, relating to source term, meteorological conditions, and other key parameters. We also evaluated the efforts of the CIA and DOD to collect and develop data on source term and other key parameters used in the modeling efforts.

We interviewed DOD and CIA modelers and officials involved with the modeling and obtained documents and reports from DOD's Deployment Health Support Directorate. We also interviewed and received documents from DOE officials who were involved with the modeling at LLNL. In addition, we interviewed officials and obtained documents from the Institute for Defense Analyses (IDA) concerning the IDA expert panel assessment of CIA's modeling of Khamisiyah. We also interviewed U.S. Army officials at Dugway Proving Ground, Utah, to determine how chemical warfare agents might have been released during the Khamisiyah pit area demolitions. Finally, we interviewed officials at the U.S. Army Center for Health Promotion and Preventive Medicine, to determine how specific troop unit exposures were identified, and officials of the United Nations Monitoring, Verification, and Inspection Commission (UNMOVIC), to obtain information on source term data from the United Nations Special Commission's (UNSCOM) analyses and inspections of the Khamisiyah, Al Muthanna, Muhammadiyat, and other sites.

To determine the validity of DOD's and the Department of Veterans Affairs' (VA) conclusions—based on epidemiological studies—that there was no association between Khamisiyah exposure and the rates of hospitalization or mortality, we reviewed published epidemiological studies in which hospitalization and mortality among exposed and nonexposed U.S. troops were analyzed. We also interviewed the study authors and researchers and examined the Gulf War population databases provided to the researchers by DOD in support of these studies. We interviewed Veterans Benefits Administration officials and obtained documents and reports on their analyses of DOD's population databases.

We did not examine whether plume modeling data were being used by VA to determine eligibility for treatment or compensation.

In an effort to identify the total costs associated with modeling and related analyses of chemical warfare agent releases during the Gulf War; we interviewed relevant officials and collected cost data from various DOD agencies and DOD contractors who supported the modeling efforts.

To determine the extent of British troops' exposure to chemical warfare agent-related releases during the Gulf War, we interviewed British Ministry of Defense (MOD) officials in London and at Porton Down, and reviewed U.K. Ministry of Defense reports concerning the potential effects of exposure to chemical warfare agent-related releases on British forces.

We conducted our work from May 2002 through May 2004 in accordance with generally accepted government auditing standards.

Results in Brief

DOD and MOD's conclusions, based on DOD's plume-modeling efforts regarding the extent of U.S. and British troops' exposures to chemical warfare agents, cannot be adequately supported. Given the inherent weaknesses associated with the specific models DOD used and the lack of accurate and appropriate meteorological and source term data in support of DOD's analyses, we found five major reasons to question DOD and MOD's conclusions. First, the models were not fully developed for analyzing long-range dispersion of chemical warfare agents as an environmental hazard. Second, assumptions regarding source term data used in the modeling—such as the quantity and purity of the agent—were inaccurate, since they were based on (1) uncertain and incomplete information and (2) data that were not validated. Third, the plume heights from the Gulf War bombings were underestimated in DOD's models. Fourth, postwar field testing at the U.S. Army Dugway Proving Ground, to estimate the source term data, did not reliably simulate the actual conditions of either the bombings or the demolition at Khamisiyah. Fifth, there is a wide divergence in results among the individual models DOD selected, as well as in the unselected DOD and non-DOD models, with regard to the size and path of the plume and the extent to which troops were exposed. Given these inherent weaknesses, DOD and MOD cannot know which troops were and which troops were not exposed.

The total costs for the various plume-modeling efforts to analyze the potential exposure of U.S. troops—from the demolition at Khamisiyah and the bombing of several other sites in Iraq—cannot be estimated. DOD

organizations and other entities involved with the plume-modeling efforts could provide only direct costs (that is, contractors' costs), which totaled about $13.7 million. However, this amount does not include an estimate of the considerable indirect costs associated with the salaries of DOD, VA, and contractors' staff or costs of facilities, travel, and equipment. We requested, but DOD could not provide, this estimate. In addition, the CIA would not provide direct and indirect costs for Gulf War plume modeling because, in its view, our request constituted oversight of an intelligence matter, beyond the scope of GAO authority. The CIA's contractor, the Science Applications International Corporation (SAIC), also did not respond to our request for cost data.

DOD's and VA's conclusions—that there is no association between exposures to chemical warfare agents from demolitions at Khamisiyah and rates of hospitalization and mortality among U.S. troops—also cannot be adequately supported. DOD and VA based these conclusions on two government-funded epidemiological studies, one conducted by DOD researchers, the other by VA researchers.[4] In each of these studies, flawed criteria were used to determine which troops were exposed. For example, in each study, the criteria used were based on (1) DOD plume modeling of exposures from postwar demolition of the Khamisiyah munitions depot and (2) DOD's estimates, using this modeling, of which troops were under the path of the plume. Troops under the path of the plume were classified as exposed, those not under the path as nonexposed. However, troops classified as nonexposed under one DOD model could be classified as exposed under another DOD model, thereby confounding the results. In the DOD models, a small area was identified as being under the path of the plume, resulting in a small number of troops identified as exposed. But in other modeling not selected for consideration, such as that performed at the LLNL, for example, a much larger, as well as different area, was identified as under the path of the plume, resulting in the potential classification of a larger number of troops as having been exposed. In addition, these exposed troops included different troops from those in the DOD models–that is, troops classified as exposed in the DOD selected models would have been classified as nonexposed in the other models, even though the area of coverage was much greater.

[4]G. C. Gray and others, "The Postwar Hospitalization Experience of Gulf War Veterans Possibly Exposed to Chemical Munitions Destruction at Khamisiyah, Iraq," *American Journal of Epidemiology* 150 (1999); H. K. Kang and T.A. Bullman, "Mortality Among U.S. Veterans of the Persian Gulf War: 7 Year Follow-up," *American Journal of Epidemiology* 154 (2001): 399-409.

These flaws may have resulted in large-scale misclassification of the exposure groups—that is, a number of exposed veterans may have been classified as nonexposed, and a number of nonexposed veterans may have been misclassified as exposed. In addition, in the hospitalization study, the outcome measure—number of hospitalizations—would not capture the chronic illnesses that Gulf War veterans commonly report, but which typically do not lead to hospitalization. Several published scientific studies of exposure involving Gulf War suggest an association between low-level exposure to chemical warfare agents and chronic illnesses.

In our report, we are recommending that the Secretary of Defense and the Secretary of Veterans Affairs not use the plume-modeling data for future epidemiological studies of the 1991 Gulf War, since VA and DOD cannot know from the flawed plume modeling who was and who was not exposed.

We are also recommending that the Secretary of Defense require no further plume-modeling of Khamisiyah and the other sites bombed during the 1991 Gulf War in order to determine troops' exposure. Given the uncertainties in the source term and meteorological data, additional modeling of the various sites bombed would most likely result in additional costs, while still not providing any definitive data on who was or was not exposed.

We obtained comments our draft of this report from VA, DOD, and CIA. VA concurred with recommendation that VA and DOD not use the plume-modeling data for future epidemiological studies, since VA and DOD cannot know from the flawed plume modeling who was and who was not exposed. DOD did not concur with the recommendation, indicating that to them it called for a blanket prohibition of plume modeling in the future. The intent of our recommendation is only directed at epidemiological studies involving the DOD and CIA plume modeling data from the 1991 Gulf War and not a blanket prohibition of plume modeling in future. We have clarified the recommendation along these lines. DOD concurred with our second recommendation, indicating that despite enhancements in the models, uncertainties will remain. CIA did not concur with our report, indicating that it could not complete its review in the time allotted.

Background

According to the CIA, modeling is the art and science of using interconnected mathematical equations to predict the activities of an actual event. In this case, modeling was used to determine the direction

and extent of the plume from chemical warfare agents. In environmental hazard modeling, simulations recreate or predict the size and path (that is, the direction) of the plume, including the potential hazard area, and potential exposure levels are generated.

Information for Modeling

In addition to identifying the appropriate event to model, modeling requires several components of accurate information:

- the characteristics or properties of the material that was released and its rate of release (for example, quantity and purity; the vapor pressure; the temperature at which the material burns; particle size; and persistency and toxicity); temporal information (for example, whether chemical agent was initially released during daylight hours, when it might rapidly disperse into the surface air, or at night, when a different set of breakdown and dispersion characteristics would pertain, depending on terrain, plume height, and rate of agent degradation);
- data that drive meteorological models during the modeled period (for example, temperature, humidity, barometric pressure, dew point, wind velocity and direction at varying altitudes, and other related measures of weather conditions);
- data from global weather models, to simulate large-scale weather patterns, and from regional and local weather models, to simulate the weather in the area of the chemical agent release and throughout the area of dispersion; and
- information on the potentially exposed populations, animals, crops, and other assets that may be affected by the agent's release.

Types of Models Used

Various plumes during the 1991 Gulf War were estimated using global-scale meteorological models, such as the National Centers for Environmental Prediction Global Data Assimilation System (GDAS) and the Naval Operational Global Atmospheric Prediction System (NOGAPS). Regional and local weather models were also used, including the Coupled Ocean-Atmosphere Mesoscale Prediction System (COAMPS), the Operational Multiscale Environmental Model with Grid Adaptivity (OMEGA), and the Mesoscale Model Version 5 (MM5).

Transport and diffusion models were also used during the 1991 Persian Gulf War plume simulation efforts.[5] These models estimate both the path of a plume and the degree of potential hazard posed by the chemical warfare agents. Dispersion models used during the Gulf War included the Hazard Prediction and Assessment Capability (HPAC) along with its component, the Second-order Closure Integrated Puff (SCIPUFF) model; the Vapor, Liquid, and Solid Tracking (VLSTRACK) model; the Non-Uniform Simple Surface Evaporation (NUSSE) model; and the Atmospheric Dispersion by Particle-in-Cell (ADPIC) model.

DOD's Conclusion about U.S. Troops' Exposure to Chemical Warfare Agents Cannot Be Adequately Supported

DOD's conclusion about the extent of U.S. troops' exposure to chemical warfare agents during and immediately after the Gulf War, based upon DOD and CIA plume model estimates, cannot be adequately supported. This is because of uncertainty associated with the source term data and meteorological data. Further, the models themselves are neither sufficiently certain nor precise to draw reasonable conclusions about the size or path (that is, the direction) of the plumes.

In particular, we found five reasons to question DOD's conclusion. First, the models DOD and the CIA selected were in house models not fully developed for analyzing long-range dispersion of chemical warfare agents as environmental hazards. DOD and CIA officials selected several in-house models to run plume simulations. For Khamisiyah and the other Iraqi sites selected for examination, DOD selected the COAMPS and OMEGA meteorological models and the HPAC/SCIPUFF and VLSTRACK dispersion models. However, these models were not at the time fully developed for modeling long-range environmental hazards.

Second, the assumptions about the source term data used in the models are inaccurate. The source term data DOD used in the modeling for sites at Khamisiyah, as well as Al Muthanna and Muhammadiyat, contain significant unreliable assumptions. DOD and the CIA based assumptions on field testing, intelligence information, imagery, UNSCOM inspections, and Iraqi declarations to UNSCOM. However, these assumptions were based on limited, nonvalidated, and unconfirmed data concerning (1) the nature of the Khamisiyah pit demolition, (2) meteorology, (3) agent purity, (4) amount of agent released, and (5) other chemical warfare agent data. In addition, DOD and the CIA excluded from their modeling efforts many

[5]We use dispersion in this report to refer to both transport and diffusion models.

other sites and potential hazards associated with the destruction of binary chemical weapons, vast stores of chemical warfare agent precursor materials, and the potential release of toxic byproducts and chemical warfare agents from other sites.[6]

Third, in most of the modeling performed, the plume heights were significantly underestimated. Actual plume height would have been significantly higher than the height DOD estimated in its modeling of demolition operations and bombings. The plume height estimates that the CIA provided for demolition operations at the Khamisiyah pit were 0 to 100 meters. However, neither DOD nor the CIA conducted testing to support estimated plume height associated with the bombings of Al Muthanna, Muhammadiyat, or Ukhaydir. According to DOD modelers, neither plume height nor any other heat or blast effects associated with these bombings were calculated from the models; instead, these data were taken from DOD's Office of the Special Assistant for Gulf War Illnesses. In addition, according to a principal Defense Threat Reduction Agency modeler, DOD's data on plume height were inconsistent with other test data for the types of facilities bombed.

Fourth, postwar field testing at the U.S. Army Dugway Proving Ground, in Utah, to estimate the source term data did not realistically simulate the actual conditions of the demolition operations at Khamisiyah or the effects of the bombings at any of the other sites in Iraq. For field testing to be effective, conditions have to be as close to the actual event as possible, but these tests did not provide more definitive data for DOD and CIA's models. The tests did not realistically simulate the conditions of the demolition of 122 mm chemical-filled rockets in Khamisiyah. The simulations took place under conditions that were not comparable with those at Khamisiyah. There were differences in meteorological and soil conditions; the construction material of munitions crates; rocket construction (including the use of concrete-filled pipes as rocket replacements to provide inert filler to simulate larger stacks); and the number of rockets, with far fewer rockets and, therefore, less explosive materials. In addition, in the tests, the agent stimulant used had physical properties different from those of the actual agent.

[6]A binary weapon mixes two less-toxic materials to create a toxic nerve agent within the weapon when it is fired or dropped.

Finally, there are wide divergences—with regard to the size and path of the plume and the extent to which troops were exposed—among the individual models DOD selected. The models DOD used to predict the fallout from Khamisiyah and the other sites showed great divergence, even with the same source term data. While the models' divergences included plume size and paths, DOD made no effort to reconcile them. The IDA expert panel observed that the results were so divergent that it would not be possible to choose the most exposed areas or which U.S. troops might potentially have been exposed. IDA therefore recommended a composite model, which DOD adopted.[7] However, this approach only masked differences in individual model projections with respect to divergences in plume size and path. In addition, DOD chose not to include in the composite model the results of the LLNL simulation, performed at the IDA expert panel's request. The LLNL simulation estimated a larger plume size and different path from DOD's models. The IDA panel regarded the LLNL model as less capable than other models because it modeled atmospheric phenomena with less fidelity. A modeling simulation done by the Air Force Technical Applications Center (AFTAC) also showed significant divergences from DOD's composite model.

MOD Relied on U.S. Plume Modeling to Determine Their Troops' Exposure to Chemical Warfare Agents

According to British officials, the MOD did not collect any source term or meteorological data during the 1991 Persian Gulf War. It also did not independently model the plume from Khamisiyah, relying instead on the 1997 DOD and CIA modeling of Khamisiyah. However, according to British MOD officials, they were reassessing the extent of British troops' exposure, based on DOD's revised 2000 remodeling of Khamisiyah. We requested from the British MOD, but did not receive, information on the findings from this reassessment.

The MOD also determined that a number of British troops were within the boundary of the plume in the DOD and CIA composite model. The MOD estimated that the total number of British troops potentially exposed was about 9,000 and the total number of troops as "definitely" within the path of the plume, however, was about 3,800. In addition, of 53,500 British troops deployed, at least 44,000 were estimated as "definitely not" within the path of the plume. However, since the MOD relied exclusively on DOD's modeling and since we found that DOD could not know who was

[7]The composite approach DOD used is also known as the ensemble approach.

and who was not exposed, the MOD cannot know the extent of British troops' exposure.

Total U.S. Plume-Modeling Costs

The DOD and CIA were the primary agencies involved in the modeling and analysis of U.S. troops' exposure from the demolition at Khamisiyah and bombing of chemical facilities at Al Muthanna, Muhammadiyat, and Ukhaydir, but several other agencies and contractors also participated. Funding to support the modeling efforts was provided to various DOD agencies and organizations, the military services, and non-DOD agencies and contractors. We collected data on the direct costs these agencies incurred or funds they spent. As shown in table 1, direct costs to the United States for modeling the Gulf War were about $13.7 million.

Table 1: U.S. Direct Costs for Modeling Gulf War Illnesses

Agency or contractor	Direct costs[a]	Work done
BAHR Inc.	$11,796	Reviewed (1) processes and technology used to produce estimates of U.S. forces potentially exposed and (2) draft reports on Khamisiyah
Central Intelligence Agency	[b]	Computer-modeling analysis
Chemical Biological Defense Command, Aberdeen Proving Ground	140,000	Wood-surface evaporative modeling and environmental data support efforts
Defense Threat Reduction Agency	870,000	Computer-modeling analyses with HPAC/SCIPUFF dispersion and OMEGA weather models
Institute for Defense Analyses	149,429	Convened a panel of experts to review Khamisiyah pit modeling analyses
Lawrence Livermore National Laboratory	60,000	Computer-modeling analyses with ADPIC dispersion and MATHEW weather models
National Center for Atmospheric Research	308,000	Computer-modeling simulations using MM5 weather model
Naval Research Laboratory	1,090,000	Meteorological analysis to identify downwind hazard assessment with NOGAPS and COAMPS weather models.
Naval Surface Warfare Center	522,000	Computer-modeling analyses with VLSTRACK dispersion and COAMPS weather models
Office of the Special Assistant to the Deputy Secretary of Defense for Gulf War Illnesses	7,980,000	Internal costs for producing case narratives for Al Muthanna, Khamisiyah, Muhammadiyat, and Ukhaydir
Science Applications International Corporation	[c]	Computer-modeling analysis
U.S. Army Center for Health Promotion and Preventative Medicine	731,000	Exposure assessment and environmental modeling to determine U.S. troops' exposed to chemical releases from multiple incidents during the Gulf War
U.S. Army Dugway Proving Ground	1,861,950	Field trials and laboratory testing using 122 mm chemical-simulant filled rockets to develop source term data for modeling
White Sands Missile Range	2,600	Missiles for testing at Dugway Proving Ground
Total	**$13,726,775**	

Sources: Agency and contractor responses provided to GAO regarding their modeling and analysis costs.

[a]Direct costs for agencies includes funding for contracts provided by the Office of the Special Assistant to the Deputy Secretary of Defense for Gulf War Illnesses.

[b]The CIA denied our request for its costs for modeling chemical releases from Khamisiyah, as well as Al Muthanna, Muhammadiyat, and Ukhaydir.

[c]SAIC did not respond to our requests for information.

DOD's and VA's Epidemiology-Based Conclusions on Chemical Warfare Exposure and Rates for Hospitalization and Mortality Cannot Be Adequately Supported

DOD and VA each funded an epidemiological study on chemical warfare agent exposure—DOD's on hospitalization rates and VA's on mortality rates. From the hospitalization study, conducted by DOD researchers, and the mortality study, conducted by VA researchers, on exposed and nonexposed troops, DOD concluded that there was no significant difference in the rates of hospitalization and VA concluded no significant difference in the rates of mortality. These conclusions, however, cannot be supported by the available evidence. These studies contained two inherent weaknesses: (1) flawed criteria for classifying exposure, resulting in classification bias, and (2) an insensitive outcome measure, resulting in outcome bias. In addition, in several other published studies of 1991 Persian Gulf War veterans, suggest an associations between chemical warfare exposure and illnesses and symptoms have been established.

DOD and VA Used Flawed Criteria for Determining Troops' Exposure

In the two epidemiological studies, DOD and VA researchers used DOD's 1997 plume model for determining which troops were under the path of the plume—who were estimated to be exposed—and which troops were not—those who were estimated to be nonexposed. However, this classification is flawed, given the inappropriate criteria for inclusion and exclusion.

In the hospitalization study, the DOD researchers included 349,291 Army troops "coded" as being in the Army on February 21, 1991. However, the researchers did not report cutoff dates for inclusion in the study—that is, they did not indicate whether these troops were in the Persian Gulf between January 17, 1991, and March 13, 1991, the period during which the bombings and the Khamisiyah demolition took place. Although we requested this information, DOD researchers failed to provide it. Finally, the total number of 349,291 troops is misleading because many troops left the service soon after returning from the Persian Gulf and therefore would not have been hospitalized after the war in a military hospital—another criterion for inclusion in the study. Moreover, the researchers did not conduct any analyses to determine what number or percentage of those who left active duty were in the exposed or nonexposed group (including uncertain low-dose exposure or estimated subclinical exposure). Given all the methodological problems in this study, it is not possible to accurately estimate the total size or makeup of the exposed and nonexposed population that may have sought or may have been eligible for care leading to military hospitalization.

In the mortality study, the VA researchers included 621,902 Gulf War veterans who arrived in the Persian Gulf before March 1, 1991. Troops

who left before January 17, 1991—the beginning of the bombing of Iraqi research, production, and storage facilities for chemical warfare agents—were included in the study. This group was not likely to have been exposed. Therefore, including them resulted in VA's overestimation of the nonexposed group.

Troops who came after March 1, 1991—the period during which Khamisiyah demolition took place—were excluded from the VA study. The Defense Manpower Data Center (DMDC) identified 696,000 troops deployed to the Persian Gulf, but the mortality study included only the 621,902 troops deployed there before March 1, 1991. This decision excluded more than 74,000 troops, approximately 11 percent of the total deployed. In addition, 693 troops who were in the exposed group were excluded because identifying data, such as Social Security numbers, did not match the DMDC database. VA researchers did not conduct follow-up analysis to determine whether those who were excluded differed from those who were included in ways that would affect the classification.

DOD and VA Used an Insensitive Outcome Measure for Determining Hospitalization Rates

Hospitalization rates—the outcome measure used in the hospitalization study—were insensitive because they failed to capture the chronic illnesses that 1991 Persian Gulf War veterans commonly report, but that typically do not lead to hospitalization. Studies that rely on this type of outcome as an end point are predetermined to overlook any association between exposure and illness.

Based on DOD's 1997 plume model, DOD's hospitalization study compared the rates for 1991 Persian Gulf War veterans who were exposed with the rates for those who were nonexposed. This study included 349,291 active duty Army troops who were deployed to the Persian Gulf. However, DOD researchers did not determine the resulting bias in their analyses, because they did not account for those who left the service.

The Institute of Medicine noted that the hospitalization study was limited to Army troops remaining on active duty and to events occurring in military hospitals. Conceivably, those who suffered from Gulf War-related symptoms might leave active duty voluntarily or might take a medical discharge. Hospitalization for this group would be reflected in VA or private sector databases, but not in DOD databases. The health or other characteristics of active duty troops could differ from those of troops who

left active duty and were treated in nonmilitary hospitals. Moreover, economic and other factors not related to health are likely to affect the use of nonmilitary hospitals and health care services.[8]

This limiting of the study to troops remaining on active duty produced a type of selection bias known as the healthy warrior effect.[9] It strongly biased the study toward finding no excess hospitalization among the active duty Army troops compared with those who left the service after the war.

Some Studies Suggest an Association between Chemical Warfare Exposure and Gulf War Illnesses

We found some studies that suggest an association between chemical warfare agent exposure and Gulf War illnesses. Each of these studies has both strengths and limitations. In one privately funded study of Gulf War veterans, Haley and colleagues reported an association between a syndromic case definition of Gulf War illnesses, based upon the ill veterans' symptomatic complaints, with exposure to chemical warfare agents.[10] Factor analysis of the data on symptoms was used to derive a case definition identifying six syndrome factors.[11] Three syndrome factor variants found to be the most significant were (1) impaired cognition, (2) confusion-ataxia, and (3) arthro-myo-neuropathy.

Conclusions

In evaluating the plume models used, the results from the DOD and CIA modeling can never be definitive. Plume models can allow only estimates of what happens when chemical warfare agents are released in the environment. Such estimates are based on mathematical equations, which are used to predict an actual event—in this case, the direction and extent of the plume. However, in order to predict precisely what happens, one

[8]Institute of Medicine, *Gulf War Veterans: Measuring Health* (Washington, D.C.: National Academy Press, 1999), p. 36.

[9]R. W. Haley, "Point: Bias from the 'Healthy-Warrior Effect' and Unequal Follow-Up in Three Government Studies of Health Effects of the Gulf War," *American Journal of Epidemiology* 148 (1998): 315–38.

[10]R. W. Haley and T. L. Kurt, "Self-Reported Exposure to Neurotoxic Chemical Combinations in the Gulf War," *JAMA* 277 (1997): 231–37.

[11]R. W. Haley and others, "Is There a Gulf War Syndrome? Searching for Syndromes by Factor Analysis of Symptoms," *JAMA* 277 (1997): 215–22. The six syndrome factors were impaired cognition, confusion-ataxia, arthro-myo-neuropathy, phobia-apraxia, fever-adenopathy, and weakness-incontinence.

needs to have accurate data on relative to both source term and meteorological conditions. DOD had neither of these.

Given the unreliability of the input data, the lack of individual troop location information, and the widely divergent results of the simulations conducted based on varying models, DOD's analyses cannot adequately estimate the extent of U.S. troops' exposure to chemical warfare agents and other related releases. In particular, the models selected were not fully developed for projecting long-range environmental fallout, and the assumptions used to provide the source term data were inaccurate or flawed. Even when models with the same source term data were used, the results diverged. In addition, the models did not include many potential exposure events and exposures to some key materials—for example, binary chemical weapons, mustard agent combustion by-products, and chemical warfare agent precursor materials. It is likely that if models were more fully developed and more credible data for source term and meteorological conditions were included in them, particularly with respect to plume height as well as level and duration of exposure, the hazard area would be much larger and most likely would cover most of the areas where U.S. troops and Coalition forces were deployed. However, given the lack of verifiable data for analyses, it is unlikely that any further modeling efforts would be more accurate or helpful.

The results of DOD's modeling efforts were, nonetheless, used in epidemiological studies to determine the troops' chemical warfare agent exposure classification—i.e., exposed versus nonexposed. As we noted in 1997, to ascertain the causes of veterans' illnesses, it is imperative that investigators have valid and reliable data on exposure, especially for low-level or intermittent exposures to chemical warfare agents.[12] To the extent that veterans are misclassified as to exposure, relationships will be obscured and conclusions misleading. In addition, DOD combined the results of individual models that showed smaller plume size and ignored the results of the LLNL which showed much larger plume size and divergent plume path. Given the uncertainties in source term data and divergences in model results, DOD cannot determine or estimate—with any degree of certainty—the size and path of the plumes or who was or who was not exposed.

[12]U.S. General Accounting Office, *Gulf War Illnesses: Improved Monitoring of Clinical Progress and Reexamination of Research Emphasis Are Needed*, GAO/NSIAD-97-163 (Washington, D.C.: June 23, 1997).

Recommendations for Executive Action

In our report, we are recommending that the Secretary of Defense and the Secretary of Veterans Affairs not use the plume-modeling data for future epidemiological studies of the 1991 Gulf War, since VA and DOD cannot know from the flawed plume modeling who was and who was not exposed.

We are also recommending that the Secretary of Defense require no further plume-modeling of Khamisiyah and the other sites bombed during the 1991 Persian Gulf War in order to determine troops' exposure. Given the uncertainties in the source term and meteorological data, additional modeling of the various sites bombed would most likely result in additional cost, while still not providing DOD with any definitive data on estimating who was or was not exposed.

We obtained comments on a draft of this report from VA, DOD, and CIA. VA concurred with the recommendation that VA and DOD not use the plume-modeling data for future epidemiological studies, since VA and DOD cannot know from the flawed plume modeling who was and who was not exposed. DOD did not concur with the recommendation, indicating that to them it called for a blanket prohibition of plume modeling in the future, where the limitations of the 1991 Gulf War may not apply. The intent of our recommendation is only directed at epidemiological studies involving the DOD and CIA plume modeling data from the 1991 Gulf War and not a blanket prohibition of plume modeling in the future. We have clarified the recommendation along these lines. DOD concurred with our second recommendation, indicating that despite enhancements in the models, uncertainties will remain. CIA did not concur with our report, indicating that it could not complete its review in the time allotted.

If you or your staff have any questions about this testimony or would like additional information, please contact me at (202) 512-6412 or Sushil Sharma, Ph.D., Dr.PH., at (202) 512-3460. We can also be reached by e-mail at rhodesk@gao.gov and sharmas@gao.gov. Individuals who made key contributions to this testimony were Venkareddy Chennareddy, Susan Conlon, Neil Doherty, Jason Fong, Penny Pickett, Laurel Rabin, and Katherine Raheb. James J. Tuite III, a GAO consultant, provided technical expertise.

Keith Rhodes, Chief Technologist
Center for Technology and Engineering
Applied Research and Methods

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Mr. SHAYS. Before I recognize you, Mr. Binns, I just want to make a comment, Dr. Rhodes. Your testimony is bringing up a real sore to this subcommittee, because when we had talked about our troops being exposed to chemical weapons and our concern about that, DOD, CIA, everyone said basically our troops were not exposed. But they then started to insert the word, "no offensive use of chemical weapons exposed," and our troops—and that word, "offensive use," was something that just kind of got inserted.

In the meantime, we had a witness who had a video of Khamisiyah, and blowing up these shells and other munitions that were in Kahmisiyah. He was to testify the next week on a Tuesday. At 12 on Friday, the DOD said they would have an important announcement at 4 on Friday. At 4 on Friday, they acknowledged that our troops had been exposed to chemical weapons, which they said was defensive. And defensive meant that we had, in essence, blown up this and were dealing with this plume, so that when we then had our hearing on Tuesday, the press treated this as old news.

This was stunning news, because DOD was trying to keep from the world community and from this subcommittee and others the fact that our troops had been exposed, and they simply inserted the word "offensive use of chemicals."

To think now that the CIA would not cooperate with you and the work that you do as a government organization just blows me away; to think that they would care so little about our troops who served there, that they would not have cooperated so that your study could have been more valid.

The bottom line is you have determined that the plume study is totally and completely irrelevant. And I would just add that after they announced at that press conference, they said only a few of our troops, a few hundred, were exposed. Then they moved it up to 1,000. Then they moved it up to 10,000. And sitting directly behind you, Dr. Rhodes, is Jim Tude, who 5 years ago said this study and what's happened is just simply a joke. And you're documenting it in a study that frankly we wish you didn't have to have done.

But I am sorry to interrupt this hearing to just express my feelings about the outrageous cooperation we have had from the military as it relates to this issue, and there has to be an answer to this.

Mr. Binns.

Mr. BINNS. Mr. Chairman, members of the committee, Lord Morris, as chairman of the Research Advisory Committee on Gulf War Veterans Illnesses, I am honored to appear before this body. It was your committee's report which led Congress to create the Research Advisory Committee.

The committee produced an interim report presenting its initial findings and recommendations in June 2002 after only one meeting. A comprehensive report reflecting our work over the first 2 years is currently undergoing final revision and will be released in approximately 6 weeks. In my time here today, I will not attempt to anticipate the full scope of that report, but let me offer an overview.

First, I regret to advise you that Gulf war veterans are still ill in large numbers. Epidemiologic studies consistently show that 26

to 32 percent of Gulf veterans suffer from a pattern of symptoms including fatigue, muscle and joint pains, headache, cognitive and gastrointestinal problems over and above their counterparts who did not deploy to the Gulf. Twenty-six to 32 percent translates into between 180,000 and 220,000 of the 698,000 troops who served.

These ill veterans are not getting better. The most seriously ill include those with diagnosed neurological and neurodegenerative disease. So this problem remains with us, it is severe, and no treatments have been shown to be effective to any substantial degree.

On the positive side, there has been a flood of new research in the last 2 years that has finally begun to shed light on the nature of this illness. By pursuing these new discoveries, medical science has the opportunity to explain the biological mechanisms at work in Gulf war illnesses and ultimately to identify treatments to address them.

To illustrate the kind of progress that is taking place, let me summarize three areas where recent research has changed previous scientific thinking.

First, earlier government reports have concluded that psychological stress is the likely cause of Gulf war illnesses. New studies, however, have shown that stress does not begin to explain the poor health of Gulf veterans. For example, a large 2002 study of British veterans sponsored by the U.S. Department of Defense concluded that more than three-quarters of ill Gulf veterans have no stress or other psychiatric disorder whatsoever. The study further concluded that, "posttraumatic stress disorder is not higher in Gulf veterans than in other veterans. Alternative explanations for persistent ill health in Gulf veterans are needed."

A second scientific breakthrough is reflected in new studies showing objective evidence of neurological abnormalities in ill veterans. For example, research at the Department of Veterans Affairs Medical Center in Boston has shown that ill veterans perform worse on tests of attention, visual-spatial skills, and visual memory. A Department of Defense-sponsored study at the Midwest Research Institute has demonstrated that ill veterans show abnormalities on a wide range of tests of autonomic nervous system function.

Third, until recently it was believed that exposure to very low levels of nerve gas below the levels that produce symptoms at the time of exposure did not produce any long-term effects. Within the past 2 years, however, there have been at least 9 animal studies demonstrating long-term effects on DNA, behavior, immune function, memory, and responses involving the autonomic nervous system.

This research and more will be discussed in detail in the committee's upcoming report, but you can readily see that scientific progress is being made. These are government-sponsored studies conducted by a wide range of respected laboratories. With due respect to my co-committee member, it is not just Robert Haley anymore. The key question now is what research is being done to followup on these new discoveries.

Let me first address research at the Department of Veterans Affairs. VA has many talented individual researchers. VA also has strong leadership in Secretary Anthony Principi, who has person-

ally championed this issue. In October 2002, at his direction, VA's Office of Research and Development announced a special initiative to invest up to $20 million in fiscal 2004 in deployment health research, particularly Gulf war illnesses. The Research Advisory Committee and veterans were extremely heartened by this action. However, at the committee's most recent meeting in February, the Office of Research and Development reported that with fiscal 2004 nearly half over, only one study totaling $450,000 had been funded.

As you can imagine, the committee was extremely disappointed. The Secretary was equally, if not more, disappointed and communicated forcefully to the Office of Research and Development that priority be given to this area.

Since then I have seen a dramatic turnaround in the outlook of the Office of Research and Development toward Gulf war veterans' illnesses. A new program will be announced in the near future. It will include new research initiatives specifically dedicated to Gulf war illnesses. Equally important, it will reflect a purposeful, logical approach to direct Gulf war illnesses research toward the areas of greatest scientific opportunity and the development of treatments.

Mr. SHAYS. Mr. Binns, I am going to ask you to—we don't usually do this. We are just going to ask you to wrap up. Your statement is excellent, and it's there for us. But——

Mr. BINNS. Let me just make one point, and that is that the vast majority of the funding for the Department—for Gulf war illnesses research over the years has come from the Department of Defense. So that even with this new research initiative that I speak of, there will still be a dramatic overall decline in Gulf war illnesses research compared to historical levels. Between 1999 and 2002, the average government research for Gulf war illnesses was approximately $35 million in direct research. This year the Department of Defense is spending in new research, that is, new initiatives funded to followup on these breakthrough studies, no initial money.

The Department of Veterans Affairs may spend up to $11 million. So you have a decline from $35 million to approximately $11 million at a time when the research is finally beginning to show breakthroughs. In addition, the effect of these decisions extends far beyond ill Gulf war veterans. The new research emerging from the study of Gulf war veterans' illnesses has important implications to the war on terrorism. Terrorist alerts at home and military actions abroad provide constant reminders of the risk of chemical attack. It is indeed tragic that at this hour of need, just as the investment in past research is finally beginning to pay off and point the way toward success, there are not funds to pursue these discoveries.

It particularly perplexes the members of the committee that funding for programs like the U.S. Army Institute of Chemical Defense is actually being reduced at this critical moment in our history and that research to develop countermeasures to chemical threats has not been included in the $1.7 billion NIH counterterrorism program. Gulf war veterans are no longer the stragglers from a forgotten war. They are the advanced guard for all of us.

Mr. SHAYS. Thank you very much, Mr. Binns.

[The prepared statement of Mr. Binns follows:]

Testimony of James Binns
Chairman, Research Advisory Committee of Gulf War Veterans Illnesses
Before the Subcommittee on National Security, Veterans Affairs, and International Relations
U.S. House of Representatives Committee on Government Reform
June 1, 2004

Mr. Chairman and Members of the Committee. As chairman of the Research Advisory Committee on Gulf War Veterans Illnesses, I am honored to appear before this body, which has kept this tragic and important subject on the national agenda for many years. It was your Committee's report which led Congress to create the Research Advisory Committee in 1998, although the executive branch at that time took no action, and the Committee was not appointed until the current administration took office.

True to the intention of Congress, Secretary of Veterans Affairs Anthony Principi appointed a committee of doctors, scientists, and veterans who truly believe in this problem. There are eleven members and one consultant, and a two-and-a-half person staff. The Committee meets three times a year for two days each. The members have been extraordinarily diligent, with only one day of absence over the entire seven meetings. Other scientists producing leading edge research in this area are invited to discuss their research at these meetings, and government officials responsible for medical research programs are also invited to participate.

The Committee produced an interim report presenting its initial findings and recommendations in June, 2002, after only one meeting. A comprehensive report, reflecting our work over the first two years is currently undergoing final revision and will be released in approximately six weeks.

In my time here today, I will not attempt to anticipate the full scope of that report, but let me offer an overview of the research we have reviewed.

First, I regret to advise you that Gulf War veterans are still ill in large numbers. Epidemiologic studies consistently show that 26-32% of Gulf veterans suffer from a pattern of symptoms including fatigue, muscle and joint pains, headache, cognitive, and gastrointestinal problems over and above their counterparts who did not deploy to the Gulf. Twenty-six to thirty-two percent is a casualty rate which rivals the darkest hours in American military history. It translates into between 180,000 and 220,000 of the 698,000 troops who served in the first Gulf War.

These ill veterans are not getting better. The most seriously ill include those with diagnosed neurodegenerative disease. Gulf War veterans are developing ALS, Lou Gehrig's disease, at a rate nearly double the population norm. There are anecdotal reports of ill Gulf Veterans developing other neurodegenerative diseases including multiple sclerosis and Parkinson's disease, and our report will call for formal studies into the prevalence of these diseases.

So this problem remains with us, and it is severe.

On the positive side, there has been a flood of new research in the last two years that has finally begun to shed light on the nature of this illness. By pursuing these new discoveries, medical science has the opportunity to explain the biological mechanisms at work in Gulf War illnesses and ultimately to identify treatments to address them.

To illustrate the kind of progress that is taking place, let me summarize three areas where recent research has changed previous scientific thinking.

First, earlier reports, including the findings of two presidential commissions appointed by President Clinton, have concluded that psychological stress is the likely cause of Gulf War illnesses. New studies, however, have shown that stress does not begin to explain the poor health of Gulf veterans. For example, a September, 2002, study of British veterans sponsored by the U.S. Department of Defense and conducted by a British team which had formerly supported the stress theory, concluded that 76% of ill Gulf veterans have no stress or other psychiatric disorder whatsoever. The study, by the Gulf War Research Unit at Guy's, King's, and St. Thomas's School of Medicine, London, further concluded that "[p]ost-traumatic stress disorder is not higher in Gulf veterans than in other veterans. ...[A]ternative explanations for persistent ill health in Gulf veterans are needed."

A second area where there has been a scientific breakthrough is in evidence emerging from neurological studies of ill veterans. For many years, epidemiologists have noted that the range of symptoms reported by ill Gulf veterans fit the pattern of an illness that is neurological in nature. Other researchers, however, have pointed out that these symptoms were reported by the veterans themselves and that when ill veterans were given standard neurological tests, they tested normal. In the past two years, however, new studies have emerged that show objective evidence of neurologic abnormalities in ill Gulf veterans. Research at the Department of Veterans Affairs Medical Center in Boston, as well as other studies, have shown that ill veterans perform worse on tests of attention, visuospatial skills, and visual memory. A Department of Defense-sponsored study at the Midwest Research Institute in Kansas City has demonstrated that ill veterans show abnormalities on a wide range of standard tests of autonomic nervous system function. Neurological abnormalities in ill veterans have also been demonstrated by brain imaging studies at the University of Texas, Southwestern in Dallas and at the Montgomery Veterans Affairs Medical Center in Jackson, MS.

Third, at the time of the Gulf War and until recently, it was believed by military commanders and scientists that exposure to very low levels of nerve gas, below the level that produces symptoms at the time of exposure, did not produce any long-term effects. Within the past two years, however, there have been at least nine animal studies demonstrating that this belief was wrong. Three of these studies have been conducted at the U.S. Army Chemical Defense Institute, three sponsored by the Department of Defense at Lovelace Respiratory Research Institute in Albuquerque, NM, and three at the Purkyne Military Medical Academy of the Czech Republic. These studies have shown that low level, sub-clinical exposures, have long-term effects on DNA, behavior, immune function, memory, biochemical alterations in brain areas associated with memory loss and cognitive function, and T-cell responses mediated through the autonomic nervous system.

This research, and more, will be discussed in detail in the Committee's upcoming report, but you can readily see that scientific progress is being made. The key question now is what research is being done to follow-up on these new discoveries.

Let me first address the research at the Department of Veterans Affairs. As you have heard, some of the breakthrough research was conducted by VA, and VA has many talented individual researchers. VA also has strong leadership in Secretary Anthony Principi, who has personally championed this issue. In October, 2002, at his direction, VA's Office of Research and Development announced a special initiative to invest up to $20 million in FY 2004 in deployment health research, particularly Gulf War illnesses, more than double the amount invested by VA in any previous year. The Secretary underscored his commitment in a personal video appeal to all VA researchers.

The Research Advisory Committee and veterans were extremely heartened by this action. However, at the Committee's most recent meeting in February, the Office of Research and Development reported that with FY2004 nearly half over, only one study totaling $450,000 had been funded under the special up-to-$20 million initiative and that no others were pending. As you can imagine, the Committee was extremely disappointed. The Committee recommended actions to get the research program on track, and asked me to express our concerns to the Secretary.

The Secretary was equally, if not more, disappointed, and communicated forcefully to the Office of Research and Development that priority be given to this area. He directed VA research leadership and the Committee leadership to work together to develop an effective new Gulf War illness research program. For reasons unrelated to Gulf War illnesses, there is new management at VA Research and Development, and they have embraced this challenge. Since then, I have seen a dramatic turnaround in the outlook of the Office of Research and Development toward Gulf War illnesses.

This new program will be announced in the near future. It will include new research initiatives specifically dedicated to Gulf War illnesses. Equally important, it will reflect a purposeful, logical approach to direct Gulf War illnesses research toward the areas of greatest scientific opportunity and the development of treatments. Finally, it reflects a new level of cooperation between the VA Office of Research and Development and the Research Advisory Committee.

The challenge today is for VA research leadership and staff to sustain this commitment. I spoke to a group of ill Gulf veterans a month ago, and they reminded me that over the past thirteen years they have heard many promises of action, only to be disappointed, just as we were a few months ago.

What I can tell them and tell you, is that if we can keep building on this progress, we have the opportunity to produce results. Our Committee measures results in one way: not studies funded, not dollars spent, not reports published. As set forth in our Committee charter, the sole result that counts is improvement in the health of ill Gulf veterans.

Science has shown the way. Now we need the resources and good-faith cooperation from all concerned.

With respect to resources, the vast majority of the funding for Gulf War illnesses research has historically come from the Department of Defense. DoD funds committed several years ago produced most of these recent research breakthroughs. In the past two years, however, with isolated exceptions, the Department of Defense has gone out of the Gulf War illnesses research business. There are no funds at DoD to follow up on the promising studies that DoD has sponsored in the past.

Defense is focusing its resources on fighting the current conflict. That focus is certainly understandable. But the result is that, even with the encouraging changes in the works at VA, Gulf War illnesses research is dramatically down overall. And it particularly perplexes the members of the Committee that funding for programs like the US Army Institute of Chemical Defense is actually being reduced at this critical moment in our history.

The effect of these decisions extends far beyond ill Gulf War veterans. The new research emerging from the study of Gulf War veterans illnesses has important implications to the war on terrorism. Terrorist alerts at home and military actions abroad provide constant reminders of the risk of chemical attack. It is indeed tragic at this hour of need, just as the investment in past research is finally beginning to pay off and point the way toward success, there are not funds to pursue these discoveries.

Gulf War veterans are no longer the stragglers from a forgotten war. They are the advance guard for all of us.

Mr. SHAYS. Mr. Robinson; and then we are going to take questions. And I will go first to Mr. Sanders and then Mr. Turner.

Mr. ROBINSON. Mr. Chairman and members of the committee and Lord Morris. Headline from the Associated Press on May 2004, "Nerve Agent Sarin was in Iraq Bomb." And the key statement out of this document, apparently reported by the Department of Defense, "No one was injured after its initial detonations but two American soldiers who removed the round had symptoms of low-level nerve agent exposure," officials have said. A person exposed to a large dose of sarin can suffer convulsions, paralysis, loss of consciousness, and could die from respiratory failure. But in small doses, people usually recover completely.

Mr. Chairman, as you know, this battle for veterans' recognition of Gulf war illness has spanned over 14 years. And you also know that it was initially fought in the court of public opinion as to whether or not veterans were ill because of stress or there was some real factor involved. Today, we can report that science is unraveling the mysteries of Gulf war illness and there is a political will to look for answers.

Nothing that happened to Gulf war veterans in 1991 should be a mystery to anyone in this room because of science that has been produced today. However, there are still researchers in DOD and in the VA health care system that refuse to read, recite, promote, or look at the new science or new committees formed to address this issue. This continued effort by a few bad people who hold key positions is the reason we are just now looking at treatment modalities for Gulf war veterans.

Mr. Chairman, I believe you will agree we need a Manhattan-like project assessment of what has happened, where we are going, and what we need to do for the future because I know you believe, as I do, that this risk of exposure to chemical warfare agents can happen here in the United States, in your home and town where even low levels of sarin may be presented and no one would ever know it.

It is very important for us to understand what has happened to ill Gulf war veterans. It is not enough to hold hearings on the issue to expose the flaws in the system. The time has come for accountability and focused determination. Where needed, Congress must pass laws mandating research and treatment. When discovered, Congress must punish those who deliberately lean away from the veteran or those who purposely manipulate and inhibit science based on old theories that have long since been found untrue.

Right now there is a Gulf war veteran in the United Kingdom who is on a hunger strike, and chances are he will die if he goes through with his hunger strike. And what he is asking for is public hearings. And we hope that this committee's work, our testimony today, and what Lord Morris takes back will encourage the MOD to hold those public hearings so that the Gulf war veterans will have the same benefit that we have had for much of the research that is here in the United States.

What do we know today? For all intents and purposes, the DOD is not conducting research or investigating things related to Gulf war illnesses. There is still this belief with some that stress is the reason why veterans are sick. Recently, soldiers who returned from

Iraq have had their medical concerns classified as in-your-head hysteria when they ask for screening for dangerous substances like depleted uranium, lariam, or exposure to sarin. In all the cases above, the Department down-played the exposures, and even in the face of scientific data ignored some of the exposures.

Now, I just recently learned outside in the hall that apparently the Department is going to produce some document or some evidence that says they took blood from some of these soldiers exposed to sarin and may, in fact, be tracking them. But we don't know that, and we would like for them to be public about it. And certainly our interest has peaked, hoping that they did learn the lessons of 1991. These soldiers also who have had a chemical weapons exposure should be eligible for a Purple Heart. A chemical weapons exposure at the hands of the enemy is no different than an IED attack or an ambush, and it is something we need to look at.

The single most egregious thing that has happened in terms of DOD research is the lack of population identification. The DOD is not providing researchers, the VA, or the soldiers unique information identifying where they served or what they may have been exposed to. And simply stating that a soldier served in southwest Asia is not the kind of data that the IOM or the VA will need to conduct epidemiological studies.

I have 15 seconds left. One of the things that is most important in getting doctors to do the right thing by Gulf war veterans is that the VA and the DOD has to look at and promote the new science. These are three books that the VA puts out. One is called "Caring for the War Wounded." One is called "Health Effects from Chemical, Biological and Radiological Weapons." And this one is the "Guide for Gulf War Veterans." These are the veterans' health initiatives. Clinicians in the VA are supposed to read this to understand what are the exposures of Gulf war veterans. There is nothing in this document that reflects the science that we know today. This is all information from 1999 and back. It is the stress theory and it needs to be updated, because if the clinicians in the VA don't know what the illnesses are, they don't know what the exposures are, they can't possibly come up with treatments or give the veterans the kind of care they need. I would encourage the committee to please ask the VA to update this. And I submit the rest of my statement for the record.

Mr. SHAYS. Thank you very much, Mr. Robinson, and thanks to all the panelists.

[The prepared statement of Mr. Robinson follows:]

National Gulf War Resource Center

Presented by

Steve Robinson
Executive Director

Before the

Subcommittee on National Security, Emerging Threats, And International Relations

Regarding

Examining the Status of Gulf War Research and Investigations on Gulf War Illnesses

June 1, 2004

Mr. Chairman,

On behalf of the National Gulf War Resource Center (NGWRC), I want to thank the Chairman and other distinguished members for affording us the opportunity to testify before you here today. Too many years have passed for our Government to not find effective treatments for veterans suffering from Gulf War Illnesses.

As you know, the battle was first waged in the court of public opinion based on Department of Defense (DoD) and in some cases, Department of Veterans Affairs (VA) spin.

Today, we can report that science is unraveling the mystery surrounding Gulf War Illnesses because there is a political will to look for answers. Nothing that happened to Gulf War veterans in 1991 should be a mystery in anyone's mind based on science produced today. However, there are still researchers and doctors in DoD and the VA healthcare system that refuse to read, recite and promote, the new science or new committees formed to address this issue.

This continued effort by a few bad people who hold key positions is the reason we are just now looking into treatment modalities for ill veterans. The corruptness and nepotism of these few players needs to be addressed for the future of all veterans in the DoD and VA Healthcare system.

Mr. Chairman, I believe you will agree with me when I say we need a "Manhattan Project-like" effort to understand the consequences of the modern battlefield. If we can find the political and scientific will to place a rover on Mars then we can certainly spend the required capitol to understand, find and deliver effective treatments for exposures. The reason this effort is so necessary is because you, this committee, your state, and our America will face these same type exposures, if predictions about terrorist activities and intent prove to be true in the future.

It's not enough to hold hearings on this issue to expose the flaws in the system. The time has come for accountability and focused determination. Where needed, Congress must pass laws mandating research and treatment efforts. When discovered, Congress must punish those who deliberately lean away from the veteran or those who purposely manipulate and inhibit science based on old theories that have long since been found to be untrue.

We call on this committee to take bold steps and we hope our testimony will provide insight and direction for the road ahead.

What we have now

DoD:
For all intents and purposes, the DoD is not conducting research nor investigating anything related to Gulf War Illness. The Department continues to fund things like Cognitive Behavioral Therapy and Exercise Behavioral Therapy. Both of these programs are fine for addressing depression and helping soldiers cope with illness, but do nothing to address the illness itself. DoD medical research continues to press on with the "Stress Theory" model of medical care. Let me cite a few examples. Recently, soldiers who have returned from Iraq have had their medical concerns classified as "In your head hysteria" when they asked for screening for dangerous substances like Depleted Uranium and Lariam Toxicity. Several days ago, a sarin filled 155 shell exposed two soldiers to low levels of sarin. In all the cases above, the Department downplayed the exposures even in the face of scientific data that is clearly irrefutable.

Something must be done to get away from the "Risk Communication "model that downplays exposures and give the veterans the information they need to address their health concerns.

The soldiers recently exposed to sarin in Iraq should have been given:

1. Blood tests (including PON concentrations and activity levels & genotype; AChE levels and variants), blood archiving, and formal monitoring. Monitoring should include symptom testing to include, cognitive, muscle strength and fatigability. Testing should be repeated several weeks after the exposure. Then a long-term plan with a 5 to10 year follow-up so that subjects can later be compared to their earlier performance. Identifying a control group of comparable age and sex to follow would also be desirable as to assess whether "age-related" losses are more rapid in the exposed group.
2. Exposed persons should be informed of the risk factors to include signs and symptoms to watch out for.
3. The soldiers should be given autonomic tests that have been found effective in ill GWV's, such as forearm erythema with methacholine challenge, visceral and cutaneous sensitivity.
4. Sample soldiers for how long traces of sarin or potential toxic degradation products remain on hair; hair is a high surface area item that can serve as a depot following exposures, and hair or hair products often are good substrates for holding lipophilic substances (which could then engender secondary low-level exposure through direct contact or repeated re-deposition.

These soldiers should also be eligible for the Purple Heart. A chemical weapons exposure at the hands of the enemy is no different than an IED attack or a vehicle ambush.

Undersecretary of Defense for Health Affairs, William Winkenwerder, is responsible for the lack of pre-deployment screening prior to this war; he is also responsible for all health affairs policies that mitigate exposures through public relations tactics used by the Deployment Health Support Directorate. Under Doctor Winkenwerder's leadership, the Army failed to pre-screen thousands of deploying soldiers headed to Operation Iraqi Freedom and continues to put future veterans at risk by not telling the truth about the dangers of a wide variety of exposures. Shamefully, the same people who denied the existence of illnesses in Gulf War veterans are now responsible for monitoring the health outcomes of Operation Iraqi Freedom and Enduring Freedom veterans. The single most egregious problem related to research and DoD is the lack of population identification. The DoD is not providing researchers, the VA or soldiers, unique information identifying where soldiers served. Simply stating that a soldier served in Southwest Asia is not the kind of data the IOM or the VA will need to conduct epidemiological studies.

VA:
Chairman Binns will discuss the lack of funding for VA Gulf War related research and treatments. He will detail lost opportunities and the VA Secretaries response once he found out that his wishes were ignored by those beneath him. We however, are not surprised since there continues to be a cadre of people in the VA system below Secretary Principi that are the culprits who create delay and lack of implementation of the Secretaries intent. It is critical that these people either get on board with the science and direction of the Secretary or be rooted out and relieved of responsibility. We know that there is room for healthy debate when science is weak or not yet founded; in fact, we expect such debate to take place. However, when science is rock solid and clearly points to a treatment or research possibility, we expect action, especially when the Secretary of the Department of Veterans Affairs directs it. Some examples of this continued refusal to acknowledge the science are contained in the Veterans Health Initiative (VHI), a program supposedly designed to recognize the connection between certain health effects and military service. If you read the VHI for Gulf War Illnesses, Caring for War Wounded and Health Effects from Chemical, Biological and Radiological weapons, you will clearly see that current science is not cited in these educational materials. The independent study courses show nothing about current studies related to sarin or any other development since 1999. This lack of current science cannot be an oversight since some of the most compelling research was done by both DoD and VA researchers.

What we need immediately

DoD:
Many service members in Iraq are being wounded by physical trauma, psychological injury and endemic disease. There are early indications of chemical warfare agent exposure, Depleted Uranium exposures, Lariam toxicity and anthrax/smallpox vaccine induced heart problems. This sounds very familiar to events that occurred post 1991.

The difference this time is that we understand that all the exposures above can cause health effects. However, what hasn't changed is DoD is continuing to downplay the health outcomes that this war will present. As Executive Director of the NGWRC, my charge is to focus on ensuring the "Lessons Learned" from the first Gulf War are implemented. Soldiers of this war should not have to face the significant obstacles Gulf War and other war veterans have faced when trying to receive care after serving their country.

If DoD is allowed to have discretion in the implementation of public laws designed to screen soldiers and then also, allowed to present a false statement about the risk of exposure on the battlefield, then we have learned nothing from the mistakes of 1991.

We need this committee and Congress to STOP DoD from creating another generation of veterans who will suffer because current DoD policies don't address the real health effects of the modern battlefield.

We need tracking systems that provide meaningful data that clinicians can cull trends from. We need DoD to sponsor treatment research into alternative therapies that veterans are seeking on their own. We need DoD to immediately release all studies paid for with tax dollars related to Gulf War Illnesses. A classic example is the Rand Study on the Anthrax Vaccine; this report was written, paid for, and yet never released.

We need DoD to continue to study Gulf War illnesses issues where warranted. Many opportunities still exist in researching the following areas.

MILITARY IMMUNIZATIONS

A. Multiple Vaccinations.

1. Anthrax / smallpox vaccines and the dangers posed by multiple vaccinations. Recent reports suggest a connection between heart problems and multiple vaccinations
2. Genetic Screening – It is clear that the "one size fits all" approach to military vaccinations needs study and recent data shows promise in

screening soldiers for genetic predispositions to vaccines and investigational new drugs. The Department of Defense should be required to modify its Defense Medical Surveillance System (DMSS) medical reporting systems to insure it is capable of identifying whether current and future bio-defense vaccines and drugs have genetic risk factors.

DEPLETED URANIUM

A. Depleted Uranium Oxides

1. Science has never been fully conducted to rule in or rule out, the harmful effects of Depleted Uranium exposures. Now that we control Iraq we should conduct large-scale studies to prove or disprove the long-term effects of DU on Iraqis and US Forces serving in Iraq from 1991 to now.
2. Soldier Screening – It is clear that DoD ignored both public law and common sense when it recently denied returning war veterans DU screening. More troubling is the fact that these soldiers medical records did not indicate that they served in an area where DU was a risk. Congress needs to mandate DU screening if DoD is not going to track and report where DU is used on the battlefield. Then we can conduct studies to access the risk.

CHEMICAL WEAPONS EXPOSURES

A. Sarin

1. We are concerned about the dismissive tone the Army has taken related to the recent Chemical Weapons exposures in Iraq. Exposure to sarin nerve gas in concentrations too low to produce immediate symptoms causes irreversible brain damage according to studies by researchers at the University of New Mexico, Albuquerque, and the U.S. Army Medical Research Institute of Chemical Defense, Aberdeen, Maryland.
2. Anyone exposed to sarin gas should be identified by entry into his or her medical record.
3. The soldiers should be advised to monitor their neurological function as well as be required to undergo complete neurological testing upon return to their duty station. If any symptoms develop, they should be directed to Magnetic Resonance Spectroscopy to look for damaged areas of the brain.
4. Additional evidence supporting the link between adverse health effects and low-level sarin exposure is coming out everyday. We need DoD to pursue this science and develop treatment modalities rather than ignoring the facts.

VA:
Congress should mandate that VA research be only Veteran related. Congress should mandate that all VA clinicians be certified in unique veterans exposures rather than allowing them the option to study the VHI series. All staff, plus residents and interns, must take all of the continuing medical education curricula that are listed at www.va.gov/vhi. However, this data must first be updated with current knowledge and scientific input regarding exposures before mandating the curricula. By doing all of the simple no-cost steps outlined above, the VA could take a giant step toward making VHA more of a "Veterans' health care system" with real data culled from inpatient and outpatient records and military history taken at initial examination.

The VA Research Advisory Committee on Gulf War Illnesses should be given oversight into proposed and funded research projects at the VA. They should also be given the responsibility to review and make changes to the Gulf War Illness VHI series. We need the VA to put forth a real effort to share data, conduct studies and direct treatment for ill veterans. We are encouraged by recent statements given by Dr Perlin and Dr Aisen on their commitment to making this happen.

Gulf War veterans illnesses appear to be neurological in nature. The time has come to stop looking for causes and start finding treatments. This means we also must service connect veterans for illnesses like ALS, MS CFS, FMS and MCS, which are more prevalent amongst Gulf War veterans and most likely connected to chemical warfare agent exposure.

Finally, we need to continue to monitor access and gather data from Gulf War veterans. What are their health complaints? What are the most service connected disabilities? Are they getting better or worse over time? These and many more important questions remain unanswered.

Some things have improved, but many things remain broken. I retired in October 2001 and filed an original claim in June 2003. I have been asking the VA to provide me with a Gulf War C&P examinations, pursuant to their statutory obligations under the Veterans Claims Assistance Act of 2000. As of today, I have had no response from VA. If someone at my level can't get an exam, if doctors at the VA don't have access to the current science, if the VA doesn't promote the committee it stood up to look at the status of Gulf War Illness Research, if you cant find the Gulf War coordinator at your local VA center, then what does it say for the how the VA system is working for Gulf War veterans?

We need Congress to refocus the VA. Secretary Principi cannot do it all by himself.

Some accountability would go a long way to fixing these problems. If there were consequences for bad actions, then people would at least be forced to change or loose their jobs.

Mr. SHAYS. And we will start with Mr. Sanders, and we are going to do 10-minute questioning here.

Mr. SANDERS. Thank you Mr. Chairman.

Chris Shays and I have participated in dozens and dozens of hours of hearings. And I have to say that this is the most peculiar process that I have ever seen in my life. Something is wrong here. We have evidence that over 26 percent of Gulf war vets were made casualties. That's probably the largest number of any war in history. Dr. Hall tells us that he recently went to a meeting and that over 92 people were present who had identical physical symptoms. I have talked to Gulf war veterans in the State of Vermont, around the room, where they tell me when they walk into a grocery store and smell detergents or perfumes, they get sick. Chris and I have heard people come forward here with terrible, terrible illnesses. That is one reality that Chris Shays and I and other members of this committee have heard for years.

And then there is another reality that seems to come from the officials is—we have heard today from Dr. Heinrich that, A, they have 80,000 soldiers have reported symptoms, significantly less than the number that Mr. Binns made. But No. 2, we have 241 federally funded projects spending $247 million.

Dr. Heinrich, is there a Gulf war illness?

Dr. HEINRICH. The experts that we spoke with, sir, have said that there are unusual symptoms and that they still cannot identify the cause. But it is also clear to us that they are doing studies to try to further identify what that might be.

Mr. SANDERS. Thank you. That is it. And that's the insanity that we are dealing with: $247 million and your researchers have come up with the fact there are symptoms. You could have saved a lot of money. Chris Shays and I knew there were symptoms.

Mr. Bunker, are there symptoms?

Mr. BUNKER. Yes.

Mr. SANDERS. Mr. Robinson, are there symptoms?

Mr. ROBINSON. Absolutely.

Mr. SANDERS. We don't have to pay them $247 million. So what are we doing? I have concluded—and I don't mean this to be a mean statement to the members of the DOD, because I know in their hearts they certainly want all veterans to get a fair shake and to be well, but something very strange is going on. I do not know why from day 1 the DOD, to a lesser degree the VA, but both institutions have been resistant to the very serious crisis that we are facing and the pain that is going on.

And I would agree for a start with Mr. Bunker who made a very simple statement and he said, we should get the research money out of the VA and DOD. I think that's right.

Let me ask Dr. Heinrich a very simple question. Dr. Haley, who is a researcher who will be testifying later on, this is what he says in his report. He says, "I am encouraged at the progress that has been made in understanding the new type of brain cell damage that appears to underlie Gulf war veterans' symptoms." Is he crazy? He has been saying this for years. What do you say? And he hasn't spent $247 million. Is he right or wrong?

Dr. HEINRICH. What we have seen and what experts have said to us is that there are concerns that there is neurological damage.

And I think that's one reason you will hear the VA talk about new efforts to fund studies that are really focusing on neurodegeneration.

Mr. SANDERS. He has gone beyond concerns that there may be neurological damage. It is incredible to me and to the taxpayers of this country and all the people who are concerned about veterans that the VA and the DOD have done so very little.

Mr. Binns, I want to thank you. I am not a great fan of President Bush, but I think in appointing you and Anthony Principi, we have some serious people who are trying to deal with this issue. From your point of view, give us some understanding of why the government has been so lax in coming up with an understanding of the cause or some kind of treatment, despite the not insignificant sum of money. Where do you think we should be going from here?

Mr. BINNS. I can't answer the question of why they haven't gotten with the program.

Mr. SANDERS. How would you assess $247 million being spent with the results we have seen?

Mr. BINNS. A lot of the money has been spent in areas which at least today we can conclude, and earlier you might have been prepared to conclude, were not the areas that would lead to the most promising answers. For example, in 2003 the VA budget in that year, according to the recent report to Congress, provided for about $4.1 million in Gulf war illnesses research. Of that amount, 57 percent went to study stress and other psychological causes; 17 percent went to study things like Web-based training for VA physicians on bioterrorism events. So only 17 percent actually went for things that we believe are directly related.

Mr. SANDERS. We don't have a lot of time. I don't mean to be rude. Based on all of the evidence, do you agree or disagree with Mr. Bunker, who basically is saying we need research, these guys are not going to do it, we should get it out of the VA and the DOD?

Mr. BINNS. I would have agreed with you 4 months ago, but Secretary Principi, as I am sure representatives here from VA will attest, is very concerned about this issue. I wish I could guarantee that Secretary Principi would be the Secretary of Veterans Affairs for the next 20 years or so. We are going to have a good program that is very accelerated coming out of VA. Whether it can continue and whether there is the sustained effort depends upon many factors, as you well know. I think if you want to guarantee that there will be this kind of effort both from VA and DOD, Congress would have to make it a line item budget that there be Gulf war illness research.

Mr. SANDERS. You can appreciate the frustration that we feel; $243 million is not an insignificant sum of money. And the question is—you heard from Dr. Heinrich basically they have done very little with this money—so I think the question is not that there should not be money, but should we be saying, look, for whatever reason, the DOD is certainly not going to do it. Maybe the VA will do something, but we have to get it out of Capitol Hill and start finding serious researchers in the private sector, who by the way, if I'm not mistaken—I don't mean to be personal here, but I think you came into this issue out of family issues, because you saw a

correlation between a family member and the illness that our veterans were seeing; is that correct?

Mr. BINNS. Yes. And I think you are right in saying that there needs to be a mix, I believe, of VA and outside research. The limitation of VA research is that they can only fund VA physicians. Obviously, that is where the veterans are, so there should be a substantial investment there. As I said, I believe they are about to do that.

On the other hand, you need to have—I don't know who is the one to do it, NIH or DOD, but you need to have some agency with the capability of funding the best talent available outside of the Federal Government, and you need to have a total funding commitment that is at least at the historical level of commitment. I believe it's happening at VA and I think I see it happening in other agencies as well. I don't believe it will be wasted.

Mr. SANDERS. In your judgment, is Dr. Haley making some important breakthroughs?

Mr. BINNS. He has been the guy out there with the spear, advancing on this evil for many, many years. And he has made continued advances. Today I would say he has squads of troops behind him, and he has other people in the woods that you will be hearing from later on that really represent the heavy artillery who are willing to come into this area.

Mr. SANDERS. There is some good news that some breakthroughs are being made. Unfortunately, they have not been made within the DOD. And I have a lot of affection and respect for Anthony Principi and I know his heart is in the right place on this. But I think we owe it to our veterans not to throw money out there, but to target that money to serious people within the VA and the private sector and universities who are prepared to work with nongovernment researchers to begin to advance some of the ideas that are beginning to be developed.

Dr. Hall, let me get back to you. What I heard you say is that not a whole lot more is happening in the U.K., is that correct?

Dr. HALL. That's correct. I think we face the same sort of problems in that the money that is being spent is being utilized by people who you might describe as being an employee of central government. They are simply government lackeys who produce what the government wish to hear. There seems to be no independent research going on, or if there is, it isn't breaking through the press barrier to get free publication.

Mr. SANDERS. The chairman has asked me, when you mentioned 92 people with identical physical symptoms at a meeting, how many people were at the meeting?

Dr. HALL. Approximately 50,000 people deployed, of which 5,000 have reported symptoms; 1,500 are members of the NGVSA; 200 were at the AGM, and of those 200, 92 people who could take my place.

Mr. SANDERS. What does your government say when you present them with this information?

Dr. HALL. I have recent correspondence from my Prime Minister denying that this syndrome exists. And that's correct as of 2 weeks ago.

Mr. SANDERS. Denying or decrying?

Dr. HALL. Denying that this syndrome exists. My ill health problems are officially denied.

Mr. SANDERS. The official position of the Government of the U.K.——

Dr. HALL. My illness does not exist. It is imaginary, yet I have x-ray proof and I have MRI scans. My blood chemistry is deranged. I am now preleukemic. That is not an imaginary condition.

Mr. SHAYS. At this time, we will go to Mr. Turner and then to Mr. Tierney.

Mr. TURNER. Thank you, Mr. Chairman.

I appreciate all of the testimony we have received today, and when you look at the issue of both the medical science but also the analytical science as being applied to determine what happened in the field of battle, I am fascinated with the discussion on plume modeling, as I said in my opening statement, because in this subcommittee, so many times we have heard from people who have testified with seemingly absolute certainty as to what would occur under certain circumstances with respect to a plume, utilizing the technology for planning purposes, not only as a guide for what we need to respond to but what we don't need to respond to. And that concerns me greatly because that seems as if the science is not defined enough for us to exclude outcomes.

And in looking at GAO's report—and it says, DOD's conclusion about U.S. troop exposure cannot be adequately supported. When we talk about the amount of money that's been spent, I noted in the testimony, it says the direct costs alone, over $13.7 million from plume modeling, and that does not include indirect costs of in-house work that was done. So $13.7 million was spent outside for the purposes of plume modeling.

And then the conclusion is that—from the GAO is they are recommending that the Secretary of Defense and Secretary of Veterans Affairs not use the plume modeling data in the future, epidemiological studies of the 1991 Gulf war, since VA and DOD cannot know from the flawed plume modeling who was and who was not exposed, again giving the issue of not just what may have happened but trying to say what didn't happen. And then you go on to talk about the unreliable assumptions that make up the plume modeling that make it useless, the nature of the pit demolition, meteorology agent purity, amount of agent released and other chemical warfare agent data, all of which, when we try to prospectively guess about what might happen under circumstances of a terrorist attack or terrorist incident, are variables that will not be known and seem to me at times to be almost unlimited.

I would like to hear from you, Dr. Rhodes, and others who might want to comment, you are recommending that plume modeling not continue to be pursued because this data is not accurate enough. Is it possible to undertake plume modeling of this? It seems as if you are saying both the data they currently have is not reliable, the moneys that have been invested do not give the adequate return, but also raises the question of can it even be done?

Dr. RHODES. Mr. Turner, you have asked the right question: Can it even be done? It can be done if you understand exactly what you want to do with the outcome. If you are trying to plan the evacuation of a city, if you are trying to plan whether or not people

should seal themselves up in place, that can be done, assuming you have enough data. The meteorological data is missing from Iraq because it stopped delivering meteorological data to the world in 1981. If I am trying to get to a number, 101,752 troops were exposed, modeling cannot—I repeat—cannot give you that number. That number is an impossible number to get. It can give you a first order approximation. It cannot give you a number as precise as that, which is what is being parlayed at the moment. It is being proffered as this is the number. That number is incorrect. The data that were loaded into the models can give you diverging plumes. And the best we can conclude from looking at the modeling is that 700,000 soldiers, including people in Kuwait and including civilian populations in Saudi Arabia may have been exposed.

Now from a policy perspective, that's the best we can proffer to you based on the modeling. But we can't give you—I cannot sit here and say that the number 101,752 is correct and none of the data shows it. That doesn't mean don't model in other scenarios, an evacuation scenario, or should we shelter in place or something like that. That can be done. But it has to be done with the understanding that all models are first order approximations. They are not going to give you reality. They are going to give you a snapshot of reality. For example, as you see in our testimony, as you pointed out, the configuration of the munition and how it was detonated varies on the plume height; how high did it go? As you see in our report, there was an arbitrary number established, and that was exactly how DOD described it. It was the arbitrary value of 10 meters when a 2,000 pound bomb can give you upwards of a 400-meter plume. At 400 meters, that plume is going to start to shelf and it will spread out where you get the classic mushrooming design. Can I tell you at this point in time exactly how it mushroomed? Can I tell you exactly who was under it? No. But I can tell you that anyone who was in theater at the time of the demolitions or the bombings may have been exposed. But I can't tell you that it's you and not I, or that it's myself and not you.

And that's the problem with what's being done with the model, is that it's being asked for a degree of precision that it cannot give. And therefore what we get is the wrong answer, faster, to a greater degree of precision. And that's why we say in this instance, not in all models, but in this incident, in this instance and for these purposes, don't waste your money.

Mr. TURNER. I do have a followup question. Does anyone want to comment on the plume modeling? Mr. Robinson.

Mr. ROBINSON. I believe in some cases, once the information was produced, which we clearly believe is a flawed model, that data was used for years and years by both DOD and researchers to make other conclusions that they themselves were also flawed. And I think it's important that if an event like this occurs again in the future, the key No. 1 thing we need, besides retrospective modeling, is what happens when the event occurs, which is identify the people who were exposed, mark it down in their medical records, point them toward followup treatment and care, and when they come back, make sure they receive their care and then do a long-term followup.

If that had been done after the 1991 Gulf war, those basic steps, identify who potentially was exposed, tell them what the risks were, put it in their medical records and then point them toward people who understand that kind of exposure, we might not be sitting here today. We would know a lot more if we had taken that.

And the last thing is, besides modeling, listen to what the soldiers say. The soldiers reported this early on, that there was a problem. So if something happens in this war, listen to what the soldiers say and make sure their information is documented.

Mr. TURNER. One of the things that Mr. Rhodes said that I find interesting is that, you know, obviously U.S. troops, British troops, others, they were not the only ones in theater; there were Iraqis and Kuwaitis. What information do we have, or reports do we have, of similar types of symptoms occurring in the populations that were in Iraq or Kuwait?

Dr. HEINRICH. Let me try to answer that. We don't have a lot of information about the populations that are in that part of the world. And there are studies that are being funded now that are trying to identify, for example, the health of soldiers in Saudi Arabia and other Middle East states.

Mr. TURNER. What about the populations, though? We have been in Iraq for a year. Obviously we have a strong relationship with Kuwait. What do we know about the types of expression of these symptoms that they have in their population? Anything at all?

Mr. ROBINSON. The Government of Kuwait is in fact studying its National Guard soldiers. It doesn't make the U.S. news. There are researchers from the United States from different universities that are in not only Kuwait but Saudi Arabia and Iraq right now as we speak, looking to form the baselines for epidemiological studies. It just doesn't make the U.S. news.

Mr. TURNER. Thank you, Mr. Chairman.

Mr. SHAYS. Thank the gentleman. At this time the Chair would recognize Mr. Tierney.

Mr. TIERNEY. Thank you, Mr. Chairman and thank you again for continuing on with this series of hearings.

I have a number of folks in my district who expressed an interest in this, not the least of which was recently—a letter from one of my constituents explaining that his 62-year-old cousin had died, a fellow that grew up in my town and went to school—from the school that I graduated from. Enlisted in the U.S. Marine Corps in 1959. His career spanned 42 years, two wars, Vietnam and Operation Desert Storm; 29 years of Active and Reserve service. He was acknowledged as one of the longest-serving intelligence officers in the history of the Marine Corps, and he served as an enlisted intelligence specialist and he died after a long illness, which is one of the reasons we are having these hearings. He served in Kuwait.

Have there been any studies done or any information that we have that would distinguish the types of symptoms being experienced by individuals in different parts of that operation?

Mr. BUNKER. The Kansas study shows that according to where a person was stationed made a difference as to the types of symptoms. There was a study done by Dr. Leah Steele and it was published in November 2002.

Mr. TIERNEY. What are we doing as a result of that? Is some of our research, Mr. Binns, focusing on that?

Mr. BINNS. The specific finding was that 41 percent of the veterans in that Kansas study who were in the forward area, who actually entered Kuwait or Iraq, fell into the ill population over and above the control group. One of our recommendations as a committee is going to be that future studies always look at the locations and at the unit designations of ill veterans, because based on that limited information, there does appear to be a dramatic difference compared to how sick they are.

Mr. TIERNEY. Mr. Binns, I know in your work so far, I know that Mr. Robinson made a point of listening to the veterans and to the people that were there. Do you find that most of the studies are doing that? Has there been a change from the earlier reports that distinctly indicated that they thought there was inadequate regard for what the veteran participants were saying?

Mr. BINNS. No. I think this is mostly an idea that we are just initiating now. It has not been applied in the past.

Mr. TIERNEY. So it continues to be an issue.

Mr. Sanders, you had another question to ask, too. Feel free to jump in on that if you do. With that as a continuing problem, one of the earlier findings was that there needed to be a better management of the research portfolio. What progress have we made on that, Mr. Binns, Mr. Robinson?

Mr. BINNS. As I said, within the past 3 months we, at the Secretary's direction and the leadership of the Office of Research and Development at VA, have been working much more closely together than we ever did before on developing a research program that indeed is focused on certain key questions which our research or reading of research shows are the questions that need to be answered, and is not focused on topics which, while they are perfectly legitimate topics for VA research, stress, are not relevant to this topic.

We believe that we are making progress. Hopefully this program will be announced in the near future by VA and that will be the start, I would say again, of moving to an organized comprehensive research plan. There has been a mechanism for coordination between VA and DOD in the past. It does not appear to have been a coordinated effort but more of a shotgun effort.

Mr. SANDERS. Let me ask a simple question. We are looking at what I have heard of about 125,000 out of 700,000 who came home with one or another type symptom. That is a huge number, probably more than any war in our history.

Simple question. Let me start with you, Mr. Binns. You mentioned that—and maybe Mr. Bunker or Mr. Robinson might want to jump in. Are these people getting better over time? Are they getting worse? Does anybody bother to find out?

Mr. BINNS. They do not appear to be getting better. Some of them are getting worse.

Mr. BUNKER. In the Kansas study, there was a small number that appeared they may be getting a little bit better. I can give you an example. If you had known me 4 years ago you wouldn't recognize me as the same person. Mr. Tude met me about 3 or 4 years

ago. I was on two crutches. This time of day, I would be incapacitated because of my cognitive disabilities.

Mr. SANDERS. You have some improvements?

Mr. BUNKER. I had a neurological doctor who ran some tests to see if I was having seizures, and I wasn't, but he put me a low dose of seizure medicine. That medicine he put me on, I have not had the cognitive dysfunction like I used to have. My productivity has greatly increased.

Mr. SANDERS. The simple question, one would think that if one were serious in trying to understand to treat this illness, we would say, OK, 14 years have come and gone. This percentage is doing better, this percentage are worse, the rate of mortality is higher, lower, whatever. Do we know that, Mr. Binns?

Mr. BINNS. No. We know mortality. There have been studies of mortality and there have been studies of certain hospitalizations and so on. There are not comprehensive records or studies done of whether the treatments that are being prescribed in VA hospitals or elsewhere are effective. And that has been one of our major recommendations in this report coming out, that evidence such as what Jim is suggesting be developed.

You can't go and fund a $9 million clinical trial on the basis of an anecdotal case or two. The problem has been is that there has been no organized effort to take this kind of information and actively develop it, find a doctor and put him together with some VA doctors and have him do a small trial and see if it works and why. That is a key part of this problem, because I believe there are treatments out there that work.

Mr. TIERNEY. Who is not doing that? Who didn't do it and who is now doing it?

Mr. BINNS. Nobody is doing it. We are recommending that VA do it.

Mr. TIERNEY. Dr. Heinrich, if we are to expand this out beyond the VA and Department of Defense, who ought Congress charge with being involved in this research, either coordinating it or conducting some of it? Where would we best be directed?

Dr. HEINRICH. There is a deployment health group with a subcommittee of—for research that does coordinate this across DOD, VA, and HHS in terms of where would the money be best placed so it is expended in ways such as Mr. Binns has suggested. It is a hard question for me to answer.

Mr. TIERNEY. Who would you recommend we go to for the answer, because most of us up here are not medical people.

Dr. HEINRICH. I would suggest that you talk with the leadership at VA and the people within the Department of Defense that have responsibility for deployment health.

Mr. TIERNEY. Go back to where the problem has been, basically is what you're telling us. I am not sure that is a great idea.

Mr. Robinson.

Mr. ROBINSON. Instead of making an all or nothing, let's not let DOD or VA do research. What we need is oversight with teeth that honest people, ombudsman, nonscientists, scientists, an independent group of people much like the VA Research Advisory Committee could play that role to be involved in the process and be an honest broker. What we have had over the last 13 years is decisions

being made that necessarily weren't in the best interest of the veteran. We needed an honest broker in there to say maybe we don't go down that road this time.

My recommendation is that the VA Research Advisory Committee be given at least oversight. Maybe you don't give them the actual authority to choose, but we have to have at least oversight into what is going on so we can tell the veterans what is or is not happening.

Mr. TIERNEY. Mr. Binns, does your group not have that authority now; and if it doesn't, do you think that would be effectively used by your group and to what end?

Mr. BINNS. My personal opinion is that the more our group is involved, the better the research program will be. And one of the keys in the last 3 months is that we have been actively involved. We have been participating in writing the new RFA. We are going to be involved in reviewing the studies. We have been introducing key researchers to the VA and they have been listening to us. The more we are involved, the better.

I also, coming from the private sector, believe in competition. I think that if you had a treatment development program going on at VA, that is a logical thing to do. Create another one outside of VA at some research university to do the same thing and see who gets there first.

Mr. TIERNEY. Mr. Bunker, you wanted to say something?

Mr. BUNKER. Sir, you are talking about the treatment earlier in that. I have been trying for 4 years to get money from the Federal Government to do phase 2 on the Kansas study which would be looking at how veterans are getting better over time. I cannot get funding out of the VA because the VA will fund VA projects. That's why I said in my testimony, get the research away from the VA.

The RAC has a setup right now and has excellent oversight, because they can give the funding either to a VA researcher or a private researcher. We have a plan there that we want to act on, but we need the money to do it, and it would be great if we could get some of the money out of the VA or from the Federal Government to do the next step and look at the health of the veteran and look at what's going to make him better.

Mr. TIERNEY. Mr. Sanders, anything you want to add?

Mr. SANDERS. Mr. Binns, let me go back to you. Has there been much discussion or are you aware of the correlation between the symptoms associated with Gulf war illness and symptoms that we see in the civilian society? Lou Gehrig's Disease comes to mind.

Mr. BINNS. There is certainly an overlap which has been recognized by VA and DOD over the years between Gulf war illnesses and conditions like fibromyalgia or chronic fatigue syndrome or multiple chemical sensitivity. Our committee has focused in its initial 2 years on the scope of Gulf war illnesses and the neurological connections and exposures which may explain neurological interconnections.

We are about to begin focusing on treatments and we are going to be looking at the experience of both civilian and government doctors in those areas. Our next meeting is at the East Orange Veterans Administration Medical Center where Dr. Ben Adelson is one of the chief NIH researchers on chronic fatigue and fibromyalgia.

Mr. SANDERS. Would you agree it might be a fertile field of study to see a correlation between how people in the civilian society and perhaps their exposure relate to people?

Mr. BINNS. Yes.

Mr. SANDERS. I yield back.

Mr. SHAYS. Lord Morris, you have the floor.

Lord MORRIS. Dr. Hall spoke movingly and with unmistakable integrity and commitment. I was delighted by his plea for more U.S.-U.K. cooperation. He speaks highly representatively of U.K. veterans. Dr. Hall referred to the pertussis vaccine used in the U.K. It was produced by the French manufacturer Mariere and was not licensed for use in the U.K. Nevertheless, 40,000 doses of vaccine were used. Although he was not deployed to the Gulf, as Bern Sanders noticed, Dr. Hall had the same vaccinations as people who were. He presents the same illnesses that so many veterans of the Gulf war are presenting. Does he know of anyone else? He must have had many, many contemporaries. Does he know of anyone else who was not deployed and not subjected to the multiple immunization program, but is presenting the same kind of illnesses? I don't.

Dr. HALL. No, sir, I don't. I only know a few people who are supposed to—or have GWS, who were vaccinate, but none deployed. I think we have a hidden reservoir of immunized, nondeployed personnel who just do not make the critical association between their current health status and the vaccinations they were forced to undergo. And as a result of that, it never ever enters their mind that they may have GWS.

Currently, we are in the middle of trying to complete a demographic study of all traceable veterans involved in GW1. Until we get comprehensive replies, we are not going to be in a position to make a statement about the various incidents of illness in those who were deployed as opposed to those who weren't deployed. The only person I know well who is nondeployed is currently on this hunger strike.

Lord MORRIS. As he knows, I continue to press again and again for an independent inquiry. And I can tell you what he said this afternoon, very urgent in my mind and continuing to press.

Turning to Dr. Rhodes, the Ministry of Defense's original estimate is that only one servicemen could possibly have been exposed to the fallout at Khamisiyah. How many of the British troops does he think could potentially have been exposed? Moreover, can the MOD's reported view, the highest theoretical dosage that the troops received was well below the level at which the first noticeable symptoms occurred and could have no detectable effect on health, still be valid?

Finally, Dr. Rhodes, how do you believe your findings would help—will help American and British troops, researchers, and clinicians?

Dr. RHODES. Thank you, Lord Morris.

In answer to your first question, how many; the U.K.'s Ministry of Defense claim that there is only one U.K. soldier who was exposed as a result of the Khamisiyah demolition, based on—the conclusion made by the Ministry of Defense is based on the Department of Defense and CIA modeling. That modeling is specious at

best. Therefore, that assumption made by the Ministry of Defense is also specious. It cannot be correct, because it has no basis in reality.

I have heard the Ministry of Defense defend their position, but knowing the modeling that was assigned, that their assumption was based on, I realized that number cannot be valid. What is the correct number? The correct number is, no one knows. I am not trying to trivialize the point here, but the main thrust is that all U.K. troops deployed in the theater of operations for the entire time at Al Muthanna, Muhammadiyat, Ukhaydir, Khamisiyah, when all of these sites were destroyed, could possibly be exposed and that is the reality.

That leads to your second question, the answer to your second question about percentage being below the dose at which symptoms would be expressed. That is also unknown, because the assumptions about the concentration of agent inside each of these locations varied wildly. Some said that it could have been as low as zero concentration, some were 18, some were upwards of 50 percent. As those numbers vary, I do not know how one mathematically derives any estimation of dosage.

Which leads to the answer of your last question: What can the understanding of the limitations that the models do for the allied troops, those that were deployed? One cannot assume, based on these models and based on these efforts, that we know who was and was not exposed. Therefore, don't force the veteran to prove that he's sick. That's how we can help, is to say you are expressing symptoms. The symptoms can now be seen scientifically in the framework of possible exposure to low-level nerve agent, and then they aren't viewed as individual symptoms but can be, as Mr. Binns is talking about in the data collection, they can now be viewed in more of a mosaic. They can be viewed more as, these might be a collection of symptoms that add up to something else. And that way we are able to help the veterans, both U.K. and United States.

Mr. SHAYS. Mr. Binns, you have been a giant in trying to get this government and the Department of Veterans Affairs to take seriously Gulf war illnesses, and you have had impact on that. And for you to reiterate before this committee, first I regret to advise Gulf war veterans are still ill in large numbers, to say epidemiological studies consistently show that 26 to 32 percent of Gulf war veterans suffer from a pattern of symptoms including fatigue, muscle and joint pain, headaches, cognitive and gastrointestinal problems over and above their counterparts who are not deployed to the Gulf, that 26 to 32 percent is a rate which rivals the darkest hours in American history—that translates into 180,000 to 220,000 of this 698 troops who served in the Gulf war—and then say these ill veterans are not getting any better is just depressing.

And we have not had a hearing very recently and I am just almost at a loss for words. Why are we losing steam? Why is it, because we haven't had hearings to make this in the public's eye? Is it just, old soldiers never die, they just pass away? What is it?

Mr. BINNS. I think that the personnel and the attitudes of the Department of Veterans Affairs and Department of Defense, that while they may have changed at the top and the bottom—that is

to say, individual researchers and also at the Secretary level, VA, at least, and DOD obviously has been busy with other things—in the middle you have had a group of people who were really the same people who were involved in running Gulf war illnesses research when you wrote your 1997 report. And until there was convincing new science—and that has been difficult to marshal until recent years because it has been primarily private research and isolated research, but now that we have government research—and I want to give credit to the Department of Defense research program. They are the ones who produced most of this research that we have been citing from. The evidence has reached a tipping point where a public official like Secretary Principi will no longer accept excuses. Before that we were providing our information.

To be fair, we have not published our report. Our report will be out in 6 weeks and it will address all of these areas comprehensively. If we had gotten our report out a year ago, perhaps it would have influenced things to move faster. I think now is the time to move. There is a tipping point now both in the science and the reason for taking action, both the veterans are still ill and we have, as Congressman Turner has pointed out, a much larger issue at stake.

Mr. SHAYS. Explain to me the funding issue so I know where the requirement lies. We are starting to learn valuable information, but the funding is going down. Is that a discretionary determination on the part of VA, DOD, or Congress? Tell me where the read is here.

Mr. BINNS. My understanding is that none of these items are line items at the moment and therefore it is discretionary to VA and DOD. And at VA we have seen the initiative announced by the Secretary 2 years ago was not fulfilled due to a variety of factors. Now we have new initiatives coming out of VA that we believe will increase the level of funding of VA total, approximately $15 million a year. But that will be dramatically below the $35 to $40 million level of 1999 to 2002 for the Federal Government as a whole.

Mr. SHAYS. And the $35 million is in general terms a fairly small sum.

Mr. BINNS. If you were to set this in terms of what is it going to take us to do the job in 4 years, I believe the sum would be larger.

Mr. SHAYS. You see, what I am wrestling with among a lot of other things, I mean obviously I wrestle with the fact that we have 17 hearings and DOD came in and said they are not sick, and VA said they are not sick and it is more of a mental issue that impacts them physically but it is mental stress. And then we have the sick veterans come and demonstrate they were sick through documentation and also through just visual reality. And so you know, at least the epidemiological studies have determined they are sick, they are not well. So we know that.

I would think that there would be this huge interest to say, well, you know, we are going to be sending more people into battle and we want to learn from this and we value the men and women who serve. So it is not just dealing with the veterans who are sick now, it is also the veterans who may become sick who we could prevent

from becoming sick. So there is every logic that says we should deal with this.

With the plume studies, Dr. Rhodes, it seems to me unless I am going to hear something different in the next panel, you kind of hit the ball out of the park. In a negative way, you are basically saying the plume studies are basically worthless; is that true?

Dr. RHODES. Yes.

Mr. SHAYS. And we have given out money and we are doing research based on, in your judgment, a worthless plume study; is that correct?

Dr. RHODES. Correct.

Mr. SHAYS. The fact that you suggest no more be done and the fact that DOD and others say they don't intend to, you came to the same conclusion. In one sense, you're not going to do more, but the difference is they have not yet said to you they agree with your analysis; is that correct?

Dr. RHODES. No. Actually, we did collect comments. And after some clarification with the Department of Defense, they did say that the modeling of these events, because that was the bone of contention, the modeling. The Department of Defense assumed that we were striking a prohibition against all modeling. We clarified the point that we were talking about, just about Khamisiyah, Muhammadiyat, Ukhaydir, the 1991 modeling event, bombing event. And after clarification, they did say that they thought that the modeling would not be fruitful.

Mr. SHAYS. And there is no question in Khamisiyah that there were significant amounts of chemical weapons, correct?

Dr. RHODES. Correct.

Mr. SHAYS. There is no dispute about that. What's interesting, we talk about 125-millimeter rockets were identified at Bunker 7. The rockets were found to be filled with combination of sarin and sarin nerve agents; 122-millimeter rockets containing the same nerve agents were also found at a pit area close to Bunker 73. It was not until 1996 that UNSCOM conclusively determined that CW agents were in Bunker 77.

Then you have in your report in September just for review, 1996, DOD estimated that 5,000 troops were within 25 miles of Khamisiyah in October 1996. They extended this radius to 50. It estimated 20,000 U.S. troops had been within the zone. In July 1997 from the first plume analysis, DOD estimated that 98,910 U.S. troops have potentially been exposed. And in 2000, additional analysis led DOD to estimate that 101,752 U.S. troops had potentially been exposed. Is there any question, though, that tens of thousands of troops were exposed, you just don't know who they are? Are there hundreds of thousands or can't we even say that?

Dr. RHODES. None of the modeling efforts are going to be definitive enough to give you a number.

Mr. SHAYS. What do we know? Basically we know there are lots of chemicals and there were plumes in the air and that potentially hundreds of thousands of troops could have been exposed, or tens of thousands, but we don't know who they were.

Dr. RHODES. If you look at the aggregate models of the ones that DOD used and did not use, it actually shows it going out into the Gulf and covers Kuwait. In some cases it goes up into Iran and

Saudi Arabia, and most of southern Iraq is covered. So at that point, you have now reached the complete limit of understanding of how many people are involved, because you can't even talk about troops as the earlier discussion, about what about civilian populations. Sarin doesn't care whether you wear a uniform or not. But we don't know who's there, and so all we can say is everyone in this area from this time in March until this time, or from this date or during this 3-day period or however people want to break the time down, everyone in theater has the possibility of being exposed. And as I stated to Lord Morris, percentage in relation to dosage, to express symptoms, impossible to calculate.

Mr. SHAYS. Dr. Heinrich, I am a little confused as to the—this happens periodically, because I am not quite sure when you were asked the question about Gulf war illness, your response to Mr. Sanders was, frankly, unclear to me given that you have been involved in this process for awhile. It seems to me that your answer was kind of, like, blah. I don't know if you believe there is a Gulf war illness or you are using some technical language that says people think there is. Do you believe there is a Gulf war illness?

Dr. HEINRICH. The evidence we looked at says that there are significant numbers of people that have these symptoms that we are calling Gulf war illness. And I think the scientists and the literature show that there is acceptance.

Mr. SHAYS. Is your trouble that we call it Gulf war illness? If lots of people come home sick from Iraq to the tune of tens of thousands, do you have any doubt about that in your studies and your research?

Dr. HEINRICH. In our review of the research, no. It is very clear that there were numbers of people coming back reporting the symptoms, right.

Mr. SHAYS. Reporting them. And in fact, hasn't it been demonstrated that there are reports of being sick. They have come home sick. Is there any doubt in your mind?

Dr. HEINRICH. No.

Mr. SHAYS. Is it the issue we call it Gulf war illness or something else is that—where you get your hang-up?

Dr. HEINRICH. I think the researchers are still trying to better understand what the possible causes are, such as the neurological damage.

Mr. SHAYS. It seems like an easy answer. Our soldiers reported that they came home sick. Studies have confirmed they came home sick. We refer to this as Gulf war illness, but we don't know what caused it. That to me is like the basic simple answer. Is there anything you would disagree with?

Dr. HEINRICH. No, sir.

Mr. SHAYS. Is there anything that any of you—Mr. Bunker, I didn't ask you any questions, but I appreciated all your testimony.

I will just say, Mr. Robinson, you have appeared before us before. You just have this simple, common logic that I wish more people dealing with this issue had. You're not emotional about it, you're just matter of fact, and it is appreciated. I just wish it somehow could get through to more people.

Mr. Bunker, any comment you want to make, or Dr. Hall, Dr. Heinrich, Dr. Rhodes, Mr. Binns, Mr. Robinson before we close out?

Mr. BUNKER. Mr. Chairman, what I would like to say is real simple and down to the point and that is that we all know we're sick. We've been exposed to a lot of different toxins. You may never find out exactly what made us all sick. I, along with a lot of other people, want to get better. I've been putting a lot of personal effort into trying to get better.

I've improved a lot since I was exposed and treated for nerve agents in the Gulf Theater itself and evacked out. From what I am now to what I was in March 1991, I'm a whole different person. A lot of that is myself.

We need research, need full research into treatment. We don't give a damn what made us sick; we want to get healthy. The VA and the DOD is not doing the job, and the funding has to be taken away from them and the research has to be done someplace else.

Mr. SHAYS. I will just comment on your comment, Mr. Bunker.

I didn't ask you any questions, but basically that's the theme that has come out. You kind of set it in play. When I was speaking to Bernie, because we've been dealing with this issue so long, and it is just getting to the point of why do we have to keep doing this? His comment to me was, the bottom line is, how do we get money to serious people to do serious research? Your point has at least reached two of us here.

Dr. Hall.

Dr. HALL. Sir, just as a final comment, I would just like to ask the $64,000 question, that is, how many abattoir workers——

Mr. SHAYS. How many what?

Dr. HALL. How many abattoir workers, slaughterhouse men, sheep dippers, people in trades of that ilk, how many of those develop symptoms of Gulf war syndrome? The answer is zero. Could that be because none of them received multiple immunizations and vaccinations on the same day?

The answer to that question may also explain why then there have been very, very few local civilians affected because of low-dose exposure. I would put money on it. It is because none of them were vaccinated against all rules and regulations.

Mr. SHAYS. Thank you, sir.

Dr. Heinrich.

Dr. HEINRICH. I would like to clarify one point in my testimony, and that is, the number that we used, the approximately 89,000 veterans, is from the number of people who have joined the Gulf war registry and who sought out these full physicals for the unexplained illness. It doesn't include everybody who came back sick, because some people came back and it was clear that there was a particular cause or particular problem.

Mr. SHAYS. The bottom line is, the number is higher than the 89,000?

Dr. HEINRICH. Yes.

I would also like to build on what Mr. Binns had said earlier in response to the question with Mr. Tierney. I think that there is a great deal of hope in the working relationship of the advisory committee and the VA staff. I think that there are strategies there that can really be very powerful as people assess the science and really think through where it is potentially most beneficial to focus more work.

But the fact of the matter is, you can't just put an announcement out there either, as they learned. You really have to seed the area with interest in the scientists so that they'll come forth and respond to those calls for research.

Mr. SHAYS. Thank you.

Dr. Rhodes.

Dr. RHODES. I would just like to echo a point that Mr. Turner made in his opening statement, and that is, if we refuse or if we don't do a good job of understanding the science behind both the modeling as well as the exposure and whether Gulf war illness is tied to low-level exposure, Mr. Turner is absolutely right. We're giving our opponent a new weapon and that will be, they'll be able to kill us over time and a long way from the battlefield.

It is an issue of taking care of our veterans. That is the paramount issue. But it is also the issue of paying attention to what really went on and what really did occur so that we can be ready.

Mr. SHAYS. Thank you, Dr. Rhodes.

Mr. Binns.

Mr. BINNS. In answer to your perplexing decisionmaking over how to get this work done by the right people, the first issue is the amount of money involved which, as we have said, is declining; and I agree with you that even going to the levels that were spent over the years, in 1999 to 2002, is not necessarily the right amount. It could be north of that.

Second, I would keep the money at the VA for those programs that they are dedicating to Gulf war illnesses research if they come out with—and I say "they;" it should be announced within 2 months certainly, the program that we have been working with them on—that program deserves funding.

As to the rest of the funds, I agree that outside researchers should be engaged because VA is limited in the number of projects it can apply because it can fund only VA doctors. So you need to have people involved.

If you want a fresh team—first, I think DOD deserves funding for certain of their programs, such as the Chemical Defense Institute, which has done dramatically wonderful work here and which is actually being cut back surprisingly at this time in our history. If DOD is, because of its other priorities, not able to focus on Gulf war illnesses research right now, the other logical organization is the NIH.

Mr. SHAYS. What is so amazing is, we do happen to be in the Gulf and we do happen to be involved in a war and so on. When you say this to me, I am doing something I don't like to do. I'm smirking. It is like, hello?

I'm sorry to interrupt you.

Mr. BINNS. Absolutely. The Congress has appropriated in the past 2 years $1.6 billion to NIH for bioterrorism research. In the 2005 proposal, there is, I think, $44 million for radiological weapons medical countermeasure research, but there is no money in that budget for chemical counterterrorism research. So NIH, both as a Gulf war illness research provider, if you will, that could contract with the best outside civilians and NIH as a source of discovering what we can do to protect ourselves in the future better than duct tape and plastic sheeting is definitely an avenue to consider.

I think at the grass-roots level, most of the people you'll be hearing from today from those agencies would agree with me.

Mr. SHAYS. Thank you, Mr. Binns.

Mr. Robinson, you have the last word.

Mr. ROBINSON. I think if we go back and look at the Institute of Medicine studies that have been conducted, currently they will state and the future ones will also state that a lack of data collected in 1991 is going to prevent us from being able to go back retrospectively and uncover the cause for what appears to be a chronic, multisymptom illness.

They just didn't collect the data at the time. They didn't do what they should have done. They didn't do medical records. That is all well known, and it's preventing us from finding maybe the cause.

We may never find the cause in some cases. However, right now DOD is allowed to have discretion in the implementation of public laws specifically designed to prevent this event from ever occurring again. If we allow them to have discretion in those public laws, and we let them make false statements about the risk of the exposure, we're just repeating the same mistakes all over again.

What I would encourage the committee to do is to demand tracking systems that provide meaningful data so that clinicians can cull information from it. DOD needs to sponsor treatment and research into alternative therapies that the veterans are already seeking on their own.

When the veterans were met with this stone wall, they did what any person would do, they turned somewhere else and they have found, some of them, treatments that aren't sponsored by the VA, aren't funded as a result of their wartime service that helped them. And it cost them thousands of dollars to get this kind of treatment, but currently the VA does not pay for it.

We also need DOD to release all of the studies that have been done that were bought and paid for with taxpayer money—specifically, one study that I'm referring to is a RAND study on the anthrax vaccine; that has never been released—and what other studies are out there that have been written and never been released. If we can continue to study Gulf war illnesses where warranted, many opportunities will still exist, and I hope this committee will pursue them because I know we will.

Mr. SHAYS. Thank you. You're triggering a conversation here. How old is the RAND study, for instance?

Mr. ROBINSON. The RAND study for anthrax, I believe it was written—it was begun in 1999. There is a researcher that worked on it, Dr. Beatrice Golomb.

Mr. SHAYS. Let me just say on the broader issue of lessons learned about deployment health from the Gulf war to the present, our subcommittee will conduct a briefing tomorrow at 2 p.m. in Room 2247. It is an open meeting. DOD health affairs, veterans service organizations, the Institute of Medicine and the veterans will brief Members and staff on predeployment physicals, medical recordkeeping, postdeployment health screening and other efforts to protect the health of servicemen and women.

Gentlemen and lady, thank you very much. We appreciate your testimony. Our apologies to the second panel, but they can respond to a lot that was said here and it will be helpful to have that. We

will ask the second panel to come up and thank you all on the first panel.

Our next panel is Dr. Jonathan B. Perlin, Acting Under Secretary for Health and Acting Chief Research and Development Officer, Department of Veterans Affairs, accompanied by Dr. Mindy L. Aisen, Deputy Chief Research and Development Officer, Department of Veterans Affairs, and also accompanied by Dr. Craig Hyams, Chief Consultant, Occupational and Environmental Health, Department of Veterans Affairs.

The second testimony is from Major General Lester Martinez-Lopez, Commanding General of U.S. Army Medical Research and Materiel Command, Fort Detrick, accompanied by Colonel Brian Lukey, Dr. Colonel Brian Lukey, Director of U.S. Army Military Operational Medicine Research Program, Fort Detrick, MD.

Our third testimony is Dr. Robert Haley, professor of internal medicine, University of Texas Southwestern Medical Center.

Our fourth testimony is from Dr. Rogene Henderson, senior scientist, Lovelace Respiratory Research Institute.

And our final testimony is from Dr. Paul Greengard, Vincent Astor professor and head of the Laboratory of Molecular and Cellular Neuroscience, The Rockefeller University, Nobel Laureate in Medicine 2000.

I don't know how many Nobel laureates we have had, but it is very nice to have you.

A large panel. An extraordinary opportunity to do a good amount of learning.

We are going to ask you to try to stay within the 5 minutes. If you trip over a minute or so, we can live with that, but it would be helpful to kind of get into the questioning. We're happy to have you respond to anything that the other panelists said. We're happy to have you submit your testimony and speak ad lib. We're happy to have you read from notes. We're happy to have you do whatever you like within your timeframe.

We'll start with, I guess, as I called you, it would be Dr. Perlin. Dr. Perlin, you are first and then we'll go to General Martinez-Lopez and then to Haley, Henderson and Greengard.

STATEMENTS OF DR. JONATHAN B. PERLIN, ACTING UNDER SECRETARY FOR HEALTH AND ACTING CHIEF RESEARCH AND DEVELOPMENT OFFICER, DEPARTMENT OF VETERANS AFFAIRS, ACCOMPANIED BY DR. MINDY L. AISEN, DEPUTY CHIEF RESEARCH AND DEVELOPMENT OFFICER, AND DR. CRAIG HYAMS, CHIEF CONSULTANT, OCCUPATIONAL AND ENVIRONMENTAL HEALTH, DEPARTMENT OF VETERANS AFFAIRS; MAJOR GENERAL LESTER MARTINEZ-LOPEZ, COMMANDING GENERAL, U.S. ARMY MEDICAL RESEARCH AND MATERIEL COMMAND, FORT DETRICK, MD, ACCOMPANIED BY COLONEL BRIAN LUKEY, PH.D., DIRECTOR, U.S. ARMY MILITARY OPERATIONAL MEDICINE RESEARCH PROGRAM, FORT DETRICK, MD; DR. ROBERT HALEY, PROFESSOR OF INTERNAL MEDICINE, UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL CENTER; DR. ROGENE HENDERSON, SENIOR SCIENTIST, LOVELACE RESPIRATORY RESEARCH INSTITUTE; AND DR. PAUL GREENGARD, VINCENT ASTOR PROFESSOR AND HEAD OF LABORATORY OF MOLECULAR AND CELLULAR NEUROSCIENCE, THE ROCKEFELLER UNIVERSITY, AND NOBEL LAUREATE IN MEDICINE 2000

Dr. PERLIN. Mr. Chairman, Mr. Sanders, members of the subcommittee, Lord Morris, thank you very much for the opportunity today to discuss the current status of VA's research program on Gulf war veterans' illnesses. With me today is Dr. Mindy Aisen, VA's Deputy Chief Research and Development Officer and to my left is Dr. Craig Hyams, VA's Chief Consultant for Occupational and Environmental Health.

Mr. SHAYS. I have erred. I was so eager to hear from you, I haven't sworn any of you in. So everything you have said so far is totally irrelevant. I am so sorry. We do know that you would come and testify and tell the truth without being sworn in, but we are an investigative committee so it has legal implications and we swear you in.

[Witnesses sworn.]

Mr. SHAYS. Note for the record all our witnesses have responded in the affirmative. I also want to say to each and every one of you, we have nothing but the highest respect for each and every one of you. We appreciate your expertise. We appreciate your work. We appreciate the service you do whether in the private sector or the public sector.

We are very grateful that you are here. You have honored us. We intend to listen to you and learn from you. Thank you.

The bottom line is you have introduced who is with you. We will assume that was under oath and we will go from there. We will start the clock now.

Dr. PERLIN. Thank you, Mr. Chairman. My full statement has been submitted for the record. I would just like to go over a few points.

As we know, the United States deployed nearly 700,000 military personnel during Operations Desert Shield and Desert Storm in 1990 and 1991. Within months of their return, some Gulf war veterans reported various symptoms and illnesses that they believed were related to their service. Of particular concern have been the symptoms that have eluded specific diagnosis.

In an effort to better understand the health problems experienced by Gulf war veterans, VA, DOD and HHS have supported research projects related to Gulf war veterans illnesses. From fiscal year 1994 through fiscal year 2003, the three departments have funded 240 projects at a cumulative cost of $247 million. Of these, VA funded 91 projects, 8 in conjunction with DOD, totaling $53.3 million. As of September 2003, 182 of 240 projects had been completed.

While each department funds its Gulf war research independently, each closely coordinates its efforts with the others to avoid duplication of effort and to foster the highest standards of competition and scientific merit.

Studies have shown that some Gulf war veterans have reported a variety of chronic and ill-defined symptoms, including fatigue, cognitive problems, gastrointestinal and musculoskeletal problems at significantly higher rates than the rates reported by non-deployed veterans. We also know that deployed Army and Air Force veterans have a higher prevalence of amyotrophic lateral sclerosis, also known as Lou Gehrig's disease.

VA has sponsored several important research and epidemiological initiatives responding to the needs of these veterans. They include the following outlined in greater detail in my full statement: $9.6 million exercise behavioral therapy study conducted between 1999 and late 2001 involving 1,092 veterans at 18 VA and 2 DOD medical centers; behavior therapy trial conducted between May 1999 and December 2001, including 491 Gulf war veterans at 26 VA and 2 DOD sites; a national health survey of Gulf war veterans and their families, which began in 1995 and has provided researchers much valuable information not only about Gulf war veterans, but about their spouses and children; VA's ALS study, conducted in cooperation with DOD and representing the largest prevalence study devoted to ALS, as well as VA's expansion of the ALS study to include a national registry for veterans with ALS and a genetic tissue bank for investigating this horrific disease.

Although VA's and other Federal research have provided valuable insight into Gulf war veterans' illnesses, much remains to be done. For example, the following are under way: New initiatives include an ALS treatment trial, expanded neuroimaging, establishment of a dedicated scientific merit review board for Gulf war and deployment health-related research projects. VA is also funding the Gulf war health effect studies that the Institute of Medicine has been conducting.

VA continues to fund the clinical health surveillance of Gulf war veterans who received large exposures to depleted uranium oxides. VA epidemiologists have been conducting a cancer prevalence pilot study to determine the feasibility of using State cancer registries.

VA appreciates and has learned from two recent GAO studies. In its draft report on Federal Gulf war illness research strategies, GAO states that the VA has not identified gaps in current research or promising areas of future research. GAO also states that VA has not readdressed the extent to which the collective findings of completed Gulf war illnesses research projects have addressed the key research questions. In general, we in VA agree with GAO's rec-

ommendations in these areas and, in fact, had earlier begun to address these issues.

In a second report, GAO evaluated DOD's conclusions about U.S. troops' exposures to chemical warfare agents based on DOD and Central Intelligence Agency plume modeling. It was GAO's finding that the models were faulty and recommended that VA and DOD not use the plume modeling data for future epidemiological studies. VA has concurred with this recommendation.

VA has taken positive steps toward laying the groundwork for improved collaboration with the Gulf war research advisory committee in improving the quality of VA's Gulf war research portfolio. The research advisory committee will recommend scientific experts to serve as research review panel members of a soon-to-be-established scientific merit review board for Gulf war research proposals. VA will consult with the research advisory committee regarding the relevancy of proposals that have been identified as being fundable. VA and the research advisory committee will also work together to identify researchers who can partner with VA investigators.

Mr. Chairman, let me conclude by emphasizing the following. Over the past decade, VA has supported an extensive and robust Gulf war research portfolio. We have taken positive steps to address the proposed recommendations in the draft GAO report on research related to Gulf war veterans. VA has taken positive steps to improve collaboration with the research advisory committee. As VA's and other Federal research programs continue to provide more results, we will substantially increase our understanding of Gulf war veterans' illnesses. This will enhance our ability to diagnose and treat them. All newly gained knowledge will enhance prevention and intervention in illnesses of service members in future deployments.

Mr. Chairman, this concludes my testimony. Dr. Aisen, Dr. Hyams and I will be pleased to answer any questions that you or the other subcommittee members may have. Thank you.

Mr. TURNER [presiding]. Thank you.

[The prepared statement of Dr. Perlin follows:]

Statement of
Jonathan B. Perlin, MD, PhD, MSHA, FACP
Acting Under Secretary for Health
Veterans Health Administration
Department of Veterans Affairs
Before the
Subcommittee on National Security, Emerging Threats, and International Relations
House Committee on Government Reform
Regarding Research on Gulf War Veterans' Illnesses

June 1, 2004
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Mr. Chairman and members of the Subcommittee:

Thank you for providing the Department of Veterans Affairs (VA) this opportunity to discuss the current status of its research program on Gulf War veterans' illnesses. With me today are Mindy Aisen, MD, VA's Deputy Chief Research and Development Officer; and Craig Hyams, MD, VA's Chief Consultant, Occupational and Environmental Health Strategic Healthcare Group.

My testimony today will address four major topics: 1) an update on the status of several major research and treatment studies; 2) promising new initiatives and important ongoing research; 3) VA's assessment of the General Accounting Office (GAO) reports on research related to Gulf War veterans; and 4) an overview of the Veterans Health Administration's collaboration on research and other initiatives with the Research Advisory Committee on Gulf War Veterans' Illnesses (RAC), a congressionally-mandated committee that advises the Secretary of Veterans Affairs.

Background

The United States deployed nearly 700,000 military personnel to the Kuwaiti Theater of Operations (KTO) during Operations Desert Shield and Desert Storm (August 2, 1990, through July 31, 1991). Within months of their return, some Gulf War veterans reported various symptoms and illnesses that they believed were related to their service. Veterans, their families, and VA subsequently became concerned about the possible adverse health effects from various exposures during Operations Desert Shield and Desert Storm.

Of particular concern have been the symptoms and illnesses that, to date, have eluded specific diagnosis. More than 130,000 Gulf War veterans have participated in the two health registries that VA and the Department of Defense (DoD) maintain. Although the majority of the registry participants had readily diagnosable health conditions, we remain very concerned about the veterans whose symptoms could not be diagnosed.

In an effort to better understand the health conditions and health problems experienced by Gulf War veterans, VA, DoD, and the Department of Health and Human Services (HHS) have supported research projects related to Gulf War veterans' illnesses. From FY 1994 through FY 2003 the three Departments have funded 240 projects at a cumulative direct cost of $247 million. Of these, VA funded 91 projects of these projects — eight in conjunction with DoD — totaling $53.3 million. The indirect costs for the three Departments for conducting this research (facility, administrative, and operational expenses) are estimated to be $70 million. In FY 2001 and FY 2002, the Federal Gulf War research portfolio grew by 36 new projects. As of September 2003, 182 of the 240 projects have been completed. All projects and their focus areas are described in detail in annual reports to Congress.

While each Department funds its Gulf War research independently, each closely coordinates its efforts with the others to avoid duplication of effort and to foster the highest standards of competition and scientific merit review for all research on illnesses in Gulf War veterans. The Research Subcommittee of the Deployment Health Work Group, which is a component of the VA/DoD Health Executive Council, currently conducts this coordination. HHS participates in both the Deployment Health Work Group and its Research Subcommittee.

Status Report on VA's Research of Gulf War Veterans' Illnesses

The casualties of war are not limited to the visible wounds of combat, and many veterans have returned from all wars with debilitating health problems. Studies have shown that some Gulf War veterans have reported a variety of chronic and ill-defined symptoms including fatigue, cognitive problems, gastrointestinal, and musculoskeletal problems, at significantly higher rates than the rates reported by non-deployed veterans.

We also know that Army and Air Force veterans who deployed to the KTO have a higher prevalence of the devastating condition amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's disease. VA has sponsored several important research initiatives responding to the needs of these veterans.

Treatment Trials

In 1998, the Office of Research and Development (ORD) began planning for two treatment trials referred to as the "EBT" (exercise-behavioral therapy) and "ABT" (antibiotic treatment) trials. Both addressed similar patient characteristics and were open to all veterans who served in the Gulf War between August 1990 and July 1991. To be eligible for inclusion in the trials, a veteran must have had at least two of three symptoms (fatigue, musculoskeletal pain, and cognitive dysfunction) that began after August 1990 and must have been symptomatic when the study began. In addition, the symptoms must have lasted for more than six months by the time the study began.

ORD conducted the $9.6 million EBT study between 1999 and late 2001, and 1,092 veterans participated at 18 VA and 2 DoD medical centers. Participants were randomly assigned to one of four 12-week treatment courses. All groups continued their usual health care. In addition, three groups received cognitive behavior therapy (CBT), aerobic exercise, or a combination of the two therapies. CBT teaches patients active techniques for reducing the severity of symptoms and is commonly used to enhance traditional treatments for many chronic illnesses, including cancer, coronary artery disease, asthma, and conditions marked by pain and fatigue. Aerobic exercise has been effective in improving the symptoms and functional status of individuals with chronic fatigue syndrome and fibromyalgia.

The results, reported in the March 19, 2003, issue of the *Journal of the American Medical Association*, showed that CBT, with or without exercise, provides modest but significant improvement in physical functioning, mental health functioning, cognitive symptoms, fatigue, and distress. An accompanying editorial in the journal described the study as "a remarkable achievement" and noted it was one of the largest trials of psychological treatment ever published. EBT remains the only evidence-based therapy for Gulf War veterans with undiagnosed symptoms that has been proven to work.

Enrollment for the ABT trial began in May 1999 and eventually included 491 Gulf War veterans at 26 VA and 2 DoD sites. The study's primary hypothesis was that antibiotic treatment, with doxycycline for 12 months, would improve the health status of patients with chronic symptoms who tested positive for *Mycoplasma* infection at baseline. Secondary hypotheses included that the doxycycline treatment would reduce symptoms of fatigue, pain, and memory problems; and that doxycycline treatment would convert patients who were *Mycoplasma* positive to *Mycoplasma* negative. The trial was completed in December 2001, when patient follow-up was finished.

Although the $10 million trial did not result in a new treatment modality for Gulf War veterans—the results failed to substantiate any of the hypotheses—the study has enabled investigators to focus their time and resources to other lines of inquiry.

VA has also funded two extremely important epidemiological studies, the National Health Survey of Gulf War Veterans and Their Families; and the ALS Prevalence Study, the largest such study ever conducted.

National Health Survey of Gulf War Veterans and Their Families

The National Health Survey of Gulf War Veterans and Their Families began in 1995 and has provided researchers with much valuable information. The data for the first two phases consisted of self-reported responses to surveys that were mailed to 15,000 Gulf War veterans and 15,000 non-deployed veterans. The survey results have been published and provided to the Subcommittee. Results from the initial two phases of this study show that Gulf War veterans are nearly twice as likely to report diverse symptoms, including joint, muscle, respiratory, gastrointestinal, and skin problems. This population also reports higher rates of chronic fatigue (5.6% for Gulf War veterans vs. 1.2% for non-deployed veterans) and symptoms of post-traumatic stress disorder (12.1% for Gulf War veterans vs. 4.3% for non-deployed veterans).

Phase III recruitment began in November 1998 and concluded in April 2001. Unlike the previous two phases, this study relied on complete physical examinations that included a neurological exam. Veterans received several blood tests, neuropsychological testing, nerve conduction velocity tests, and pulmonary function tests. The study also included the family members of deployed and non-deployed Gulf

War era veterans. Veterans and spouses were examined for illnesses that had frequently been reported by Gulf War veterans in previous studies, namely, chronic fatigue syndrome (CFS), fibromyalgia, post-traumatic stress disorder, neurological abnormalities (including cognitive dysfunction and peripheral neuropathy), arthritis, hypertension, asthma, and chronic bronchitis. Children were examined for birth defects, which were diagnosed through pediatric examinations.

Eventually, 1,061 Gulf War veterans and their spouses and children, and 1,128 non-deployed veterans and their spouses and children participated. Family members included 1,584 spouses (758 of deployed veterans and 826 of non-deployed veterans) and 1,139 children (539 of deployed veterans and 600 of non-deployed veterans). Participants were examined at one of 16 VA medical centers across the United States.

The study found that Gulf War deployment is associated with a significantly increased risk of CFS (5.6% for Gulf War veterans vs. 1.2% for non-deployed veterans) ten years after redeployment. In addition, Gulf War deployment is associated with increased prevalence of PTSD, other psychological disorders, and poorer self-reported quality of life. The study findings do not indicate increased prevalence for objectively measured cognitive impairment.

Researchers also found, among spouses of deployed Gulf War veterans, a higher incidence of PTSD, depression, having at least one psychological disorder, and lower scores on the mental component scale of the SF-36. Researchers found no significant physical health outcomes of clinical concern among spouses of deployed and non-deployed veterans. In addition, the investigators found that Gulf War deployment of a parent is not associated with any significant differences in the frequency of birth defects compared to children of non-deployed veterans.

Amyotrophic lateral sclerosis (ALS) Study

VA's ALS study, conducted in cooperation with DoD, represents the largest prevalence study devoted to that devastating disease. Equally important, the study reflects VA's willingness to respond to its stakeholders. Veterans and advocates consistently inquired whether a connection between ALS and Gulf War service existed.

Although available evidence did not indicate a potential link between the two, VA developed a study that included all 2.5 million Gulf War era veterans.

The study identified and confirmed by medical record review ALS cases occurring over a 10-year period starting from August 1990. Investigators found that among Gulf War veterans, the rate of disease was 6.7 per million. Among other military personnel, it was 3.5 per million.

Since researchers still do not know why Gulf War veterans have a higher rate of ALS, VA has expanded the study to include a national registry for veterans with ALS and a genetic tissue bank (ALS-DNA) for this registry. The goals of the registry are to identify as completely as possible all veterans with ALS, not just Gulf War era veterans, and to provide a mechanism for VA to inform veterans with ALS about clinical drug trials and other studies for which they may be eligible. Enrollment began in April 2003 and has a target of 1,800 patients over a 3-year period. The ALS-DNA bank will involve collection of DNA and plasma from blood samples from consenting ALS registry participants. It is the intent that these materials be made available for future genetic research on ALS. The Veterans ALS Registry has generated great enthusiasm and praise among the national community of ALS researchers.

Promising New Initiatives and Ongoing Research

Although VA and other Federal research have provided valuable insight into Gulf War veterans' illnesses, much remains to be done. New initiatives include an ALS treatment trial, expanded neuroimaging, and a dedicated scientific merit review board for Gulf War and deployment health research proposals.

New Initiatives

VA is currently conducting a review of a proposal for a clinical treatment trial to determine the tolerability and efficacy of sodium phenylbutyrate (NaPB) in research participants with ALS. The study builds on the novel and reproducible findings of a VA investigator. Using ALS mice, the investigator has determined that NaPB, a compound used safely in humans for years, produces a substantial increase in survival in the ALS

mice. The present proposal has been submitted and a review committee will evaluate the submission before a funding decision is made.

A team under the direction of Michael Weiner, MD, at the San Francisco VA Medical Center has begun another project involving neuroimaging. Using a 4-Tesla magnetic resonance imaging – magnetic resonance spectroscopy system that the San Francisco VAMC purchased through grants from DoD and the National Institutes of Health, Dr. Weiner will conduct research to detect any brain changes associated with Gulf War veterans' illnesses and to determine possible relationships with ALS. In addition, this imaging center will act as a coordinating center for future multi-site studies of deployment-related neurodegenerative diseases throughout the VA system.

VA has taken other steps to increase the quantity and quality of Gulf War research proposals. Working closely with the chairman and scientific director of the RAC, VA will divide the current request for proposals (RFP) for Gulf War veterans' illnesses and deployment health into two new RFPs—one for Gulf War research and the other for health consequences of military deployments. The new RFPs will be released this autumn and will provide greater clarity for potential investigators.

In addition, VA issued a special request for applications (RFA) specifically for Gulf War research in April 2004. This RFA will fund meritorious proposals that include, but are not necessarily limited to, immunological changes that may be associated with the unexplained illnesses reported by Gulf War veterans; autonomic changes that may be associated with symptoms reported by Gulf War veterans; and the prevalence of neurological disorders in Gulf War veterans. In 2004, VA has endeavored to work very closely with the RAC to identify internationally acclaimed researchers and encourage them to bring their scientific expertise to bear on the pathophysiology of neurotoxin exposure related illness. I would like to acknowledge the help the RAC has given VA in this area.

Also reflecting our commitment to studying and identifying treatments for the health consequences of service in the KTO and other military deployments, the Veterans Health Administration has requested that Secretary Principi approve a new scientific merit review board within the Office of Research and Development (ORD). The new board will review and evaluate all proposals dealing with Gulf War veterans'

illnesses and deployment health. Through review by a scientific merit review board dedicated to Gulf War research proposals, these proposals will not have to compete for funding with more than a thousand other proposals that VA's other four scientific merit review boards consider each year. I am confident that this step will enable VA to improve the relevance, scientific merit, and quality of such proposals.

Ongoing Research

VA has also contributed to on-going efforts to understand the health consequences of service in the KTO. VA is funding the Gulf War Health Effects studies that the Institute of Medicine (IOM) has been conducting. Two volumes have already been published. Volume 1, released in 2000, examined the potential effects of depleted uranium, pyridostigmine bromide, sarin, and vaccines. In 2003, IOM released Volume 2, a literature review of insecticides and solvents. Although neither volume found any evidence of an association with Gulf War veterans' illnesses (several solvents were linked to a few specific cancers), VA still funds research germane to these areas to ensure that nothing has been overlooked.

Work on Volume 3—Selected Environmental Agents, Pollutants and Synthetic Chemical Compounds—is underway, and the volume should be published in August 2004. In addition, VA commissioned IOM to conduct an update on the Gulf War Health Effects of sarin.

VA continues to fund an invaluable clinical health surveillance of Gulf War veterans who received large exposures to depleted uranium (DU) oxides as a result of friendly fire incidents. Approximately one-third of the 70 surveillance participants, have retained DU fragments that cannot be removed due to medical considerations and have had significantly higher exposures than other service members who served in the KTO. Testing of all participants to date has found no differences in the frequency of musculoskeletal, cardiovascular, psychiatric, nervous system, or other disorders. Although the kidney is the putative critical organ for uranium toxicity under acute and chronic exposure conditions, no evidence of renal dysfunction has been found. Of note, none of the participants' offspring have birth defects, a rate far better than the national

norm. Despite these favorable outcomes, VA will continue to fund this surveillance to monitor for any potential DU-related long-term health problems.

The surveillance program offers DU screening for any KTO and Operation Iraqi Freedom veterans with concerns about potential exposures. Several hundred screens have been performed without any veteran being found with elevated levels of DU.

In addition, VA epidemiologists have been conducting a cancer prevalence pilot study to determine the feasibility of using state cancer registries. Previous studies have focused on cancer mortality, and the results have been reassuring. Gulf War veterans have not experienced elevated rates of cancer deaths. However, not all cancers are fatal although they may cause grievous long-term effects. Since many states maintain registries for fatal and non-fatal cancers, VA has examined those of six states (including California, Florida, Maryland, New Jersey, Texas, and Virginia) and the District of Columbia to determine whether such registries can be used to ascertain whether any differences in cancer rates exist between deployed and non-deployed Gulf War era veterans. The pilot study indicates that state registries can address this question. VA is now considering how best to expand and fund this project.

GAO Report on Research Related to Gulf War Veterans

In its draft report, "Federal Gulf War Illnesses Research Strategy Needs Reassessment (GAO-04-767)", GAO states that VA "has not analyzed the latest Gulf War research findings to identify whether there are gaps in current research or to identify promising areas of future research." "In addition," GAO states, "VA has not reassessed the extent to which the collective findings of completed Gulf War Illnesses research projects have addressed key research findings." GAO's proposed recommendations include that VA take the following actions:

- conduct a reassessment of the Gulf War illnesses research strategy to determine whether the 21 key research questions have been answered, whether they remain relevant, and whether there are promising areas for future research;
- ensure that a liaison who is knowledgeable about Gulf War illnesses research is appointed to routinely share information with the Research Advisory Committee

(RAC), and ensure that VA's research offices collaborate with the RAC on the development activities for the Gulf War illnesses research program.

In general, we agree with these two recommendations, and, in fact, had already begun to address the issues prior to learning what recommendations GAO would propose.

Two weeks prior to the team's debrief, VA began its assessment of the existing Federal Gulf War veterans' illnesses research strategy to ensure its continued validity and to identify promising areas for future research. Each of the 21 research questions will be thoroughly evaluated to determine which ones have been answered, which ones require additional study, and what new questions should be added. To date, reviews of four questions have been done. Once its initial assessment is completed, VA will present it to the RAC and to the Research Subcommittee of the Deployment Health Working Group for their comment.

VA has also taken numerous steps to ensure that an effective relationship exists with the RAC. The Deputy Chief Research and Development Officer and I regularly communicate with the RAC chairman, Mr. Binns. Since February 2004, we have had a designated liaison to the RAC scientific officer. However, since our liaison also has other duties, we hope to recruit a full-time health science PhD in the near future to serve as liaison to the RAC and as portfolio manager for Gulf War and deployment health studies.

In addition, VA coordinated its most recent Gulf War RFA with the committee and will do the same with the planned Gulf War veterans' illnesses RFP for autumn 2004. The RAC provided valuable recommendations, and while our coordination efforts may not have been seamless, we believe that they have improved significantly over the past two years.

GAO Report on U.S. Troops Exposure to Chemical Warfare Agents

I would also like to briefly address a second recent draft GAO report (GAO-04-159), which evaluates DoD's conclusions about U.S. troops exposure to chemical warfare (CW) agents following demolition of Iraqi facilities at Khamisiyah in March 1991.

These conclusions were based on GAO's analysis of the DoD and Central Intelligence Agency plume modeling. It was GAO's finding that the models were not fully developed for analyzing long-range dispersion of CW agents and that the model's assumptions on source term data were inaccurate. Accordingly, GAO recommended that VA and DoD not use the plume-modeling data for future epidemiological studies. VA has concurred with this recommendation and will not use the plume modeling for future research studies on Gulf War veterans' illnesses.

Collaboration with the Research Advisory Committee on Gulf War Veterans' Illnesses

VA is very pleased with recent efforts with the RAC to lay the groundwork for improved collaboration.

By way of recent example, at the urging of the RAC, VA contacted a foreign investigator who had developed a novel bioassay for measuring acetyl cholinesterase (AChE) activity to determine the feasibility of conducting a study with VA researchers. The resulting project analyzed previously collected blood samples from deployed and non-deployed Gulf War era veterans to test three hypotheses: (1) blood AChE levels are associated with mood and anxiety disorders; (2) deployed Gulf War veterans have lower blood AChE levels than non-deployed veterans; and (3) veterans with symptoms of Gulf War veterans' illnesses have lower AChE levels than veterans without. As often occurs in scientific investigations, the study did not substantiate any of the hypotheses. However, the study enhanced VA and RAC relations.

In addition to the steps already outlined earlier in my testimony, VA and the RAC have agreed to several other steps to improve the quality of VA's Gulf War research portfolio. The RAC will recommend scientific experts to serve as research review panel members of the soon to be established scientific merit review board. In addition, VA will consult with the RAC regarding the relevancy of proposals that have been identified as being fundable. As I indicated earlier, VA and the RAC will also work together to identify researchers who can partner with VA investigators. Already this effort has shown promise. Due to the efforts of the RAC chairman, VA is now in contact with Dr. Paul Greengard, a Nobel laureate, to conduct research on the effects of subacute

exposures to sarin, a nerve agent to which perhaps 100,000 Gulf War veterans were exposed.

Conclusion

Mr. Chairman, let me conclude by emphasizing the following points:

- VA has an extensive Gulf War research history, ongoing epidemiological studies, expanding research initiatives, and a robust Gulf War Research portfolio.
- VA has taken positive steps to address the proposed recommendations in the two GAO reports on research related to Gulf War veterans.
- VA has taken positive steps to improve collaboration with the RAC.
- As VA's and other Federal research programs continue to provide more results, we will substantially increase our understanding of Gulf War veterans' illnesses. This will enhance our ability to diagnose and treat them.
- All newly gained knowledge will enhance prevention and intervention in illnesses of service members in future deployments.
- This knowledge will also increase our ability for research to improve the health and welfare of those who served our country in the Gulf War.

Mr. Chairman, this concludes my testimony, and I am ready to answer any questions that you and the other subcommittee members might have.

Mr. TURNER. Next we will hear from Major General Lester Martinez-Lopez, Commanding General of U.S. Army Medical Research and Materiel Command, Fort Detrick, MD.

General.

General MARTINEZ-LOPEZ. Mr. Chairman, distinguished subcommittee members, and Lord Morris, thank you for the opportunity to briefly discuss the Department of the Army's science and technology program addressing Gulf war veterans' illnesses and general deployment health concerns.

As Commander of the U.S. Army Medical Research and Materiel Command, I am responsible for the medical research that focuses upon Gulf war illnesses and force health protection for the Department of Defense. In my remarks, I will discuss some of the accomplishments of the Gulf war illnesses research program.

My command was asked to organize and direct the research effort for the DOD in 1994, and we have made enormous progress in the past decade. We sense the frustration of this subcommittee in that no single problem or solution to our sick veterans has emerged from the research investment. This in no way should detract from the search for causes and treatments for our veterans with very real symptoms and illnesses. It is equally important that we continue to seek better ways to evaluate and predict health hazards that our young men and women may encounter in current and future deployments so that we can better protect them.

As a result of the Gulf war experience, the DOD and the Department of Veterans Affairs medical research programs have grown closer, with an unprecedented level of collaboration and coordination. For example, at this very moment, researchers from at least three different VA centers are collaborating with DOD investigators to interview soldiers at Fort Lewis, WA, who have just returned from Iraq. This effort is part of an ambitious study, jointly funded by VA and DOD, to identify the most sensitive neuropsychological tests that can be used to detect early signs of a change in neurological status of soldiers following a deployment. This was one of the important diagnostic gaps identified in our Gulf war experience.

Another example is the DOD support to the neurodegenerative disease imaging center at the VA medical center in San Francisco. This center is developing state-of-the-art methods to use objective brain measurements to explain subjective symptoms of chronic multisymptom illnesses. Currently, they are about halfway through a major study involving Gulf war veterans.

Between 1994 and 2002, the U.S. Army Medical Research and Materiel Command invested $182 million to support 154 projects. We have pursued multiple lines of investigation to treat the Gulf war veterans. Thirty-eight of these projects continue and many of these address key questions identified in earlier projects.

The results of some of this research identified areas to followup work on suggested findings, while others ruled out potential causes. For example, infectious diseases proved to be unlikely explanations after we investigated several candidates such as leishmania. However, our investment in leishmaniasis was important anyway, as we have encountered new clusters of soldiers in-

fected with this parasitic disease in Afghanistan and Iraq and can better diagnose and treat these soldiers.

We supported numerous surveys of the veterans with a focus on hazardous exposure and symptoms. One study compares British Gulf war veterans with U.S. Gulf war veterans to study symptom reporting and likely exposure histories. Several large-scale surveys focused upon nervous system dysfunction and have either ruled out differences between deployed and nondeployed forces, or have discovered findings suggestive of chronic multisymptom illnesses, including chronic fatigue syndrome and fibromyalgia.

Other DOD programs, such as our efforts in force health protection research, started because of issues raised in Gulf war illnesses. These studies will followup on important Gulf war illnesses studies such as the joint VA and DOD study that suggests that deployed Gulf war veterans may have a higher rate of ALS than nondeployed forces.

We are moving on a wide front to address the issues that began with sick Gulf war veterans looking for an answer to their diseases. Our continuing research in early detection methods and monitoring will help identify individuals earlier than ever before, increasing their opportunities for treatment and helping to mitigate further exposures of other troops.

Our continuing research on neurotoxicology ranges from work by Dr. Paul Greengard, a Nobel laureate, to the establishment of a military version of the famous Framingham heart study, our own millennium cohort study. In 2002, the Assistant Secretary of Defense for Health Affairs directed transition of this program to a more forward-looking effort we call force health protection. The primary emphasis of the program is prospective with a goal of protecting current and future service members put into operational environments. The program's scientific focus areas rely heavily on lessons learned from research on Gulf war illnesses.

Mr. Chairman, this concludes my remarks. I will be pleased to answer your questions.

Mr. TURNER. Thank you.

[The prepared statement of General Martinez-Lopez follows:]

Statement of
Major General Martinez-Lopez
U.S. Army Medical Research and Materiel Command,
Fort Detrick, Maryland
Before the
Subcommittee on National Security, Emerging Threats and International Relations
House Committee on Government Reform
Regarding
Research on Gulf War Veterans' Illnesses
June 1, 2004

Mr. Chairman and members of the Subcommittee, thank you for the opportunity to briefly discuss the Department of the Army's Science and Technology program addressing Gulf War Veterans' Illnesses (GWVI) and general deployment health concerns.

As Commander of the US Army Medical Research and Materiel Command, I am responsible for the medical research that focuses upon Gulf War Illnesses and Force Health Protection for the Department of Defense.

In my remarks I will discuss some of the accomplishments of the Gulf War Illnesses research program.

My Command was asked to organize and direct the research effort for the DoD in 1994, and we have made enormous progress in this past decade. The best scientists in renowned universities have devoted much effort to understand the cause and develop treatments for these great veterans. We sense the frustration of this sub-Committee in that no single problem or solution for our sick veterans has emerged from the research investment. Still, today, no new Gulf War syndrome has come to light that was previously unknown to medical science. This in no way should detract from the search for causes and treatments for our veterans with very real symptoms and illnesses. It is equally important that we continue to seek better ways to evaluate and predict health hazards that our young men and women may encounter in current and future deployments so that we can better protect them.

As a result of the Gulf War experience, the DoD and the Department of Veterans Affairs (VA) medical research programs have grown closer, with an unprecedented level of collaboration and coordination. The programs now dovetail so that the Defense Department pays more attention to long-term consequences of operational threats that may only emerge as problems long after soldiers return from a deployment. The VA helps identify exposure risks to better prepare and protect warfighters, ultimately avoiding some of the longer-term health consequences that would appear in their hospitals. This is being accomplished through collaborative research involving both DoD and VA researchers and administrators at multiple levels.

For example, at this very moment, researchers from at least three different VA centers are collaborating with DoD investigators to interview soldiers at Fort Lewis, WA, who have just returned from Iraq. This effort is part of an ambitious study jointly funded by VA and DoD to identify the most sensitive neuropsychological tests that can be used to detect early signs of a change in neurological status of soldiers following a deployment. This was one of the important diagnostic gaps identified in our Gulf War experience.

Another example is the shared funding support by DoD, the National Institutes of Health (NIH), and VA to the neurodegenerative disease imaging center at the VA Medical Center in San Francisco. Support to this center was expanded through a VA and DoD research review group. This center is developing state-of-the-art methods to use objective brain measurements to explain subjective symptoms of chronic multi-symptom illnesses, as well as early changes that may forecast brain diseases. Currently they are about half way through a major study involving Gulf War. One major goal of this study is to determine if earlier findings of Dr. Robert Haley can be confirmed that specific changes in brain chemistry were associated with undiagnosed symptoms in veterans who deployed to the Gulf.

Between 1994 and 2002, the US Army Medical Research and Materiel Command invested $182 million to support 154 projects. We have pursued multiple lines of investigation to treat the Gulf War veterans. Thirty-eight of these projects continue and many of these address key questions identified in earlier projects.

Initially, we funded all projects with scientifically testable hypotheses that explored potential causes of veterans' symptoms. The results of some of this research identified areas to follow-up work on suggestive findings, while others ruled out potential causes. For example, infectious diseases proved to be unlikely explanations after we investigated several candidates such as leishmania. However, our investment in leishmaniasis was important anyway, as we have encountered new clusters of soldiers infected with this parasitic disease in Afghanistan and Iraq and can better diagnose and treat these soldiers.

Depleted uranium (DU) was also investigated as a hazardous exposure suspect. Scientists found it very difficult to produce any significant health effects from DU in animal studies. Initial concerns for our veterans with embedded fragments, that could not be surgically removed, have largely been allayed. We funded ten projects to determine possible consequences of uranium on nerve function and initiation of cancer. As these projects wind down, we are gaining confidence in the conclusion that depleted uranium is much less hazardous than some initial predictions, and that this is not an explanation for undiagnosed Gulf War Illnesses.

We supported numerous surveys of the veterans, with a focus on hazardous exposure and symptoms. One study compares British Gulf War veterans with US Gulf War veterans to study symptom reporting and likely exposure histories. Several large-scale surveys focused upon nervous system dysfunction and have either ruled out differences between deployed and non-deployed forces, or have discovered findings suggestive of chronic multi-symptom illnesses, including chronic fatigue syndrome and fibromyalgia.

We know that stress can trigger the development of serious diseases in some individuals. With nearly than 700,000 service members potentially exposed to combinations of chemicals, psychological stressors, and other environmental conditions, it would be extraordinary if there were not some who would have an adverse biological response. We have funded the Institute of Medicine to carefully analyze illnesses and deaths of soldiers who may have been exposed to chemical agents near Khamisiyah, and they are expected to announce their findings within the

next few months. Another study investigated the worst case combination of exposures in human volunteers to drugs, chemicals, and other stressors related to the Gulf deployment to determine if any short term symptoms were produced. The final results of this important study will also be available soon.

We still do not have good methods to determine which individuals will be at special risk when they receive a drug or vaccine intended for their protection. This is an area for continued research that will benefit greatly from new scientific methods such as the field of genomics and proteomics. Through continuing research on Gulf War Illnesses by individuals such as Drs. Dan Clauw, Robert Haley and Michael Weiner, we are on the edge of significant advances into objective brain physiology assessments, chronic multi-symptom illnesses, and some of the factors that may precipitate undiagnosed Gulf War Illness symptoms. Hopefully, their work will lead to effective treatments.

DoD programs, started in part because of issues raised in Gulf War illnesses, are providing us with a deeper understanding of what exposures are hazardous to brain tissues of humans, including the most susceptible neurons whose loss leads to illnesses such as Parkinson's disease and ALS. These studies will follow up on important Gulf War illnesses studies such as the joint VA and DoD study that suggests that deployed Gulf War veterans may have a higher rate of ALS than non-deployed forces. This current research effort, which includes over 100 studies is providing new insights into the causes of Parkinson's Disease and related neurodegenerative diseases; earlier diagnostic methods; preventive measures including personal health habits; and treatments. We are moving on a wide front to address the issues that began with sick Gulf War veterans looking for an answer to their diseases. These DoD efforts are coordinated with other federal agencies through a neurodegenerative disease working group that includes Offices from the NIH and VA.

Our continuing research in early detection methods and monitoring will help to identify individuals earlier than ever before, increasing their opportunities for treatment and helping to mitigate further exposures of other troops. Our continuing research on neurotoxicology ranges

from work by Dr. Paul Greengard, a Nobel laureate, to the establishment of a military version of the famous Framingham Heart Study, our own Millennium Cohort Study. The DoD Birth and Infant Health Registry was established as a result of the investigations into birth defects in offspring of Gulf War veterans. Such efforts will help us to further identify exposures that are harmful and allow us to better guard against these exposures in future deployments.

In 2002, the Assistant Secretary of Defense for Health Affairs directed transition of this program to a more forward-looking effort we call Force Health Protection. The primary emphasis of the program is prospective, with a goal of protecting current and future service-members put into operational environments. The program's scientific focus areas rely heavily on lessons learned from research on Gulf War Illnesses.

Mr. Chairman, this concludes my remarks, and I will be pleased to answer your questions.

Mr. TURNER. Now we will hear testimony from Dr. Robert Haley, professor of internal medicine, University of Texas Southwestern Medical Center.

Dr. HALEY. Thank you, Mr. Chairman. Mr. Chairman, members of the committee, Lord Morris, in thinking through what I was going to say today, I wrote out some comments and I'm going to summarize them briefly. But, really, from the point of view of trying to analyze why did our research group sort of get out front on this early and come up with clues, I think that's an important thing for us to talk about because it's a clue to where so much of the effort went wrong and perhaps how we can bring it back to relevancy.

I think the reason we got out front early is that we really had the ability to think through and try to answer and address the pivotal questions that would drive the investigation one direction or the other. We also had independent funding early, so we were free to go ask the question that we thought was pivotal and try to get an answer.

Let me talk about some of the pivotal questions. The first one is Gulf war syndrome: Is it a real illness or not? We went out and studied a unit, a battalion, got their symptomatology and did factor analysis, which is the way you do that, and came out with very clear evidence that there is a Gulf war syndrome, there is a disease and it appears to have three variants.

Since then Dr. Han Kan at the VA has done a nationwide study and replicated those same three factors in his study. Others have not been able to do that, but I will talk about the reasons for failure in a little bit.

The second pivotal question was, is this illness a psychological illness or a reaction to stress or is it a brain cell injury, an organic illness? There we did studies comparing the sick and the well, those who satisfied the case definition of the illness versus controls, used brain imaging, the most sensitive thing that will detect brain cell injury which is called MR spectroscopy. It is a brain chemical analysis.

With that we found, in fact, there is strong evidence that the basal ganglia have abnormal metabolism in the sick Gulf war veterans compared to the well. This is a pivotal question that drives it toward a physical illness rather than stress. There is no other way to explain that finding other than this is a brain cell injury.

This finding has now been reproduced by Dr. Michael Weiner at UC, San Francisco, and the San Francisco VA. The VA has now invested in his outfit with a big imaging center to follow that up. That was a really good move that General Martinez-Lopez mentioned.

Also, this has been replicated again. Just recently, about 2 weeks ago, an article from the University of Mississippi and the Mississippi VA found the same thing except both basal ganglia and the hippocampus, two different deep brain structures.

So it appears that we're really making progress in the pivotal question, is it psychological or is it physical? Is it organic?

The next question is, what's the basis of the actual symptoms to show brain cell injury doesn't necessarily explain the symptoms and so many of the symptoms we think are autonomic in nature;

that is, they are a dysfunction of the autonomic nervous system. You might call it the automatic nervous system.

We have a study that will be published in the next couple of months, which demonstrates definite autonomic dysfunction in veterans meeting this Gulf war syndrome. There are two other groups that have similar findings produced at national meetings. We think that is going to explain a lot of the symptomatology and maybe provide a little beachhead for directing treatment.

And then, of course, the question, if there is one brain illness, brain cell injury, could that have kicked off a neurodegenerative disease; and that's what got us looking toward ALS, finding the first cluster. And now the VA study has come along and replicated that, so that appears to be real.

The next question is, is there an environmental etiology or cause of this? Of course, we then did an epidemiologic study, the first study that looked at risk factors for this case definition. We found in our study that sarin was by far the strongest risk factor for this illness. Nine other studies have done this epidemiologically using self-reported reports. All of them have found that sarin is the strongest risk factor. Those are self-reported studies so there is a possibility of other explanations, as you know.

We also found that there is a geographical risk; that is, soldiers who were deployed up front, particularly on the fourth day of the air war when the Czechoslovakian team detected chemical weapons, we found that group to have the highest risk of this Gulf war syndrome, which is a neurological problem. Dr. Lea Steele in the Kansas study showed the same—similar finding.

We then looked at a genetic finding. If sarin is the cause, then you would expect people who have a greater risk, a greater susceptibility to sarin would be sicker. That is exactly what we found from a genetic point of view. The paraoxonase enzyme is the enzyme in your body that protects you from nerve gas, and Gulf war veterans meeting this case definition of Gulf war syndrome were born with low levels of this defensive enzyme. And so that connects the disease with the cause.

Then I think we are going to hear later from Dr. Henderson. Her animal studies, I think, are critical, following up about eight or nine other animal studies, animal laboratory studies showing brain cell damage from combinations of low-level chemical exposures. I won't steal her thunder and talk too much about her study except to point out that what she found in her profound study was low-level exposure to sarin produces brain cell injury injust the same parts of the brain that we found brain cell abnormality, the basal ganglia; and then the University of Mississippi group found it in the hippocampus.

So there appears to be a great deal of evidence emerging that is linking all of these things up. This is still a hypothesis because there is not enough replication from other studies. The reason for that, it's not because others have tried and failed; it is because there is no effort to replicate, and that is the problem.

In my handout, I went through reasons that we failed. I won't go through those again; you can read them in the handout. But I think there are five or six main reasons that $247 million worth

of research sort of went off in other directions. That was not fruitful.

In conclusion, my main point is, I think, in looking back on the history of medicine and understanding new diseases, there are standard ways of going about it; and all we did in our studies was go about this in the way you usually investigate an epidemic of a new disease, and we found a lot of interesting things. We now see that the scientific world is starting to buy into this, is getting interested in it and there are people who want to do research, but as Dr. Binns, Jim Binns, mentioned, there just isn't funding right now. We need to fix that.

Mr. TURNER. Doctor, thank you very much.

[The prepared statement of Dr. Haley follows:]

The Nature and Causes of Gulf War Neurological Syndrome and Gulf War-Associated Lou Gehrig's Disease and the Need for Continued Funding for Research

Testimony of

Robert W. Haley, M.D.
University of Texas Southwestern Medical Center
Dallas, Texas

Before the Subcommittee on National Security, Veterans Affairs and International Relations, Committee on Government Reform, United States House of Representatives

Washington, D.C.

June 1, 2004

As you know, for the past 10 years I have been leading a research effort at the University of Texas Southwestern Medical Center in Dallas to understand the illnesses that have affected many of the veterans who served in the 1991 Gulf War. Our thrust has been to try to cut through all the metaphysical debates about stress, plume models, and expert committee reports and get right to the heart of the problem: what is wrong with these veterans, what caused it, and how can we help them. This effort has carried us along a path of fascinating scientific studies to the brink of understanding the problem.

Right now I am encouraged at the progress that has been made in understanding the new type of brain cell damage that appears to underlie Gulf War veterans' symptoms. Up to a year or so ago, anyone who would give credence to anything other than stress as a cause of the problem was a pariah, but we are now seeing a broad change in viewpoint in the scientific community. Just last month I attended an NIH-sponsored meeting on responding to chemical terrorism, and the scientists in attendance were discussing the chronic brain effects of sarin nerve gas as a given. So the good news is that the bureaucratic resistance to research toward a biological explanation has finally been overcome, and the scientific world is poised to jump in and study the problem broadly. The bad news is that, just as clear directions are emerging for productive research to begin, funding for research on this problem has dried up.

Let me briefly list the main scientific breakthroughs that have been responsible for the change in scientific viewpoint. I'll discuss the evidence on three general questions: the nature of the Gulf War neurological illness, the causes of the Gulf War neurological illness, and the recognition of an elevated rate of ALS in Gulf War veterans. I will then discuss briefly a series of severe methodological errors in government-funded studies that are responsible for inconsistent findings.

The Nature of Gulf War Neurological Syndrome

First, we now know that down inside this mass of confusing symptoms that has baffled us for over a decade, there is at least one real disease—maybe two or three diseases, or one disease with several variants—that was caused by exposures in the Gulf War. Almost all of the varied symptoms relating to different body organs in this condition could be caused by damage to one organ—the brain. So what is the evidence that brain damage underlies this condition?

My group identified three symptom complexes that appear to be separate variants of a Gulf War neurological syndrome. Dr. Han Kan's team at VA has identified three symptom complexes that appear very similar to the ones we identified. In both studies the second symptom complex ("Syndrome 2") appears most like a neurological syndrome. We have completed several additional studies that show all three symptom complexes differ from healthy veterans on neurophysiologic and neuropsychological tests, suggesting a neurological basis. The most convincing evidence of a neurological basis for the syndromes comes from brain imaging studies of brain cell chemistry and neurophysiologic studies of the autonomic nervous system.

Evidence of brain cell damage underlying Gulf War neurological syndrome. In our studies comparing a well characterized group of sick Gulf War veterans and well control veterans, we measured the chemical composition of deep brain structures in the center of the brain, called the **basal ganglia**, with a well established brain chemistry test called Magnetic Resonance Spectroscopy, or MRS scanning. We found that the sick veterans had reduced levels

of normal chemicals inside brain cells of the **basal ganglia**. This finding proves that the brain cells in the **basal ganglia** of the veterans with this condition are physically damaged. Since we published this finding in 2000, two other independent research groups have made similar discoveries—Dr. Michael Weiner and colleagues at the UCSF medical school and the San Francisco VA Medical Center in 2001, and Dr. P. M. Menon and colleagues at the University of Mississippi Medical School and the Montgomery VA Medical Center in 2004, just last month. Dr. Weiner confirmed our finding of abnormal brain chemistry in the **basal ganglia**; whereas, Dr. Menon confirmed that finding and also found the same abnormality in the **hippocampus**. These "hard" scientific findings are giving us, and the rest of the scientific world, confidence that this is a real brain disease, and they are attracting more scientists to join in the investigation, which is what we will ultimately need to really bring help to the ill veterans.

Evidence of autonomic nervous system dysfunction. Another important path of research into the nature of the disease involves studies of the **autonomic nervous system**. This is what you might think of as the "automatic" nervous system, that part that is constantly carrying out all the automatic functions that you aren't aware of, like digesting food, maintaining body temperature, heart rate, and energy level, and so on. The **autonomic nervous system** is very difficult to study, which helps explain why this problem has been so difficult for medicine to deal with. My group has a new study that will be published later in the summer that demonstrates a characteristic abnormality of the **autonomic nervous system** in ill Gulf War veterans compared with well controls. At least two other research groups have presented similar findings at scientific meetings, and these should be appearing in scientific journals later this year. These findings will go a long way toward explaining the symptoms that have seemed so mysterious up to now.

Followup survey to capitalize on these findings. For the past seven years my group has been proposing to do a nationwide survey in random samples of the deployed and nondeployed Gulf War-era military populations to compare the prevalence of the symptom complexes and neurological abnormalities in the two populations. In the telephone survey we will determine the prevalence of the symptom complexes and answer many questions posed by recent research. Then we will select random subsamples of the ill and well veterans, and bring them to Dallas for brain imaging, neurophysiologic tests and other sophisticated medical tests designed to explain the basis for the illness. We have Congressional funding for the survey, which is administered through USAMRMC at Ft. Detrick, and we are expecting to receive final clearance from the Ft. Detrick Human Subjects Research Review Board next week. This should allow us to start the pilot survey to test the methodology by late summer and to begin the survey by late fall, with results this time next year. In parallel with the survey, we will be advancing the brain imaging methods to be used in the later onsite medical testing phase. For this we are developing a state-of-the-art brain imaging center on the UT Southwestern Medical Center campus by adding the most advanced 3 Tesla brain imaging magnet with staffing to support it. Teams of neuroscience researchers are planning new brain imaging protocols to start testing later this summer.

Approaches to find treatments for the illness. At present no treatments are known to substantially relieve the symptoms of Gulf War neurological syndrome. Historically there have been two ways of finding new treatments for diseases, serendipitous discoveries by physicians treating patients and rational new drugs designed on the basis of scientific discoveries of how a

disease works. The former is sometimes rapid but uncertain, while the latter is sure but may take a long time. We are taking both approaches. Our national survey of Gulf War veterans will ask veterans if they have been treated with medications that are effective for them; if we are lucky, this could identify one or more effective treatments that are already available. Dr. Han Kang of VA is asking for this same information in his national survey which is currently in the field. In parallel we are studying the cellular and molecular basis of the disease so that in the future we, or others, will be better able to design new treatments with a higher likelihood of being effective.

Causes of Gulf War Neurological Syndrome

Proving that some environmental exposure causes a disease is a very difficult undertaking. It requires a combination of approaches with results all lining up to form a coherent picture. The usual approaches include epidemiologic studies showing statistical associations, genetic studies showing predisposition to illness from the exposure, and laboratory experiments that reproduce a similar illness in laboratory animals experimentally exposed to the causative agent. All of these have now been done for Gulf War neurological syndrome, and a coherent picture is emerging.

Epidemiologic Studies of Self-Reported Exposures. In my review of the published scientific literature, I count 15 epidemiologic studies in which the investigators asked large groups of veterans to report whether they recalled being in contact with a variety of possible causative exposures during the Gulf War (self-reported risk factors) and then analyzed to see which exposures were more strongly associated with chronic illness. Although these studies rely on veterans' recall of their exposures, two studies have examined the validity of these recall data and found that errors from inaccurate recall occur at the same rate in the ill and well groups, indicating that no bias results. The studies are remarkable in that they are consistent on one major finding. In the 10 studies that included questions on exposure to chemical nerve agents, all 10 showed that nerve agent exposure was more strongly associated with a case definition of Gulf War neurological syndrome than any other risk factor included. Thus, the body of epidemiologic studies nominates chemical nerve agent exposure as the most important cause of the illness.

Epidemiologic Studies of Geographical Location. Two epidemiologic studies have shown that military personnel deployed nearest the Kuwait-Saudi border during the conflict were at greater risk of later chronic illness. Our survey found very specifically that those personnel who were nearest the border area on the fourth day of the Air War (approximately January 19 and 20, 1991) have the highest risk of chronic Gulf War neurological syndrome. After discovering this association, we researched the dates of various exposures and found that January 19 and 20 was the exact period when Czech chemical weapons detection experts, working with the most sophisticated detection equipment, detected sarin in ambient air in the border area amid U.S. troop positions. Similarly, Dr. Lea Steele's survey of Gulf War veterans from Kansas found that personnel who were forward deployed during the conflict period had higher rates of Gulf War neurological syndrome. These findings add geographical and temporal specificity to the association with chemical nerve agent.

Studies of Genetic Predisposition. In one of our earlier studies, we reasoned that if repetitive exposure to low-level sarin was the cause of the Gulf War neurological syndrome, then personnel born with low resistance to sarin would be the most seriously affected with chronic symptoms. Through searching the scientific literature, we identified a gene—the PON1 gene—that codes for a blood enzyme—type Q paraoxonase—that destroys chemical nerve agents in the bloodstream before they can get to the brain and cause damage. So we tested out theory by measuring the blood activity of the paraoxonase enzyme in groups of ill and well Gulf War veterans. As you know, we found that the veterans sick with Gulf War neurological syndrome had been born with low levels of type Q paraoxonase, meaning less protection; while those who remained well had been born with high levels, more protection. This was a remarkable finding, because type Q paraoxonase essentially has only one toxicologic function, and that is destroying nerve agents like sarin, soman and VX, but it doesn't very strongly attack any other chemical toxin. Taken altogether, this set of findings strongly connects Gulf War neurological syndrome directly to nerve agent exposure, further pointing to a link with sarin exposure.

Animal Model Experiments. Back in 1995 during our initial epidemiologic studies, Dr. Tom Kurt of my research group designed a set of animal experiments to test the biological plausibility of our epidemiologic findings, and with funding from the Perot Foundation contracted with Dr. Abou-Donia at Duke University to perform the experiments. Those and later experiments by Dr. Abou-Donia showed that combinations of pesticides, inset repellants, and chemical nerve agents can cause permanent damage to nerve cells in the brains of experimental laboratory animals. Following publication of those findings, there has been a crescendo of laboratory animal experiments by researchers throughout the country and overseas, adding to our knowledge of the long-term brain affects from low-level, repetitive exposure to these chemicals.

A longstanding criticism of this body of research was that the experimental conditions in the laboratory did not closely enough fit the exposure situation of military personnel in the 1991 Gulf War. Indeed, in their 2000 report *Gulf War and Health Volume 1: Depleted Uranium, Pyridostigmine Bromide, Sarin, Vaccines*, the Institute of Medicine's Committee on Health Effects Associated with Exposures During the Gulf War concluded that, whereas there is sufficient evidence to conclude that exposure to sarin at levels sufficient to cause immediate symptoms of toxicity can lead to chronic brain damage, they found insufficient evidence to conclude that exposures below symptomatic threshold could cause chronic damage, and they called for more animal experiments to fill this research void.

This issue was finally addressed in three scientific publications that appeared in October 2002 by Dr. Rogene Henderson of the Lovelace Respiratory Research Laboratory, University of New Mexico, and collaborators at the U.S. Army Medical Institute of Chemical Defense in Aberdeen, Maryland. Their experiments exposed rats to sarin by inhalation for 5 or 10 days, with and without heat stress, at doses of sarin below the levels that would cause signs of immediate toxicity. Throughout the dosing period they monitored breathing, body temperature and activity level—the main indicators of immediate sarin toxicity in rats—and found no immediate effects. They also sacrificed half the animals immediately after the end of the dosing period to examine the brains which were found to be entirely normal. These findings thus satisfied the IOM Committee's stipulation of no evidence of immediate toxicity. Then 30 days after the end of the sarin exposures, they sacrificed the rest of the rats, examined their brains and found striking evidence of structural damage to **cholinergic receptors** in several deep brain structures, including the **basal ganglia** and **hippocampus**. Recall that the MRS scanning studies, discussed

above, found biochemical abnormalities in the **basal ganglia** and **hippocampus** areas of veterans ill with Gulf War neurological syndrome. In a second paperin the series, the investigators presented evidence of damage to the **autonomic nervous system** caused by the sarin exposures. Consequently, the laboratory animal experiments of Henderson and colleagues, which satisfied the IOM Committee's requirement to simulate exposure conditions present in the 1991 Gulf War with exposure levels that produced no signs of immediate toxicity, identified sarin-induced damage to **cholinergic receptors** in the very brain regions found to be biochemically abnormal in the ill veterans—the **basal ganglia** and **hippocampus**—and damage to the **autonomic nervous system** also being found to be functioning abnormally in ill veterans.

Extension of Human Studies to Link to the Findings of the Animal Experiments. My group is presently completing the analysis of a complex human experiment where we performed brain scans measuring brain bloodflow throughout the brain with the SPECT method (single photon emission computed tomography). We performed two resting SPECT brain scans on each of 23 veterans with Gulf War neurological syndrome and 17 well veteran controls. The first scan was performed while the subjects were receiving an intravenous infusion of saline (a placebo), and the second scan 48 hours later while they were receiving an intravenous infusion of physostigmine, a safe drug that stimulates **cholinergic receptors**, the ones found to be damaged in Henderson's sarin-exposed rats. Our prediction was that, if sarin exposure caused the veterans' illness, certain parts of their brains would respond less well to the physostigmine infusion. Moreover, of the three syndrome variants only syndrome variant number 2 was linked epidemiologically with sarin exposure; consequently, we predicted that this subgroup would show the most abnormal response to the cholinergic stimulus. If our analysis were to confirm these predictions, it would link the objective abnormalities of ill Gulf War veterans directly to the mechanisms of sarin-induced brain cell damage identified in Henderson's animal model. We expect to complete these analyses and submit a scientific paper for later publication this year.

Discovery of the Excess Rate of Lou Gehrig's Disease in Gulf War Veterans

In late 1997 I began a collaboration with Major Michael Donnelly and members of his extended family to investigate whether the rate of occurrence of Lou Gehrig's disease (amyotrophic lateral sclerosis, ALS, motor neuron disease, MND) was greater than expected in young Gulf War veterans, less than 45 years of age. Major Donnely flew jet fighters in combat missions during the 1991 Gulf War and six years later developed ALS at age 42. Within months of starting to look for additional cases, we had identified 17 young Gulf War veterans with ALS. My epidemiologic calculations confirmed that this was over twice the rate expected when the incidence rate of ALS of the U.S. population in each one-year age group is applied to the numbers of Gulf War veterans in the same age groups. This calculation is a time-honored method resulting in the standardized morbidity ratio (SMR) statistic. In addition, I constructed the "epidemic curve," a graph showing the number of cases diagnosed in each year since the 1991 Gulf War. The epidemic curve showed an average of one case per year in 1991 through 1994, exactly the expected number, and thereafter two in 1995, three in 1996 and 1997 and five in 1998. The combined number in 1995-1998 was 2.3 times the expected number, and the number in 1998 was 3.2 times greater than expected. These differences were statistically significant, thus not due to chance. This finding suggested that in the final year of our study, the

rate of ALS cases was still increasing and could herald a serious emerging public health crisis in future years.

While attempting to publish the controversial finding in a medical journal, I approached the VA Central Office to collaborate by providing me the names of all Gulf War-era veterans with ALS from their nationwide computer records so that I could confirm them and add them to my case series for a more complete study. When the VA administration declined, I asked that they at least send a letter to all ALS patients apprising them of my study, but this too they declined. However, they immediately set up a VA-supported study to check my findings. In 2001 I presented the results of my study to the new VA Secretary Anthony Principi and suggested that he check my findings against those of the VA study still in progress and, if the results were mutually confirming, to consider service-connecting the Gulf War veterans with ALS. Six months later Secretary Principi announced this decision.

Because of the extreme skepticism of our finding among neurologists generally, my paper met stiff opposition by journal peer reviewers and was not published for several years. Finally when the VA study was completed, showing essentially the same result, both papers were published together in the September 2003 issue of the journal *Neurology*. Subsequently, the VA established a center for the study of ALS at Duke University, where the subsequent course of the problem is being monitored. Skepticism of the finding continues to be expressed by some neurologists, with one negative editorial and a critical letter to the editor. The findings of the Duke ALS Center, however, should clarify the nature and full magnitude of the problem shortly.

New funding for ALS breakthrough research. Another important outcome of the finding was that it stimulated a new funding initiative for innovative research into the causes and treatment of ALS, sponsored jointly by VA, the National Institute for Neurological Disorders and Stroke (NINDS) of NIH, and the private ALS Association (ALSA). Shortly after VA Secretary Principi announced service-connection of the Gulf War veterans with ALS, representatives of the three institutions began meeting to plan a research response to the problem. In late 1993 NINDS released a request for applications (RFA) for an R21 grant offering—the R21 mechanism encourages high risk, innovative proposals to stimulate breakthroughs in the understanding of the disease. Expecting only a dozen or so applications, NINDS officials were surprised to receive over 70 research applications, a huge outpouring of interest in the disease. After peer review of the applications by an NIH study section, several projects were funded; however, before all the awards were made VA scaled back its contribution to the consortium, and fewer projects will now be funded.

Hypothesized explanation for the increased rate of ALS in Gulf War veterans. As for the cause of the increased rate of ALS in Gulf War veterans, there is insufficient evidence to reach a conclusion at present; however, existing evidence gives important clues to the causal mechanisms. First, it is clear that ALS has a strong genetic basis. Approximately 10% of civilian ALS cases are familial, and approximately half of these are associated with an identified set of gene mutations in the SOD1 gene. Second, many epidemiologic studies of civilian ALS have shown links with environmental exposures. One of the most interesting is a strong association with farming occupations and with long-term exposure to pesticides and herbicides; recall that most pesticides used in farming are organophosphate chemicals in the same chemical family and with the same mechanism of action as the chemical warfare nerve agents sarin, soman and VX. Third, in our study of ALS in young Gulf War veterans we found that 66% of our ALS

patients had symptoms of Gulf War neurological syndrome beginning during, or soon after returning from, the 1991 Gulf War and developed the first symptoms and signs of ALS five to eight years later. Since only about 15% or so of Gulf War veterans in general developed Gulf War neurological syndrome, finding that 66% of the ALS patients had it long before the onset of their ALS suggests a link between the two diseases.

These findings could be explained by the hypothesis that widespread exposure to low-level sarin in the Gulf War caused both chronic neurological diseases: 1) Gulf War neurological syndrome due to brain cell damage in the approximately 15% of troops born with low levels of type Q paraoxonase, and 2) ALS in the much rarer individuals who were genetically susceptible to getting ALS (through as yet undiscovered genetic mutations like those in the SOD1 gene). Thus, it is possible that the young veterans who got ALS might have gotten it anyway, but at a much older age, namely, in their 60s and 70s, but Gulf War exposure to low-level sarin nerve agent—a far more potent environmental toxin—accelerated the appearance of ALS by several decades. Again, let me emphasize that this is an unproven hypothesis that would explain the facts we have, but we have insufficient evidence at present to confirm it.

Inconsistent Findings from VA and DoD Research from Plume Models, Hospitalization and Mortality

In assessing the evidence on the nature and causes of Gulf War neurological syndrome, one must account for the seemingly contradictory, though inconsistent, findings of a number of epidemiologic studies performed by researchers in DoD and VA as well as those performed by researchers at Kings College London, funded in early years by DoD.

The first set of studies, published in the 1996 time frame, showed that the deployed population had no higher rates of hospitalization in military hospitals and no higher mortality rates than the non-deployed Gulf War-era population. Actually, the mortality study showed significantly excess mortality rates from motor vehicle accidents in the deployed population, although this important finding has repeatedly been obscured in dissemination of the findings. A second set of DoD and VA studies, published several years later, similarly used hospitalization and mortality rates as surrogate measures for Gulf War neurological syndrome to test for an association with exposure to low-level nerve agent. In the second set, however, DoD researchers attempted to correct some of the negative bias by counting hospitalizations in VA hospitalization databases. This made a bid differences in the results.

The first set of studies showed no increase in hospitalization or mortality in Gulf War veterans exposed to the 1997 Khamisiyah plume, generated by DoD's plume modeling. The second set, with VA hospitalizations included, showed increased rates of hospitalization associated with deployment and with the 2000 Khamisiyah plume, but these important corrections on earlier findings have been obscured in dissemination of the findings.

All of these studies suffered from serious methodological flaws that minimized or entirely obscured strong adverse health effect of deployment. The major flaws are as follows:

Use of deployment as a surrogate for a case definition of Gulf War neurological syndrome obscures the health effects of deployment. The studies that compared the rates of hospitalization or mortality in the deployed versus the nondeployed Gulf War-era military population were using deployment as a surrogate measure for illness. Since, however, only a

relatively small percentage of the deployed became chronically ill, the studies obscured the associations with the illness by grouping the small number of deployed veterans who became ill with the much larger number of deployed who did not become ill and comparing the combined group to the nondeployed population. This averaging of the ill veterans with the larger population of well Gulf War veterans made it all but impossible to see the effects of the illness.

Use of hospitalization and mortality as surrogates for a case definition obscures the health effects of deployment. A fundamental feature of the Gulf War neurological syndrome is that the ill veterans have disturbing symptoms but no clinically evident signs of known diseases. Consequently, physicians do not tend to hospitalize Gulf War veterans for this problem, and it does not progress to a fatal outcome, except in motor vehicle accidents. Consequently, rates of hospitalization and mortality are not appropriate measures of the disease, and studies using them to test the association of the illness to deployment or plume exposure are foreordained to show negative results.

Studies measuring outcomes in military hospital records only are strongly biased against finding an association with Gulf War neurological syndrome. In the first several years after the 1991 Gulf War, the U.S. Military was severely downsized, resulting in separation of large numbers of active duty personnel. Many personnel who returned from the Gulf War with chronic illness that impaired their performance either left the service voluntarily or were "downsized" out, as personnel better able to perform were preferentially retained. Evidence of this selective attrition of those returning ill from the war was published in the first DoD hospitalization study. Since military personnel are no longer eligible to be admitted to military hospitals after leaving active duty, the selective attrition of the sickest personnel soon after the war produced a severe selection bias in studies relying only on military hospital records. Such studies were strongly biased toward finding no association between deployment and hospitalization, or conditions diagnosed with ICD-9 codes in hospitals.

Studies using nonspecific definitions of Gulf War neurological syndrome are biased toward finding negative results. Early in the history of Gulf War illness research, around 1993, a decision was made in the government to the effect that "there is no Gulf War syndrome," and this led to pressure on researchers who wanted government funding not to use a case definition of the illness in their research. Without at least a provisional case definition, however, it is virtually impossible to design studies that will elucidate the nature of the illness, or illnesses, and connect them with causes. This unfortunate government decision is arguably the main reason for the delay in progress in this research field. Finally, when a few studies bucked the policy and used provisional case definitions successfully to make promising discoveries, research groups that had performed expensive population surveys without a case definition in mind attempted either to prove that no case definition was possible or to concoct case definitions after the fact from data collected earlier, even when the collected data were insufficient for defining a case definition.

The most important example of the unproductive use of a nonspecific case definition concocted after the fact was the series of studies from the Kings College London group. In place of a case definition describing the disease that veterans were complaining of, they defined Gulf War illness as having a score of greater than 72.2 on the SF-36 questionnaire, which measures functional impairment regardless of the cause. This case definition essentially counted veterans

as having Gulf War illness if they had any condition that caused them to feel bad. Consequently, many veterans with diseases other than Gulf War neurological syndrome that made them feel bad were mistakenly counted as cases, and conversely, many with typical symptoms of Gulf War neurological syndrome but who were not very ill with it were not counted as cases. This severe degree of bidirectional misclassification has caused all studies from the Kings College London group to reach spuriously negative conclusions.

Studies using nonspecific measures of nerve agent exposure are biased toward finding negative results. With the high likelihood of low-level nerve agent exposure playing a causative role in the chronic illnesses of Gulf War veterans, it was crucial to develop accurate measures of low-level nerve agent exposure for epidemiologic studies. Inaccurate measures of the exposures would predictably bias studies toward finding no association with illness. Four types of measures of low-level nerve agent exposure have been used in studies: 1) mathematical models of the plume generated by demolition of the CW-containing ammunition depots at Khamisiyah and other sites in Southern Iraq, 2) veterans' self reports of having actually seen the explosion of the ammunition depot at Khamisiyah, 3) veterans' self-reports of low-level nerve agent exposure at any time or place during the war, and 4) epidemiologic linkage of illness with low type Q paraoxonase, a blood enzyme that selectively protects from nerve agent.

Studies using measures of low-level nerve agent of types 2, 3 and 4 have rather consistently found strong associations between low-level nerve agent exposure and Gulf War neurological syndrome; whereas, all studies using measures of type 1, plume modeling, have shown no association, except for an association with one hospital diagnosis, cardiac arrhythmias, in the latest hospitalization study. Although the researchers who used plume-modeled markers of nerve agent exposure have argued that this measure is preferred because it is objective and not reliant on veterans' self reports, I consider the exposure measures from plume modeling spurious for the following four reasons.

First, the plume models attempt to express only the sarin exposure that resulted from post-war demolition of ammunition depots and do not attempt to capture the more apparent, and widespread, nerve agent exposures that occurred during the Air and Ground War phases of the 1991 Gulf War conflict. These exposures were documented by widespread sounding of nerve gas alarms among our troop concentrations, simultaneous nerve agent detections by Czech CW experts among our troop concentrations, and scrupulous review of exposure records by credible nongovernment experts. The plume models also did not include exposures that may have occurred after the war to personnel who ventured into nerve agent-contaminated sites or handled vehicles or equipment contaminated at the sites. By thus failing to include these exposures, which are captured by the other three approaches, the plume models captured only one component—most likely a minor component—of the true exposure burden. Consequently, the plume models misclassified many personnel as not exposed who really were exposed earlier during the Air and Ground War phases of the conflict or later during the cleanup operations.

Second, the plume models used many input parameters of low reliability, thus yielding models with a great variance.

Third, the plume models themselves were never submitted for scientific publication through the peer review system of respected scientific journals.

Fourth, in the midst of controversy over the plume models, DoD officials at OSAGWI transmitted to VA a computer database containing flags of plume exposure from the 1997 plume and from the 2000 plume. When VA officials cross-tabulated the two flags they found

irregularities in the death rates suggesting that the 2000 plume may have been manipulated invalidly to exclude deceased veterans from the 2000 model's plume-exposed group. A VA report attempting to explain the discrepancy was, in my view, not cogent.

Combined effects of several methodologic flaws in the same study. The confusion produced by studies containing such flaws is compounded by the fact that some of the government-funded studies contained more than one of the methodologic flaws described above. For example, one study measured nerve agent exposure with a flawed plume model that misclassified veterans on the exposure, measured the illness outcome with hospitalization diagnoses that did not detect Gulf War neurological syndrome, and restricted the hospitalizations counted to those from military hospitals that excluded the sickest personnel who left the military shortly after the war. Such studies provide no useful information and yet have been widely quoted and have exerted strong influence on government policy. It is my observation that these, and other less obvious, methodologic flaws are responsible for the inconsistent evidence against the existence of a Gulf War neurological syndrome and against the role of nerve agent exposure.

Conclusions

Over the past several years published research from diverse institutions has provided evidence from which we can begin to understand the nature and causes of the unusually large burden of illness in veterans of the 1991 Gulf War. The evidence increasingly suggests that there are at least two serious disease problems in this population, a very common condition that I refer to as the Gulf War neurological syndrome and an excess rate of the rare condition ALS. Although not covered in this review, there is also increasingly compelling evidence of excess rates of birth defects. There may be other diseases emerging in this population; for example, with two environmental diseases affecting the brain already documented, it would not be unexpected to see an excess of brain tumors or other cancers, as we reach the end of the expected latent period when cancers would be expected to appear.

The weight of the evidence also points increasingly to exposure to low-level sarin nerve agent as a predominant player, perhaps potentiated by other environmental co-exposures, in the causal mix. Before the Gulf War U.S. chemical defense doctrine held that exposure to low-level nerve agent did not lead to chronic effects, and for over 10 years after the war, false confidence in this doctrine served as an impediment to scientific research into its role in Gulf War veterans' illnesses. We now know that the old doctrine was based on overly simplistic studies of single exposure events and insensitive measures of chronic brain effects. Current evidence clearly shows that repetitive, low-level nerve agent exposures, at doses too low to cause immediate symptoms of toxicity, regularly lead to chronic brain changes in vital deep brain structures and related chronic, disabling symptoms.

The good news from this is that we have learned much and are on the verge of scientific breakthroughs that would lead to treatment of the ill veterans and prevention of brain injury from nerve agent exposures in the future. The bad news is that we do not yet have a treatment for the tens of thousands of ill Gulf War veterans, and government funding for further research to capitalize on emerging breakthroughs has all but dried up. Even limited funding that is supposed to be going to new research on Gulf War neurological syndrome and ALS is being quietly reprogrammed to other uses.

Now is the time to invest in a new wave of research funding for these important questions. Riding the crest of recent research breakthroughs, a new round of research funding is now well timed to translate the new findings into practical treatment and prevention products. Once funded, we must then ensure that the funding actually gets to our best researchers who will avoid the pitfalls of the past decade and use the resources to advance understanding to a higher plane. The public-private consortium of NINDS, VA and ALSA to fund high risk, breakthrough research on ALS is a model for this new wave of funding, although the pullback of VA funds illustrates the bureaucratic hurdles that will have to be overcome. The recent funding alliance between NINDS and the U.S. Army Medical Institute of Chemical Defense to create a new extramural grant program for research into defense of chemical terrorist threats is another good model that should be supported.

The most optimistic development is the growing awareness in the scientific community of the legitimacy of research into the chronic brain effects of low-level chemical exposures. Resulting from a decade of solid research published in reputable scientific journals, this broad awareness will gradually stimulate wider interest among our best scientists and simultaneously wear down the bureaucrats who would hold back progress. Now is the time to put resources into solving this problem for the relief of Gulf War veterans and the protection of future military personnel and civilians who may be exposed to these chemical threats.

Acknowledgments

I am indebted to the following individuals and organizations that have supported our research: H. Ross Perot and the Perot Foundation, Texas Senator Kay Bailey Hutchison, the former Joint Chiefs of Staff under General Hugh Shelton, former Secretary of Defense William Cohen, Secretary of Veterans Affairs Anthony Principi, and the U.S. Army Medical Research and Materiel Command at Ft. Detrick. The contents of my testimony do not necessarily reflect the position or the policy of the U.S. Government, and no official endorsement should be inferred.

Mr. TURNER. Next we'll hear testimony from Dr. Rogene Henderson, Senior Scientist, Lovelace Respiratory Research Institute.

Doctor.

Dr. HENDERSON. Thank you, Mr. Chairman, for this opportunity to speak to the subcommittee.

Since the conclusion of the Persian Gulf war in 1999, there have been complaints among some veterans of diverse health symptoms that include mood changes, concentration problems, muscle and joint pains, skin rashes, chronic fatigue, sleep disturbances, chronic digestive problems and loss of sexual drive. The cause of these illnesses is unknown, but one theory is that some veterans of the Persian Gulf war were unknowingly exposed to subclinical levels of nerve gases.

Potential long-term effects of single or repeated exposures to subclinical levels of nerve gas have not been well studied. The Lovelace Respiratory Research Institute received funding through a competitive process sponsored by the Department of Defense to study the effects of single and repeated exposures of rats to the nerve gas sarin at a level that did not produce acute symptoms of nerve gas poisoning. The Lovelace studies were designed to use inhalation exposures of rats under normal and heat-stressed conditions to determine the interactive effect of heat stress and subclinical levels of sarin, first on the levels of cytokines and apoptotic cells in the brains of rats, second on the immune system of the rats, and third on the cholinergic muscarinic receptor sites in the brains of the heat-stressed and nonstressed rats.

Rats were exposed to one-tenth and one-twentieth the acutely toxic level of sarin for 1 hour a day for 1, 5 or 10 days and observed for alterations at 1 day and 30 days after the exposures. Half of the rats were exposed under normal temperature conditions and half under heat stress conditions, that is, 90 degrees Fahrenheit. None of the rats showed symptoms of acute nerve gas poisoning.

There were two major findings. First we found a suppression of the immune system. The repeatedly exposed rats even without heat stress showed a reduced ability to mount an effective immune response. White blood cells in the rats did not respond well to antigens. Tests were made to determine if this effect was caused by increased corticosteroids in the blood of the rats due to stress of the exposures because you would expect if the corticosteroids were high that you would have a suppressed immune response.

But the opposite was found. The rats had unusually low levels of blood corticosteroids. The reduction in the immune response could be prevented however by treating the rats with a ganglionic blocker, indicating that the effects of the sarin were through the autonomic nervous system.

Our second finding, which Dr. Haley has referred to, was an interaction between the heat stress and sarin in causing alterations in certain brain cells in the rats. The brains of the rats repeatedly exposed to low levels of sarin under heat stress conditions showed alterations in the densities of the muscarinic acetyl choline receptor sites in areas of the brain responsible for memory and cognitive function.

Of great interest was the fact that in most cases these alterations were delayed and did not appear until 30 days after the ex-

posures. This suggests that there may be an opportunity for intervention to prevent these effects in exposed persons.

These initial studies raise many questions. What are the behavior problems associated with alterations in the density of receptor sites in the brain? What is the temporal pattern of the response? How long will the ill effects last? When did the delayed effects first occur and how long will they last? What interventions could be used to prevent the delayed effects? In terms of immunosuppression, what is the mechanism by which sarin causes immunosuppression? Does this suppression increase the susceptibility of exposed persons for mycrobial infections? How can the immune system be restored to normal function?

Finally, is it possible that the low blood corticosteroids that we observed, if these are also observed in humans, could be used as a marker for subclinical exposure to a nerve gas?

As we have heard, there is a problem of who is exposed, because it is not obvious since they are at subclinical levels. Could this be a biomarker for exposure? At the present time the DOD has funded us to do additional research on the effects on the immune system, and we are seeking additional funding to continue our studies on the effects on the brain receptor sites.

Thank you for this opportunity for talking to you. We hope that the information that we have found and what we hope to find in followup studies will be useful for development of prevention and therapeutic measures for both our military exposed during hostile actions and for civilians exposed in potential terrorist attacks. Thank you.

Mr. TURNER. Thank you, Doctor.

[The prepared statement of Dr. Henderson follows:]

Written Testimony Presented to the
HOUSE SUBCOMMITTEE ON NATIONAL SECURITY, EMERGING THREATS AND INTERNATIONAL RELATIONS SUBCOMMITTEE
Christopher Shays, Connecticut
Chairman
By the
Lovelace Respiratory Research Institute
Rogene F. Henderson, PhD, DABT
Senior Scientist

At the hearing on
Examining the Status of Gulf War Research and Investigations on Gulf War Illnesses

June 1, 2004

INTRODUCTION

Thank you, Mr. Chairman for this opportunity to speak to the subcommittee.

Since the conclusion of the Persian Gulf War in 1991, there have been complaints among some veterans of diverse symptoms that include mood changes, concentration problems, muscle and joint pains, skin rashes, chronic fatigue, sleep disturbances, chronic digestive problems and loss of sexual drive. Available medical records do not indicate the soldiers in the Persian Gulf War reported clinical symptoms consistent with exposure to nerve gases. However, when a munitions dump in Kamisiyah, Iraq was blown up during the war, fragments of the destroyed missiles were found to have polyethylene liners, suggesting that the missiles may have contained chemical warfare agents. This information stimulated the theory that some veterans of the Persian Gulf War were unknowingly exposed to sub-clinical levels of nerve gases.

Potential long term effects of a single or even several exposures to sub-clinical levels of nerve gas have not been well studied. The Lovelace Respiratory Research Institute received funding, through a competitive process sponsored by the Department of Defense, to study the effects of single and repeated exposures to sarin at a level that did not produce acute symptoms of nerve gas poisoning.

The soldiers in the Persian Gulf War, as in any war, were under stress. The release of cytokines, such as IL-1 and IL—6, into the brain during the stress response are reported to cause mood alterations, suppressed appetite and libido, sleep stimulation and a febrile response. These

symptoms are not unlike some of the symptoms reported by veterans. Therefore it seems reasonable to think that the stress of war may have exacerbated whatever effects were elicited by chemical agents.

THE EXPERIMENT

The Lovelace studies were designed to use inhalation exposures of rats under normal and heat-stressed conditions to determine the interactive effect of heat stress and sub-clinical levels of sarin 1) on the levels of cytokines and apoptotic cells in the brains of rats, 2) on the immune system of the rats and 3) on cholinergic muscarinic receptors in the brains of the heat-stressed and non-stressed rats.

Rats were exposed to one tenth and one-twentieth the acutely toxic level of sarin for one hour a day for one, five or 10 days and observed for alterations at one day and 30 days after the exposures. Half of the rats were kept at normal room temperature and half were kept at 90 degrees F. None of the rats showed symptoms of acute nerve gas poisoning.

There were many negative findings, which indicated that the exposures were indeed below the level that causes acute symptomology. The sarin did not affect body weight, respiratory parameters, activity measurements, or control of body temperature. There were no brain lesions as observed by standard histopathology and there was no increase in apoptotic cells in the brain.

In the repeatedly exposed rats, there was an induction of brain cytokines known to be associated with mood alterations, appetite suppression, libido suppression and sleep stimulation.

Twoother major findings were observed.

FINDING ONE

The repeatedly exposed rats, even without heat stress, showed a reduced ability to mount an effective immune response. White blood cells in the rats did not respond well to antigens. Tests were made to determine if this observation was caused by increased corticosteroids in the blood due to the stress of the exposures. The opposite was found. The rats had unusually low levels of blood corticosteroids. The reduced immune response could be prevented, however, by treating the rats with a ganglionic blocker, indicating that the effects of the sarin were on the autonomic nervous system.

FINDING TWO

The brains of the rats repeatedly exposed to low levels of sarin under heat stress conditions showed alterations in the densities of muscarinic acetyl choline receptor sites in areas of the brain responsible for memory and cognitive function. Of great interest was the fact that in some cases these changes persisted for 30 days and in some cases the alterations were delayed and did not appear until 30 days after the exposures.

RESEARCH GAPS OF HIGH PRIORITY

These initial studies raise many questions. What are the behavioral problems associated with alterations in the density of receptor sites in the brain? What is the temporal pattern of the response? How long will the effects last? When did delayed effects first occur and how long will they last? What interventions could be used to prevent the delayed effects?

What is the mechanism by which sarin causes immunosuppression? Does sarin increase the susceptibility for microbial infections? How can the immune system be restored to normal function?

Is it possible that low blood corticosteroids could be used as a marker for subclinical exposure to a nerve gas?

At the present time, the DoD has funded us to do additional research on the effects on the immune system. We are still seeking additional funding to continue studies on the effects on brain receptor sites and subsequent behavioral changes.

Thank you for the opportunity to tell you about our studies on the effects of sub-clinical exposures to sarin. The information should be useful in the future for development of prevention and therapeutic measures for both our military exposed during hostile actions and for civilians exposed in terrorist attacks.

REPORTABLE OUTCOMES FROM THESE STUDIES

Abstracts:

1. R. F. Henderson, E. B. Barr, C. R. Clark, M. L. Sopori, C. A. Conn, Y. Tesfaigzi, T. H. March and D. B. Mash, "Effects of Inhalation Exposure to Low Levels of Sarin in Fischer 344 Rats," Society of Toxicology meeting in San Francisco on March 27, 2001.
2. R. F. Henderson, E. B. Barr, C. R. Clark, M. Sopori, C. A. Conn, Y, Tesfaigzi, T. March and D. B. Mash, "Effects of Inhalation Exposure to Low Levels of Sarin in Fischer 344 Rats," Conference on Illnesses Among Gulf War Veterans: A Decade of Scientific Research, Alexandria VA, January 24-26, 2001.
3. Sopori MB, Henderson RF. Neuroimmune Effects of Subclinical Doses of Sarin: Sarin Suppresses T Cell Responsiveness through the CNS. Presented at the Conference on Illness among Gulf War Veterans: A Decade of Scientific Research, Alexandria, VA, January, 2001.
4. Conn CA, Dokladny K, Menache MG, Barr EB, Kozak W, Kozak A, Wachulec M, Rudolph K, Kluger MJ and Henderson RF. Effects of Acute Inhalation Exposure to Low Levels of Sarin on Temperature and Activity of Rats. Presented at the Federation of American Societies of Experimental Biology, Orlando, FL, May, 2001.

5. Henderson, RF, CA Conn, EB Barr. , TH March , JR Krone , ML Sopori, Y Tesfaigzi. M Wachulec and DB Mash. Effect of low level sarin exposure on physiological parameters in rats. Presented at the 39th annual meeting of the Society of Toxicology, March 19-23, 2000 in Philadelphia, PA.
6. Henderson, RF, EB Barr. ML Sopori, S Singh, CA Conn, Y Tesfaigzi, TH March and JR Krone. Effects of inhalation exposure to low levels of sarin in Fisher 344 rats. Presented at the 96th International Conference of the American Thoracic Society, Toronto, Canada, May 5-10, 2000.
7. Henderson, RF, EB Barr. M Sopori, S Singh, R Kalra, C Conn, Y Tesfaigzi, T March and DB Mash. Effect of inhalation exposure to low levels of sarin in Fischer 344 rats. Presented at the USAMRICD Bioscience 2000 meeting, June 4-9, 2000, Baltimore, MD.
8. Hobbs, CH, Henderson RF, Kluger, MJ and Barr EB. Effect of Exposure to Low Levels of Sarin During Heat Stress on Brain Cytokines. Abstract presented at the Conference on Federally Sponsored Gulf War Veterans' Illnesses Research. Pentagon City, June, 1999.

Publications:

Henderson RF, Barr EB, Sopori MB, Singh S, Kalra R, Conn CA, Tesfaigzi Y, March T and Mash DB. Effects of inhalation exposure to low levels of sarin in Fischer 344 rats. Published as part of the proceedings of the Bioscience 2000 meeting, Baltimore, MD, June, 2000.

Henderson, RF, Barr, EB, Blackwell, W, Clark, CR, Conn, CA, Kalra, R, March. T, Sopori, M, Tesfaigzi, Y, Menache, M and Mash DB. Response of rats to low levels of sarin. *Toxicol. Appl. Pharmacol.* 184: 67-76, 2002..

Kalra, R., Singh, S, Boroujerdi, SR, Langley, R, Blackwell, W., Henderson, RF and Sopori, ML. Subclinical doses of the nerve gas sarin impair T cell responses through the autonomic nervous system. *Toxicol Appl. Pharmacol.* 184: 82-87, 2002.

Conn, CA, Dokladny K, Menache MG, Barr EB, Kozak W, Kozak A, Wachulec M, Rudolph K, Kluger MJ and Henderson RF. Effects of sarin on temperature and activity of rats as a model for Gulf War syndrome neuroregulatory functions *Toxicol. appl. Pharmacol.* 184: 77-81, 2002.

Mr. TURNER. Next we'll hear testimony from Dr. Paul Greengard, Vincent Astor professor and head of the Laboratory of Molecular and Cellular Neuroscience, the Rockefeller University, Nobel Laureate in Medicine 2000.

Doctor.

Dr. GREENGARD. Thank you, Mr. Chairman, for the opportunity to testify on the topic of Gulf war illnesses. This afternoon and in testimony presented to the committee at prior hearings, other witnesses have summarized evidence indicating that exposure of U.S. military personnel to acetylcholinesterase inhibitors during the first Gulf war represents a probable contributing factor to Gulf war illnesses. In fact, various of our Gulf war veterans were exposed to three distinct classes of these inhibitors, including chemical warfare agents such as sarin, pesticides and pyridostigmine.

The sarin incident which occurred this past month in Baghdad underlies the importance of accelerating efforts to develop therapeutic substances to combat chemical warfare agents and of developing treatments for our military personnel who have already been exposed to such agents. The good news is that we have technology available today to mount a program for the development of such therapeutic substances.

The rationale is as follows. The chemical warfare agents all achieve their lethal actions by preventing the breakdown in the brain of a substance known as acetylcholine, which Dr. Henderson just mentioned. As a result, in those individuals who are exposed to these agents, there are high levels of acetylcholine in the brain for prolonged periods of time.

We now have the technology to determine precisely how acetylcholine modifies nerve cells in the brain. Data already established indicate that acetylcholine can directly affect 17 distinct proteins in the human brain. These proteins are called acetylcholine receptors. It is possible, using techniques which have already been established, to identify which subset of these 17 receptors is primarily responsible for the toxicity caused by chemical warfare agents. It is also possible to determine precisely how those receptors that are involved produce the toxicity.

Elucidation of those mechanisms would immediately permit a search for therapeutic agents. Such agents could have the ability to reverse the chemical changes induced in the brains of Gulf war veterans by these lethal agents. The same research should lead to the development of therapeutic substances that could prevent the lethal effects of these agents in the event of a chemical warfare attack either within the United States or on U.S. citizens deployed to other regions of the world.

The single major point that I wish to emphasize in this brief presentation is that the technology now exists for a rational approach to treat Gulf war illnesses and to protect our military and civilian populations from the consequences of future chemical attacks.

Thank you.

[The prepared statement of Dr. Greengard follows:]

Greengard

Thank you, Mr. Chairman, for the opportunity to testify on the topic of Gulf War illnesses. This afternoon, and in testimony presented to this Committee at prior hearings, other witnesses have summarized evidence indicating that exposure of United States military personnel to acetylcholinesterase inhibitors during the first Gulf War represents a probable contributing factor to Gulf War illnesses. In fact, various of our Gulf War veterans were exposed to three distinct classes of these inhibitors, including chemical warfare agents, pesticides, and pyridostigmine. The Sarin incident which occurred this past month in Bagdad underlines the importance of accelerating efforts to develop therapeutic substances to combat chemical warfare agents and of developing treatments for our military personnel who have already been exposed to such agents. The good news is that we have technology available today to mount a program for the development of such therapeutic substances.

The rationale is as follows: The chemical warfare agents achieve their lethal actions by preventing the breakdown of a substance known as acetylcholine. As a result, in those individuals who are exposed to these agents, there are high levels of acetylcholine in the brain for prolonged periods of time. We now have the technology to determine precisely how acetylcholine modifies nerve cells in the brain. Data already established indicate that acetylcholine can directly affect 17 different proteins in the human brain. We call these proteins acetylcholine receptors. It is possible, using techniques which have already been established, to identify which subset of these 17 receptors is primarily responsible for the toxicity caused by chemical warfare agents. It is also possible to determine precisely how those receptors that are involved produce the toxicity. Elucidation of these mechanisms would immediately permit a search for therapeutic agents. Such agents would have the ability to reverse the chemical changes induced in the brains of Gulf War veterans by these lethal agents. The same research should lead to the development of therapeutic substances that could prevent the lethal effects of these agents in the event of a chemical warfare attack either within the United States or on United States citizens deployed to other regions of the world.

The single major point that I wish to emphasize in this brief presentation is that we now have the technology for a rational approach to treat Gulf War illnesses and to protect our military and civilian population from the consequences of future chemical attacks.

Mr. TURNER. Thank you.

I now will begin a question period. We're going to continue with our 10-minute question periods as with the other panel, and we'll start with Mr. Sanders.

Mr. SANDERS. Thank you, Mr. Chairman.

Dr. Perlin and General Martinez-Lopez, you've heard Dr. Haley, Dr. Henderson and Dr. Greengard give us some reasons for optimism. Yet, as I understand it, General, the DOD is putting zero money into Gulf war research this year.

Can you explain to me, given the fact that we have seen some significant breakthroughs, why we would not be working with these researchers?

General MARTINEZ-LOPEZ. Sir, we're still pursuing this level of research. In other words, the research that is being done to my left, by these distinguished scientists, this research has been funded and will continue to be funded by the Department of Defense. But the focus of the Department has shifted to force health protection.

Many of the issues of force health protection exactly deal with issues that are very relevant to Gulf war illnesses. One does not eliminate the need of the other.

Mr. SANDERS. Dr. Perlin, how is the VA responding to the research that we have heard?

Dr. PERLIN. Thank you, Mr. Sanders. You are absolutely correct.

The research that has been presented, these hypotheses, are very intriguing and deserve further study. It has really been in these past few months that we have forged a close working relationship with the Gulf war research advisory committee, and for that, we greatly appreciate Mr. Binns' leadership. These are exactly the sorts of things that we want to take to further study.

For example, the research that Dr. Haley described will come to further evaluation at the new neuroimaging center in San Francisco. Dr. Michael Weiner runs that. This imaging center allows us not only to see the actual structure of the brain in individuals who may be experiencing or who are experiencing these sorts of symptoms, but because it is actually magnetic resonance spectroscopy, actually allows us to look at the brain function. In fact, in all these sorts of avenues, there are really the bases for hypothesis-driven research that we can translate into greater understanding.

Mr. SANDERS. Thank you.

Dr. Haley, what excites me and I think people who are struggling with Gulf war illness is, as I understand it, what you are saying, that through brain imagery, you can actually see the brain damage and make a correlation between that brain damage and the symptoms that the individual is suffering.

Am I right in that?

Dr. HALEY. That is correct. Brain research, neuroscience, has progressed dramatically in the last 10 years. If we had tried to address it with these techniques in 1992 or 1993, we wouldn't have had these techniques available by and large. So there is a great panoply of techniques that are available and there is an explosion going on right now. Every month we see new techniques.

And so we now have the tools to do it, and so I think—and we have the clues and now is the time to put money into this and study Gulf war veterans as well as new, emerging issues of force

health protection in the current operations. Now is the golden moment to fund research.

Mr. SANDERS. Let me ask you a question a little bit outside the general area of your work.

Many of us have been extremely dissatisfied with the lack of progress made by the DOD and VA over the years, and we have been impressed by your work and other people's work. Give us an idea of how funding could be most effective to those people who are doing the most serious research.

Dr. HALEY. It is a tough question. I think Jim Binns really summed it up perfectly, and Steve Robinson, in the combination of their comments.

For one thing, I think there has been a change in viewpoint in this whole field. We see the scientific community now starting to buy into the issue, to the idea that even low-level chemical exposures in susceptible individuals can produce brain cell injury. That no longer makes you a pariah to say that. It used to, but it is now a popular concept. So I think you are going to see naturally the government agencies wanting to fund that research because it's not so controversial.

We were at a meeting at NIH just a month or so ago with DOD people, NIH people, private researchers there, and it was just a given that low-level nerve gas can produce symptoms and chronic illness.

Mr. SANDERS. Because of brain damage?

Dr. HALEY. Yes, because of physical brain cell damage.

There is now a new alliance forming between NINDS, National Institute of Neurological Diseases and Disorders and Stroke, and the Defense Department, Fort Detrick, and the Institute for Chemical Defense to look at those issues, particularly as they relate to defense against chemical terrorism. That is unfunded yet.

Mr. SANDERS. We are all obviously concerned about the potentials of chemical terrorism, but we are also concerned about a number of civilian diseases. Are you learning anything in your research that can help us with chronic fatigue syndrome, fibromyalgia or multiple chemical sensitivity or other type diseases?

Dr. HALEY. It remains to be seen because we haven't applied these techniques to those. We have plans actually to do that and part of our funding, congressional funding through Fort Detrick, is to look and compare chronic fatigue syndrome, firbromyalgia, multiple chemical sensitivity and other similar illnesses with Gulf war illness. So we and, I'm sure, others will be doing that as well.

Let me get back to the funding issue because that is what is critical. I think what you want to see is a mosaic of funding. You don't want all the funding to be in one place, and I think that was one of the places where perhaps we went wrong before. The Persian Gulf veterans coordinating board that sort of oversaw all the research in the government really had a strong agenda and, I think, led all of that in a direction.

I think what you want to see, you would like to see NIH with this NINDS-Defense Department collaboration, you would like to see that go. We have a new collaboration funding research with NIH, VA and the ALS association funding research on ALS. You would like to support that with government funding.

You would like also to have some funding specifically directed for Gulf war veterans to understand that particular group and have some good oversight by the VA research advisory committee, as was suggested earlier, in collaboration with VA research and development. That is emerging as a good model. I think all of these ought to be supported.

Mr. SANDERS. Let me ask Dr. Henderson and Dr. Greengard the same question.

It appears that we may be making some significant breakthroughs not only with understanding the symptoms of Gulf war illness, but perhaps other diseases and preparing us, God forbid, from any chemical terrorist attacks. What's your suggestion as to how we can move forward most effectively in better understanding these problems?

Dr. HENDERSON. I think you have your heavy science hitters, your heavy hitters in NIH, and you would like to bring those heavy hitters in on this problem. But you also have to have the DOD working collaboratively with them.

I was at the same meeting that Dr. Haley attended where NIH was working with DOD together to see how NIH can contribute to this problem. I think that type of collaboration is essential. It can't just be one agency. It has to be, if it can be achieved, intergovernmental cooperation, interagency cooperation.

I would recommend that NIH and DOD work together on this.

Mr. SANDERS. Thank you.

Dr. Greengard.

Dr. GREENGARD. I would just as soon not get into the issues of which agencies. I get nervous just coming to Washington, let alone saying which agency should be the recipient of your beneficence. I have had very good experience with the Department of Defense in two ways. I've been doing some work for them, medical research in another area, not chemical warfare or Gulf war illness, and I gradually began to learn about the problems of chemical warfare agents. I was almost oblivious of it, as I think a large segment of the scientific population are.

Much of the work that we have done in the past has been concerned with how nerve cells communicate with each other, what goes wrong in various neurological and psychiatric disorders, how drugs that affect these disorders, treat these disorders, achieve their actions, and using this information to try to develop better drugs.

The situation with these cholinesterase inhibitors is quite analogous. You can take an example. For example, Parkinson's disease is associated with the loss of the neurotransmitter dopamine. Neurotransmitters are chemicals that communicate between nerve cells. You can think of victims of these chemical warfare agents, it would be the same as if they had been congenitally consigned to a life with too much of the neurotransmitter acetylcholine.

These are very solvable problems. Just like it has been possible to make great progress in understanding Parkinson's disease and finding treatments for it, it is quite analogous to the chemical warfare agents.

The technologies are there. The major principles of the science have been established. It is just a matter almost of engineering

now to do this. The problem is that there is no money available. When I got interested in the chemical warfare problems, because they are so analogous to some of the things we have dealt with, I talked to various people that I know in various branches of the government, and there is practically no money anyplace.

Mr. SANDERS. Let me just go back and conclude, going back to General Martinez-Lopez and Dr. Perlin.

Do both of you now accept the premise that one of the possible causes of Gulf war illness is brain damage associated to low-level exposure to sarin and perhaps other agents?

General MARTINEZ-LOPEZ. I think there's enough science there, sir, to take that as a very serious consideration. In other words, I think, yes, there may be some soldiers from the Gulf war that were affected because of the level of exposure to sarin.

Mr. SANDERS. Dr. Perlin.

Dr. PERLIN. Given the research contributed by people such as Dr. Greengard, I think it is quite plausible, quite believable, that there is damage from low-level exposure to nerve agents, and that can be a basis of, in fact, multiple diseases and nerve dysfunction.

Mr. SANDERS. Thank you. Thank you very much.

Thank you, Mr. Chairman.

Mr. TURNER. Thank you, Mr. Sanders.

Dr. GREENGARD. Should I continue, sir?

Mr. TURNER. Yes.

Dr. GREENGARD. We have gotten support from the Department of Defense in terms of a certain amount of funding for chemical warfare research, but it has been very small, because they had a very small pot to give money out of.

Also, we have collaborated with the Institute for Chemical Defense where we have done experiments with people there with sarin that have shown chemical changes in the brain in the same regions that Dr. Haley and Dr. Henderson talked about.

Here are three entirely different approaches all coming to the same conclusion. These chemical warfare agents are causing disruptions in the region of the brain called the basal ganglia. That happens to be a region we know an enormous amount about.

Mr. SANDERS. These are animal studies?

Dr. GREENGARD. Yes, sir.

Mr. SANDERS. With rats?

Dr. GREENGARD. Yes. They were done in collaboration with this Institute for Chemical Defense because you can't get sarin very easily.

Mr. SANDERS. You have more or less replicated in rats what Dr. Haley has seen in Gulf war veterans?

Dr. GREENGARD. We have replicated in rats that there is damage in this same region of the brain. The measurements are somewhat different. A simple answer to your question would be "yes" with some small caveats.

Mr. SANDERS. What you're saying basically is, more money is needed to continue this research?

Dr. GREENGARD. Yes. Just like what Mr. Binns said, bioterrorism, $1.7 billion to NIH, radiation $44 million, chemical zero.

I've been going around and everybody says, this is really needed and your ideas are very, very good. Let's do it. But we don't have

any money. Call me again next year. I'm afraid I'll get an even worse answer next year.

Mr. SANDERS. Thanks.

Dr. GREENGARD. Or give you a worse answer next year.

Mr. SANDERS. Thank you.

Go ahead.

Dr. HENDERSON. I would just like to point out one thing that may seem obvious to everyone. The reason I said you have to have collaboration with DOD is they have the sarin.

I mean, for our work, we thought about, well, we will go to NIH for funding. And, you know, you want the sarin to be under good control, and so I'm glad the DOD has it. And that's something to consider, that they have to be involved.

Mr. SANDERS. Thank you.

Mr. TURNER. General, I have a question for you, just to follow on what Mr. Sanders had been asking you.

In reading your testimony, it reads like a great commercial trailer for what's to come. And looking at it, it says: Expected to announce their findings within the next few months. The next sentence: The final results of this important study will be available soon. Next: This is an area for continued research. Next: We are on the edge of significant advances. Next: Are providing us with a deeper understanding. Next: Is providing new insight.

But there are no conclusions. And so what I want to ask you is really a follow-on to what Mr. Sanders has said. In hearing the testimony of the three doctors who are currently undertaking research in this, did you hear anything that they told us that you disagree with or that you would be concerned or caution us on?

General MARTINEZ-LOPEZ. Sir, research is a journey. You know, it doesn't happen overnight. And there is—what we have learned in the Department of Defense—by the way, just as a matter of record, most of the 154 research projects have been extramural. It has not been internal to a department. We have gone to academia. We have to seek people of the caliber I have to my left to do that research for us.

And yes, we have discovered some things, as I said before. You know, we discovered—at the beginning, we thought there was something there, and now, we don't think that is where the money is. So we know where not to look at, and now we have some good leads here that we need to pursue.

But many of these are hypotheses that before we embark into treatments and solutions, we have to know for sure that that is what we are dealing with. And so that's why we incorporated with the VA system, to develop a center down in San Francisco to replicate and even expand on Dr. Haley's work, because I would think there is a hint there that we should pursue. So I am optimistic. But again, I am optimistic that we are going to find solutions, I mean, and part of the way—by the way, there are some treatments that we have found that may help people with many of the multiple symptoms, you know, cognitive therapy and some exercise.

Now, how does it work? We don't know. We know that some of them are getting better. But we need to pursue far more avenues than that. We need to look at better solutions than that. So again,

I tend to be optimistic, sir. But I guess history will tell whether we are right or wrong.

Mr. TURNER. Dr. Haley and Dr. Henderson and Dr. Greengard, one of the things that I thought was important about your testimony is that discussion not only of the issue of the Gulf war veterans and the symptoms that they are experiencing, but also taking the research that you are undertaking, that you are doing, and looking at other applications that are more prospective.

Yes, we have the issue of treatment of our veterans and the importance of their care, but we also have the issue of, we are currently back in the Gulf again, and we have the danger of men and women in uniform who might be exposed to these agents again. We have, as you all recognize, the issue of preparedness for terrorists, possible attacks in this country and in other countries, the prospects of a country using these weapons in the offensive, not just as we heard the distinction of defensive use where we have undertaken destruction of them. And also a fourth category, we have the issue of, as you, Dr. Henderson, indicated, that the Department of Defense does currently have stockpiles of these types of weapons that they are undertaking destruction of. And certainly, the information as to what are tolerable levels of exposure applies to how we undertake destruction of our own weapons.

And I wonder if each of you could speak for a minute about how you might have looked and, the research you have undertaken, how it might have applications in the issue of terrorist preparedness, in the way that we are currently protecting our troops, some of the equipment that they may have, issues of what we are considering tolerable exposure, or if you have even looked at the issues as to what we currently have as standards in the destruction and disposal of our own weapons.

Dr. HENDERSON. Well, I think our research applies to all of those fields. And that's what makes it interesting, and that's also why you will get NIH-type scientists interested in this, because it is really basic research that tells us how the body works and how we—how our nervous system works. And it can be—this type of research will be of significance, as you said, for terrorist protection, homeland defense, if there is money there.

We are all seeking money, of course, to continue our research, so we look for places where it might be applied. But I think this isn't just in the interest of Gulf war veterans, though it certainly is. It's in the interest of our understanding of how the nervous system works and how we can protect ourselves against terrorist attacks and, as you say, disposal of weapons. So I think it is very astute you observed that. I think that, too.

Dr. GREENGARD. Well, I certainly agree with that. What happened in the Gulf war is a picnic compared to what can happen. I mean, it is very possible to develop these. One bit of good news, almost all of the effective chemical war agents belong to the same class, these cholinesterase inhibitors. So it should be possible to develop antidotes against all of that category.

The other type of chemical warfare agent is called Nitrogen mustards, and they are just not very practical for a variety of reasons. It is a nightmare scenario what chemical warfare can do. And I have to say, as a citizen, I am amazed how we hear all our leaders

talking about the dangers of chemical warfare, and I go around to various branches of Government, and they say, "We have no money, we like your idea, we have no money to do anything about it."

Dr. HALEY. Actually, we spend a great deal of time thinking about that. That is another one of those pivotal questions. I think it is a critical one.

And the question, I think it really evolves to the issue of, could we come up with a way of protecting people—our soldiers, for example—from low-level nerve gas or high-level nerve gas in other ways other than a gas mask that you have to have on at the time that you are exposed? And with low-level, you may not know you are exposed.

So one of the things we did early after finding out about the peroxidase enzyme and this gene that produces an enzyme that protects you from nerve gas—in your blood, you have this enzyme, and it destroys nerve gas when it gets in your blood. And people with low levels of that seem to have been the ones that got Gulf war syndrome.

So we reasoned: What if you could boost the level of peroxidase in a person's blood? And so we developed a collaborative project on our campus where we took the gene, the pawn gene, the peroxidase gene that makes this protective enzyme, and we put it on a virus, benign virus and put it in a gene therapy device, put it in mice, and then we showed that doubled or tripled the level of peroxidase in the blood of those mice. And then when you expose them to chlorpyrifos, which is a pesticide that simulates nerve gas, that you would protect the mice. The mice who had the gene therapy were protected from it compared to the controls who had the ill effects.

And so gene therapy is one possible way of protecting troops. You could put a little blister under the skin that was manufacturing peroxidase, boost the level in their blood, and give them the enzyme, kinetics of this enzyme. If you just double or triple the level, you might produce infinite protection from nerve gas.

But, see, the idea came from the fact that we had done a case control study in peroxidase in Gulf war veterans. And so the more research you do in this, the more ideas, and then you spin off an idea that no one had ever thought about.

But let me make one other comment that, really, I think your point is an excellent one. You know, the whole field of psychiatry, the psychiatric diseases, is being revolutionized by these same techniques we are talking about. What is depression? What is mania? What is bipolar disorder? What is schizophrenia? What is a phobia? You know, what are these psychological diseases that we used to think were diseases of moral turpitude? You know. What they are, it is clear that what they are is combinations of damage to brain cells in certain areas of the brain that damage receptors so brain cells can't respond the way they should, damage to the internal machinery of certain nerve cell, brain cells. And, adaptations of the brain to those injuries, which goes under the term plasticity. The brain is constantly changing and molding and adapting to these changes. And so that's what we think psychiatric diseases are.

And so sarin damage is just another one of these same illnesses of brain cells and plasticity that we may be able to prevent once

we understand them. And as Dr. Greengard points out, there may be ways, as in Parkinson's disease, that we can respond once they occur. Once the disease occurs, we may be able to cure them by understanding that. But what that requires is funding.

If you look back at the history of all the great campaigns that solve disease problems, my favorite one is the HIV/AIDS problem because it started out very similar to Gulf war syndrome. It was a disease that nobody wanted to study and no Government agency wanted to fund anything about it. It was a pariah disease, and then, through various political changes, it became a high-priority disease. And in just a decade, with very strong funding, we understand the immune system, we understand HIV/AIDS, we are coming out with a new and better treatment every year.

That same story could be true of Gulf war veterans, but it's going to take a real commitment to it. And right now, that commitment to research this is not there. The Congress has not made a commitment to this. It is a dead issue, and nobody is going to fund it. We are going to move on into the future of deployment health, which we ought to be doing, too. But right now, the funding is dead for Gulf war illness and for these sorts of things that we are talking about. There just isn't any money.

Mr. TURNER. Thank you, Doctor.

Next, I would like to recognize again our guest, Lord Morris of Manchester, who is in the House of Lords of Parliament of the United Kingdom.

Lord MORRIS. Thank you, Mr. Turner.

Can I ask Dr. Perlin if he can say more about the findings of the Harvard School of Public Health, showing increased risk of ALS—which in the U.K., as you may know, we call motor neuron disease—in veterans as opposed to non-veterans? As you are aware, in the U.K., we still don't regard this devastating condition as Gulf war related, notwithstanding prevalence rates no less significant than those in the United States that led Mr. Principi to accept the link. Has the veterans agency seen any reason to reconsider that decision?

Reverting to Dr. Hall's evidence today, can Dr. Perlin say how he thinks the VA would respond in such a disturbing case as his?

And Mr. Turner, turning to Dr. Henderson, she referred to some very interesting research, some very interesting research that seems extremely important in terms of linking sarin exposure to post Gulf war symptoms. However, rats aren't humans. Is there any plan anywhere to extend or replicate this research in higher mammals, such as primates?

And turning now to Dr. Haley, please say why in the U.K. our studies have been so unrevealing despite such a large sample, unlike U.S. studies. Again, if he were to study U.K. troops, how would he do it differently?

As you may know, Mr. Chairman, Professor Haley has been very widely read and is very highly regarded on both sides of the British Parliament, and it would be extremely interesting to have his comments on those two points.

Dr. PERLIN. Thank you, Lord Morris.

You asked me two questions, one, how we would respond to a situation such as Mr. Turner's terribly tragic situation and, second, to expand a little bit on our work on ALS.

Let me start with the question about Mr. Turner, is that we would hope that for any veteran who presents to us in distress, with disease, even if we didn't understand the etiology, the basis of that disease, even if we couldn't give it a name, that we would treat that individual. And in that, we were absolutely bound, with the Research Advisory Committee, in seeking to find ways to effectively treat the veterans who approach us.

The ALS may not have shown up in as large a number in the U.K. because—as you know, it is a horrific disease, Lou Gehrig's disease, as it is sometimes known in the United States, and it is fortunately a somewhat rare disease, but it is a terribly tragic disease. And our research in large found that the rates of Gulf war veterans were approximately twice that of background population. And we have been, by virtue of our electronic health records and, effectively, a captive population, putting together a registry. And I would ask—you want to ask another question, but I would like to ask after that Dr. Aisen, who is our deputy chief research and development officer and also a neurologist to expand on some of the exciting work that is coming forward in ALS, both in terms of the study, understanding the molecular, the genetic basis of it, potential mechanisms, susceptibility, and new modes for treatment. But you appear to have another question, sir.

Lord MORRIS. Yes. As you know, the condition is found more frequently in older people than in younger people. In the case of Gulf war veterans, we are talking, for the large part, almost wholly about younger people?

Dr. PERLIN. Yes, you are absolutely correct.

Let me turn to Dr. Aisen to expand on both the research findings and about the approach.

Dr. AISEN. Sir, the numbers are small, but I think, at the moment, we have identified 40 Gulf war I veterans who have ALS. And this is defined by physical examination by neurologists. And so that gives us an incidence and prevalence of about 6.7 per million as opposed to 3.5 per million.

It is absolutely occurring in a younger population, and that is the finding that caused Mr. Principi to declare this a deployment-related condition and extend benefits to these veterans. We are creating the registry. We estimate we have about 3,300 veterans throughout the country who have ALS, and that includes Gulf war deployed and nondeployed. And we are creating a DNA bank.

We have a number of animal studies and some new clinical trials that emanate directly from those animal studies that we are about to unroll this summer. Those would be my comments about ALS.

Dr. HENDERSON. I really like your idea about moving up to primates. And I think, whenever you do studies in rats, people say, "Well, what does it have to do with humans?" And the primate—studies in primates would be a link.

The problem is funding. And right now, we are struggling to get enough money to followup in the rats to really define what we are finding there and, you know, develop strong hypotheses that we might do in primate studies. And then, I think it would be appro-

priate to go to primates. But they are expensive studies, and right now, we don't have that type of funding.

Dr. HALEY. Can I follow that also a little bit?

In just looking at Dr. Henderson's studies, there are several critical questions that need to be followed up in those studies that aren't funded yet. And they need to look at what other receptors are involved. They have looked at the muscarinic acetylcholine receptors. But as you know, there are dopamine receptors and other receptors that might also be damaged and not functioning. And you need to know the answers to all of that before you go to primate studies so that you could also correlate it with similar nondestructive studies in humans.

And so we are working in that direction. But that's why we really need funding now to be targeted at some of these basic questions where we have tremendous clues, but they are just waiting to be followed up.

Let me also comment on your question about the ALS study. You mentioned the Harvard School of Public Health study. That's a very confusing finding, and I would urge caution on that until we see it published, because it is a fundamentally different—that study is fundamentally different from the two studies on Gulf war veterans. In the Gulf war veterans, you are looking at all-military populations within the military. In the Harvard study that has not been published yet, they were comparing ALS in military populations, primarily from World War II and Korea, with people who didn't serve in the military.

And we know there is a very great difference between those two populations, and many reasons that you would have different rates. For example, in people who didn't serve in the military, nonmilitary people are by and large much less healthy, less educated and so forth, and are more likely to die of other causes before they can die of ALS. And so you would automatically have less ALS in that population. And so until some of those issues—we have to see whether those issues have been really cleverly answered in this study, or is this just, you know, a simplistic study that found a spurious finding that they shouldn't have come out with? And we don't know that yet.

So I would urge no interpretation of that finding until we really see the results.

And, finally, you asked me a question, why do I think the studies in the U.K.—the epidemiologic studies of Gulf war veterans—have been so unrevealing? And they have been. I know why, and this has affected a number of the studies in this country. The large epidemiologic studies by and large have been unrevealing, also. And the reason for it is a very simple thing that is the epidemiology 101, we say, in the basic course that we teach students in epidemiology.

When you see an epidemic and you are trying to investigate an epidemic of a new disease, the very first thing you do is come up, design a case definition. That is, you define the disease; you write a sentence that says a case of toxic shock is low blood pressure, red skin, and high fever. And then you go in and you apply that case definition. You find some people who meet it, and there are the cases, and find some people who don't meet it, and there are the

controls. And you compare them on all sorts of things. And that's where you solve the problem.

Well, early on, our Persian Gulf Veterans Coordinating Board, a strategic error in this whole thing was the Persian Gulf Veterans Coordinating Board made a policy, and the policy was: There is no Gulf war syndrome. Now, in a scientific sense, we would have said, "Well, OK, that's fine. We will go ahead and see if there is one." Well, no, that was a policy. And so researchers were basically forbidden, if they wanted funding, to come up with a case definition because they would be defining a Gulf war syndrome. You see?

Lord MORRIS. It's called writing the minutes before the meeting.

Dr. HALEY. Exactly. Writing the minutes before the meeting. And so coming up with a case definition was forbidden, and so a whole generation of epidemiologic studies were done by DOD, VA, and by the King's College group in London. They didn't have a case definition, so they were comparing surrogates for their case definition. They were comparing deployed versus nondeployed. That's too general. The few ill are lost by averaging with all the ones who aren't ill. Hospitalization and mortality were used as proxies for illness. Well, but they don't measure the illness because that isn't the disease.

And so all of those epidemiologic studies were complete busts, including the King's College studies. And we have seen scores of publications from those all saying there is no problem. And the reason for it is they were forbidden to come up with a case definition and apply it in a proper epidemiologic study.

As soon as case definitions were applied, we have come up with great findings. Others are now doing the same thing. We are finally off to the investigation.

Now, what would I do differently? I would redo a survey in the U.K. in which I administer, say, a telephone questionnaire that where the survey has been designed in order to develop and determine a case definition, whether each respondent satisfies the case definition or not, and then you would determine the prevalence of the disease. You could then pick sick and well on the basis of that case definition, and do brain imaging and genetic studies and so forth. And you would be off to the races.

Mr. SHAYS [presiding]. I may be inaccurate on this description, but it seems to me the VA is looking at things retrospectively. And DOD is retrospective and also prospective. And I am wondering, speaking to our military folks, if that doesn't color how we give out grants. Because there is the temptation not to just focus on the veterans, but to look at the broader picture. And in the process, since DOD is the one providing some of this funding for VA, if that is not one of the explanations of why we are not seeing money get out.

General MARTINEZ-LOPEZ. I tend to believe, sir, that the collaboration and the way we go about the peer review and, right now, the way we are trying to work it out between the two Departments would take into consideration—not only you take into consideration the gaps and you take into consideration what needs to be known, not only for yesterday, to answer the mail to the Gulf war veterans, but also to answer the mail to the future, to the soldiers that we are going to be deploying forward.

So if the collaboration and the management of the portfolio works out right, and we have the right peer review process bringing external peers, like the RAC and other systems that will keep us honest, I think we can really advance and make the difference and find out the right solution. So, again, I am optimistic that we are on the right track and that we can do that.

Mr. SHAYS. I'm not quite sure how that is responding to my question, but let me ask another question, and maybe we can. I'm going to read just a statement.

On October 30, 2002, the VA, news released by the VA Deputy Secretary, Dr. Leo S. Mackay, Jr., announced the Department of Veterans Affairs planned to make available up to $20 million for research into Gulf war illnesses during fiscal year 2004. However, VA has only funded one research project related to Gulf war illness research at the cost of $450,000 for fiscal year 2004.

My question is, why hasn't the VA funded more than one research project for fiscal year 2004?

Dr. PERLIN. Let me just be clear on this. We could have done better. We intended to be very ambitious about this. It was a confused period where this organization was trying to really understand the findings that it had developed, a forward-looking portfolio.

In point of fact, over that period of time—and though not a justification, but simply a chronology of what did occur, there were six letters of intents to review. Four researchers actually submitted proposals. Only one was funded that specifically applied.

Our portfolio is really meant to involve three areas, the retrospective, particularly the epidemiology, the concurrent, directed very much at devising therapy, and the prospective, the clinical trials to actually get ahead of the curve. And that really will be the basis for the forthcoming portfolio of research activity that we actually enjoy a much closer working relationship with Research Advisory Committee on framing.

Mr. SHAYS. Thank you.

Let me ask you this. I appreciate the honest, straightforward answer here. How has the VA notified researchers about the funding available for Gulf war illness research?

Dr. PERLIN. I'll turn to Dr. Aisen on that, and we'll actually continue with some of the outreach efforts.

Dr. AISEN. We do monthly conference calls. We have talked to the field at length about this. We have asked the Research Advisory Committee to help us alert people who have other talents and might not be thinking about working in the area of Gulf war illnesses to think about applying their talents into our area and to this area.

I think there is a fundamental viewpoint that we are trying to convey very clearly to the entire field of VA researchers and the academic affiliates that train some of the people who then come to work in the VA. And that is that these veterans are sick. We don't know everything about why they are sick. We don't clearly have a classification for their illnesses. We don't yet have a firm idea about the neuro-imaging findings, the metabolic changes, the patterns of neurodegenerative.

Mr. SHAYS. And tell me, based on that, what am I supposed to conclude?

Dr. AISEN. I think that we have gone from a philosophy that says, this is not a legitimate area for serious scientists to look at, to one that says, absolutely, it is an area for serious scientists and clinicians to think about. And I think, to that end, we are getting more and more applications, and I think we will have high-quality applications to choose from. And we will have a merit—you know, in the end, it's the dry quality merit review, the dry intellectual rigor that's going to produce real science. But I think that we have invited the field and the whole group of people in our VA field to submit applications. And we have made it very clear that quality will be funded.

Mr. SANDERS. If I could just jump in. I don't want to beat a dead horse here, but when you say there has been a change of thought in the VA, where previously it was not thought that—Gulf war illness perhaps was not thought to be an area of serious scientific concern, I don't know what I could say, because we were up here 14—well, 12 years ago anyhow, whatever it was. We thought it was an area of serious scientific concern. We had people from the VA and the DOD, and we tried. I'm glad to see that there is a conversion, but I think it is a very sad day that tens and tens of millions of dollars essentially went nowhere because the VA and the DOD did not recognize the reality, if you would like. The great debate is that, is it an illness? Of course, it was an illness. We saw the people dying in front of our eyes. And it is a sad thing that it took so long—better now than never, but it is a sad state of affairs that it took so long for the VA to recognize that.

Dr. AISEN. Let me just respond to that. I misspoke. And, you know, I am relatively new at this. But just to contrast the number of letters of intent that we received for the last round, which was 6 or 4, we got 66 this time. So I think that this approach has helped a great deal. And I do not mean to denigrate prior attempts.

And I think that, throughout the years, the comments made about proactive versus retrospective and prospective, we have done clinical trials, we have looked at antibiotics, which was the therapy that was considered to be beneficial. We looked at exercise behavioral therapy. We have been attempting these treatments. They didn't work. But science is difficult, and clinical medicine is difficult. And just because an expensive trial didn't work doesn't mean people weren't trying.

Dr. PERLIN. Mr. Sanders, Mr. Chairman, if I might reframe part of that—is that. I think we are at a much more fortunate point now in terms of our understanding. The previous work has laid a groundwork. It has been treatment and hypothesis. And I am very pleased that we have the opportunity to ask investigators—not, bring us something on illnesses afflicting Gulf war veterans, but we have major leads. That we can attract people to the work Dr. Greengard has mentioned in terms of acetylcholinesterase, acetylcholine receptor function, is very promising. The opportunity to partner and really leverage the great investment of the Department of Defense and Michael Weiner's imaging, neurofunctional imaging center, is really a $7 million effort. So we now have something to attract people to. And, as Dr. Aisen said, 66 new letters of intent.

Mr. SANDERS. I think, if I can, Mr. Chairman—again, I don't want to argue the past. What's important is where we go from here.

But I will never forget, sitting up here, the constant resistance that we had from the DOD and the VA, basically that we are here because we asked them to be here but we don't really think—it is probably a psychological problem. Yeah, if you force us to do something, I guess we'll have to do something, but we really don't believe it.

That really was what I took out of that for so many years. But forget that. I mean, the good news—let me just say where I think we are, and people tell me if you think I'm right or wrong. But it appears that, in the last couple of years, some very—what I think everybody up there now agrees—serious scientific breakthroughs have been made which deserve further pursuit of. And what is now distressing, if we have made, after all of these years, some major breakthroughs, what we are hearing from some of the researchers: OK, we are ready to go, but we don't have the money now to do that research.

Is that a fair summary of kind of where we are at, perhaps?

Dr. PERLIN. I think this is a very complex illness. And you heard Dr. Greengard discuss Parkinson's and the research there. We understand the neuro-chemical basis of that, but we don't have perfect cures. We have good treatments. So I don't want to diminish some of the importance of the research that has gone before.

As you know, also in direct response to your point, where is the money for this? Our secretary, Secretary Principi, is absolutely passionate that we do good research in the interest of veterans, in the interest of veterans suffering with Gulf war illness. And toward that end, we will be working and are working very closely with the Research Advisory Committee to find the funds to frame these sorts of promising evidence-based, hypothesis-driven research programs. And we will do that.

Mr. SHAYS. I'm going to continue with my question, but my staff helped me understand what you were saying, General Martinez-Lopez, that you were basically saying to me, in response to the question that the coordination between the VA and the DOD and the rigorous peer review will keep DOD, bridge the apparent conflict between the prospective and retrospective research. That's basically what you were saying to me.

General MARTINEZ-LOPEZ. Yes, sir. What I'm saying is we need to manage the portfolio. In other words, you have to manage the portfolio and do some retrospective studies still. But still, we need to do some basic science to understand some of the mechanisms, and we need to do some prospective treatment trials to see if they work or not. And also, with this redeploying, as I told you, sir, in the testimony, we need to apply some of the lessons learned.

In other words, do some interventions early on as they come back to—not only from the standpoint of treatment but also from the standpoint of research to understand better what is happening here. And that will help us to look back.

So you manage the portfolio and you peer review the portfolio, I think we will be on far better footing to answer some of these

questions from a scientific basis. That is not just the Department or the VA, but there are checks and balances built in.

Mr. SHAYS. Your response to my question was not the failure of the answer. It was the failure of me to comprehend it. So I just want to——

General MARTINEZ-LOPEZ. I'm sorry, sir.

Mr. SHAYS. I said, your response to my question was not the failure of your response; it was the failure of my ability to understand what you were saying. And I thank you for being responsive.

I am looking at both VA and DOD, and I am thinking, you weren't here 12 years ago or 10 years ago. And that's the good news. And—no, it's really the good news. But we remember when Dr. Haley was a wolf crying in the wilderness. And he had some funding from Ross Perot. And I listened to him, and he seemed to make so much sense to me, but nobody else seemed to agree. You know, he seemed to be in a whole different area.

And one of the things we learned—and I would just say this to the VA, what I would bring to the table was the recognition that as the State legislature for 13 years, we passed laws all the time about the chemicals that you could use and OSHA's requirements and you didn't do things with certain chemicals. And yet, DOD was just oblivious to this. I mean, we had one gentleman who ended up with ALS. We had someone else who—excuse me, was a pilot, but we had someone who passed away in Hartford from cancer, liver cancer. And he was spraying the detainees with Lindan for 8 hours a day with no ventilation. And there was just something intuitively—we wouldn't allow that in the private sector. And so then you have Dr. Haley talking about, you know, these chemicals matter.

And what I want to say is, when I heard Dr. Haley and Dr. Henderson and Dr. Greengard, they basically—and this was staff again, saying, you know, the last few witnesses are a powerful antidote to the stress lobby that we have been hearing for so many years.

We just know that we could be doing a lot better. And I would plead with the VA and DOD to break away from the history that exists in both Departments.

And I would just say one more thing to VA, when we questioned how many doctors, of the thousands that you have—and all of them well-meaning and capable—how many of them were in occupational safety, the chemical side of the equation, they could only give us two out of thousands. And so, you know, there was a general feeling on our part that a lot of the doctors who were hearing these cases just didn't have the kind of experience and the background that our three witnesses at the other end of the table had.

And Dr. Greengard, you go down in record as having the shortest statement of anyone ever. And I'm not sure if that is just you are a cautious man or if you are a man of few words, but I would like you to tell me, is your presence here—can I infer from that it is a—not a vindication but a—I mean, you bring to the table a Nobel Laureate background. Can I infer from this that you are bringing your reputation to the table as well to say people like Dr. Haley were on the right track?

Dr. GREENGARD. Yes. There are two issues. One is whether people like Dr. Haley were on the right track. And I believe they were. The jury is still out on the percentage of Gulf war victims due to chemical warfare agents—there is no question in my mind that Gulf war illness is an illness. It is absurd not to say it is. And some very bright people were misled. For example, Joshua Lederberg headed a really blue-ribbon committee that concluded—he is at the same university that I am. They concluded that Gulf war illness was nonexistent, that it was a stress of our troops in very unpleasant conditions. Why they came to that conclusion, I have no idea. I haven't read all that information.

The other issue, which is absolutely black and white, I bring my reputation to the table here, is that chemical warfare illness is an issue that can be treated like any other disease or potential disease. The scientific knowledge, is there now to combat it.

Now, so there are really those two issues. What percentage of Gulf war illnesses is due to exposure to these nerve agents, that's one question. And then the other is, can we do anything about chemical warfare, by understanding how these nerve agents work? And as I said, the science knowledge is there now to work out.

What happens—we have talked about receptors. But downstream of these receptors are a bunch of biochemical steps which occur which are being elucidated. And so we already know several—from this work I said we do with the ICD—several biochemical reactions. And there are undoubtedly dozens more. One can find out what those dozens are and then develop chemical treatments to prevent them.

For example, let's say that these nerve agents cause too little of a certain compound. Then one can use drugs that prevent breakdown of that compound to raise it to cure the illness.

In terms of the likelihood of success, the most likely is that we can find out how these nerve agents work and then develop antidotes which will prevent the side effects. I think there is a very excellent chance that can happen.

It seems such an obvious thing. I've talked to several of the scientists I most respect to say, does this seem logical to you? And we have gone through it. Everybody agrees. There are no flaws in this logic. So to find out how these toxic substances are working is really just a straightforward thing.

The chances that, based on that, one would be able to prevent—develop preventatives is very good. There is a somewhat lesser chance but still a real chance that one could develop—combat or reverse the effects on people who were exposed by treating them shortly after an attack.

And the last one, the Gulf war veterans is certainly an enormously important problem. I'm somewhat less optimistic there, but it's still the best chance, because we can find out, for example, from animals what the biochemical changes are—and we are talking about many, many different biochemical changes now—and then, either by using biomarkers in living Gulf war veterans or doing autopsies on deceased Gulf war veterans, find out what percentage of those have the same biochemical changes that we can produce in experimental animals.

Mr. SHAYS. I would like to conclude by just pleading with the VA and the DOD to see the opportunities here, and not to—I think we have come too far, and I think we have been a little too slow recently. And I would welcome you—if we have to put a line item, we will do it. But I would like not to have to do it. I would like to see some energy in DOD and the VA on this area that we have just talked about. And I just think there would be huge benefits to our veterans and to our soldiers of the future.

I am ready to just adjourn here. If there is any last comment, I will be happy to hear it. Otherwise, we will just adjourn. And I thank all of you very much.

[Whereupon, at 4:45 p.m., the subcommittee was adjourned.]

[Additional information submitted for the hearing record follows:]

Statement of
Retired Staff Sargent Edward J. Bryan
Researcher for Gulf War Illnesses
Before the Subcommittee on National Security, Veterans Affairs, and International Relations
U.S. House of Representatives Committee on Government Reform
June 15, 2004

Mr. Chairman and Members of the Committee. I am a Veteran who has been following this disease for many years and have gone through many medical test and have seen many Doctors, and I am still having neurological issues. It seems that there will be a long period of time before medical treatments will be Administrated from this Administration. My own reading material on June 1, 2004 states that civilian medical (AMA) would help if needed or if the DOD / VA still refuses **Specialty Treatments** for Middle Eastern Troops from the 1990 to present conflict. Your Committee heard testimony that treating Gulf War Illnesses should be removed from DOD / VA, I agree.

The Committee must act on what the GAO said from Mrs. Janet Heinrich on June 1, 2004. She couldn't come to the terms of an Illness from the Gulf War, well all she has to do is look it up in the National Library of Medicine **" Petroleum Induced Illnesses "** Then she would have said , Yes, there is an Illness. We need treatment today, not in the year 2020.

Another issue is Military Nerve Agents and other unknown chemicals, now the U.S. Government doesn't know how many troops were exposed ? We need tougher questions answered soon. The treatment Trials list should go forward, and let the veterans decide what treatment is needed from there health care provider. We need this Committee to demand treatment for Gulf War Illness in this calendar year. So many Veterans are waiting for these kinds of treatments. Can your office please reply to this letter and place this in your reading ?

We need answers today. The CIA, Robert Walpole is releasing documents from the war, they need to release the 6 or more million medical records for treatments for Gulf War Illnesses. I would give the VA-RAC one last chance.

Thank You

Edward J. Bryan
Researcher for Gulf War Illnesses
685 Broadway Apt. # 74
Malden, Ma. 02148
Tel.# 781-321-3161

To: Lea Steele, Ph.D.
RAC-Gulf War Veterans Illnesses (T-GW)
U.S. Department of Veterans Affairs
2200 S.W. Gage Blvd.
Topeka, KS. 66622

June 28, 2004

Subject: Congressman Shays Hearing, June 1, 2004

Dear Dr. Steele and Committee Members,

On June 1st at the committee hearing about gulf war illnesses, Congressman Shays asked if this committee would need additional help on gulf war issues. I would ask this committee to review all the information including the verbal testimony delivered on June 1, 2004. It sounded like we have to start research all over again. Can your committee send me a conclusion to this issue, so we can plan accordingly.

This committee may have to extend its legal definition of your charter according to the June 1, 2004 hearing. The gulf war veterans and returning veterans called Gulf War 1 Vs. Gulf War 2, need treatments, this committee should recommend some of the treatments to the VA Central Office. There are no treatment trials to date. Gulf veterans need to know where they can send their information on coping with their illnesses. The Veterans Affairs would have to put out notices, so doctors and veterans can write to the proper offices for treatments.

Again thank you for the last letter, I hope your committee can find some treatments for gulf war veterans.

Thank You
Mr. Edward J. Bryan

685 Broadway St. Apt. # 74
Malden, Mass. 02148
Tel. # 781-321-3161
Disabled Gulf War Veteran

To:
Subcommittee on
National Security, Emerging Threats, and International Relations.
B-372 Rayburn House Office Bldg.
Phone: 202-225-2548
Fax: 202-225-2382

Subject: Gulf War Illnesses June 1, 2004.

Dear Congressman Shays

As a gulf war 1 Veteran and following the medical treatment protocol from the beginning, we as veterans are not being treated because of the stalling tactics from DOD / VA. We need hard and fast answers. For example, the Heparin Shots are not in the clinics, the hyperbaric medicine is not in the clinics either, Why ?

We need to know, why is the VA-RAC very slow and secret on all the issues, when are they going to issue a treatment plan, the VA-RAC says that identification and development of treatments should be VA's highest priority, see December 16, 2003 letter.

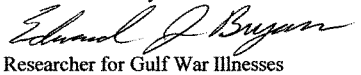
See, 2004 specialty treatment list

How long will we have to wait ?

Partial Investigation Vs. Full Investigation

Please go over my supporting documents and you will find why this topic is still a national problem, and the AMA is interested in helping the returning veterans and gulf war veterans. Can you please address this to the committee, and place this in the reading of today.

Thank You
Mr. Edward J. Bryan



Researcher for Gulf War Illnesses
685 Broadway St. Apt. # 74
Malden, Ma. 02148
Tel. 781-321-3161

To: Lea Steele
RAC-Gulf War Veterans Illnesses (T-GW)
U.S. Department Of Veterans Affairs
2200 S.W. Gage Blvd.
Topeka, KS. 66622

December 3, 2003

Subject: Letters sent on March 21, 2003 and October 28, 2003.

Dear Mrs. Steele,

I would like your office to expand on what is going on with treatments and when are they (DOD / VA) going to release most of these treatments. This issue has been going on for awhile, the other blue ribbon panels just didn't put enough time into treatments for injured soldiers coming back from the first gulf war. We just need some information on what is going on, it seems like the DOD / VA are just ignoring veterans, no letters; no replys, no calls, no emails, etc.

Another item that the Boston Globe published in the Parade section of the Sunday globe on November 9, 2003. By Dr. Isadore Rosenfeld, I thought this could be an over-looked issue about lung cancer, the symptoms almost match what veterans are complaining about, we were in the most hazardous area of the world and when you look at the chemical sarin, oil well fires, no taste of food, the way the winds blew, South over the troops, now we can put better ideas and research together and come up with a common solution.

The other issue in-country veterans vs. stateside veterans shouldn't stop the treatment process, but will have a bearing on who gets the treatment. We are hoping this committee keeps the issue a scientific one and not a political one. Can you please let us know in writing as what your committee is doing up to the present time.

Thank You
Mr. Edward J. Bryan

685 Broadway St. Apt. # 74
Malden, Mass. 02148
Tel. # 781-321-3161
Disabled Gulf War Veteran

Research Advisory Committee on Gulf War Veterans' Illnesses

VA Eastern Kansas Healthcare System (T-GW)
2200 S.W. Gage Blvd. Topeka, KS 66622

Phone: 785-350-4617 Fax: 785-350-4616

December 16, 2003

Mr. Edward J. Bryan
685 Broadway St., Apt. #74
Malden, Mass 02148

Dear Mr. Bryan,

Thank you for contacting the Research Advisory Committee on Gulf War Veterans' Illnesses with your comments and questions. As you may know, we are a Committee of scientists and Gulf War veterans charged with recommending research studies to the Secretary of Veterans Affairs. Our primary goal is to identify and recommend research that can improve the health of Gulf War veterans in a timely way. I couldn't agree with you more that 12 years is too long to wait for answers and treatments.

You asked me specifically about the status of different treatments, and when information on treatments will be released. From the materials you provided, I see you are already aware of the two large treatment trials conducted by VA that tested whether exercise/behavioral therapy (EBT) or antibiotics would improve veterans' health. As you know, a minority of veterans benefited from EBT. Investigators who conducted the antibiotic trial have reported that the study did not find that antibiotics improved veterans' health overall, although there appeared to be some benefit in the initial months of treatment.

As far as I know, those are the only studies conducted on specific therapies for Gulf War illnesses so far. Currently, VA has generated evaluation and treatment guidelines for unexplained symptoms that are similar to those suggested for chronic fatigue syndrome in civilian populations. That information can be found on their web site at the two addresses below.

http://www.oqp.med.va.gov/cpg/cpgn/mus/mus_base.htm
http://www.oqp.med.va.gov/cpg/PDH/PDH_base.htm

As you may have read in our 2002 Interim Report, our Committee has determined that identification and development of treatments should be VA's highest research priority for Gulf War illness research. But since there has been so little research done in this area, our committee is asking for input regarding treatments found to be useful by veterans and the doctors who treat them. We want to hear about conventional and/or alternative therapies and are aware of the work of the scientists and clinicians you listed in your earlier letter to Mr. Binns. We are urging all those who believe they have found a way to help veterans with these conditions to come forward

to provide data on their work, or information on individual cases. We are working to bring this information together for a Committee meeting to be held in June of next year. The meeting will be held in Washington, D.C. and all sessions will be open to the public.

You also mentioned briefly that there could be concerns about lung cancer in Gulf veterans, given the exposures they experienced in the desert. Lung cancer has not been found to be a problem in Gulf veterans in studies done so far. But this and other types of cancer can take years to develop. We think it is important that the federal government continue to monitor the health of Gulf veterans for many years to come, so that we can know if increased rates of cancer of any type show up in the future.

Thank you also for your comment regarding the importance of keeping Gulf War illnesses a scientific rather than a political issue. Of course, this has become a political issue in a number of ways. But the work of our Committee is to review the science and identify what needs to be done to keep the scientific effort moving forward. We sincerely hope, as you do, that the political issues can be kept separate in the interest of finding ways to benefit ill veterans.

Please feel free to contact our office again if you have questions or information to share. As I mentioned, we are particularly interested in hearing about treatments that you or others have found to be useful in dealing with these multisymptom conditions.

Sincerely,

Lea Steele

Lea Steele, Ph.D.
Scientific Director,
Research Advisory Committee on Gulf War Veterans' Illnesses

Gulf War Medical Tests 2004

Specialty Testing in DOD / VA Hospitals

1). Dr. Nicolson Doxycycline Test (A 50% Positive Showing).

2). Exercise Behavior Therapy

3). Dr. Ya Fang Liu, - Neurodegenerative Disorders

4). DNA Testing - Chromosome Damage Test, Heavy Metal Testing, others

5). Qxci Test - electrical feed back

6). Dr. Hymans Urine Test

7). Dr. Haleys Brain Test - Confusion / Ataxia

8). Dr. Haleys Hyperbaric Testing - Wound Care, Currently not being done.

9). Dr. Leisure Murray Test - Leishmaniasis

10). Dr. Mohamed Abou Donia MCS / CFS / FM Testing

11). Dr. Baumzweiger - Brain Fungus

12). Dr. Pam ASA - Autoimmune Condition

13). Dave Bergs - Heparin Injections

14). Washing of the Lungs - World Trade Center Workers only have 2 years left ?

15). Conventional and/or alternative therapies

Mr. Edward J. Bryan

Edward J Bryan

Life Member DAV
Life Member VFW
U.S. Army (Retired) 1974-2000
U.S. Firefighter (Retired) 1986-2000
Health Care Liaison (VA-BU) 1995-2001
Researcher for Gulf War Illnesses 1992-Present
Walter Reed Veteran Health Advisory Council - Deployment Health, 2000-2003

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Global Security Newswire by National Journal Group

Daily news on nuclear, biological and chemical weapons, terrorism and related issues.

From Monday, June 2, 2003 issue.

Iraq I: Scientist Says Saddam Hid Weapons Programs Near Commercial Facilities

An Iraqi scientist has told Bush administration officials that Saddam Hussein placed the country's chemical and biological weapons programs close to commercial facilities in an effort to produce the weapons on a moment's notice, the *Washington Post* reported today (see *GSN* , May 29).

Positioning the alleged WMD programs near commercial facilities also helped to keep them under wraps, the scientist said. In a May 7 White House document made available to the *Post*, the scientist describes Iraq as having "carefully embedded its (weapons of mass destruction) infrastructure in dual-use facilities" so the weapons could be made quickly in the event of an attack.

According to the *Post*, the commercial facilities also made legitimate products such as pesticides, but "such sites also could employ 'just in time' manufacturing and delivery systems to reduce the need for stockpiles," the document noted.

Administration officials have pointed toward the recent discovery of two trailers in Iraq that could have been used to concoct biological weapons. The trailers — one captured by Kurdish forces near the northern Iraqi city of Mosul and turned over to U.S. troops in late April and a second discovered by U.S. troops at the al-Kindi Research, Testing, Development and Engineering site in Mosul in early May — have long been suspected of being mobile biological production plants (Walter Pincus, *Washington Post*, June 2).

The United States is ramping up efforts to find weapons of mass destruction, sending in the Iraq Survey Group, which will consist of 1,300 to 1,400 personnel. The team will be led by Maj. Gen. Keith Dayton, who is scheduled to arrive in Baghdad today.

"This will be a deliberate process and it will be a long-term effort. We will be using all sources to put together pieces of an incredibly complex jigsaw puzzle," Dayton said (Politi/Alden, *Financial Times*, May 31).

Some Looted Barrels Recovered

U.S. officials, meanwhile, are busy recovering barrels that were used to store nuclear material that were looted from Iraqi government facilities.

U.S. forces are paying $3 for barrels that originally contained uranium and were being used by civilians for storing food and washing clothes, Reuters reported.

"We recovered 100 barrels, but we do not know how many more are out there," said Lt. Col. Brent Bredehoft, head of the U.S. unit searching for the radioactive material (Reuters/*Sydney Morning Herald*, June 2).

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Possible chemical weapons agents found in Iraq

Tuesday, April 8, 2003 Posted: 2:35 AM EDT (0635 GMT)

Suspicious materials found in central Iraq were being tested to see whether chemical agents were present.

Story Tools

VIDEO

U.S. troops are testing suspicious materials at an agricultural complex in central Iraq as possible chemical weapons agents CNN's Ryan Chilcote reports. (April 8)

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U.S. troops find chemicals in Iraqi agricultural compound that may be used for weapons. (April 7)

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WAR IN IRAQ

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KARBALA, Iraq (CNN) -- U.S. troops were testing suspicious materials as possible chemical weapons agents at an agricultural complex in central Iraq, U.S. military officials said Monday.

Samples of the materials are being studied, and no conclusive determination has been made, said Brig. Gen. Benjamin Freakly of the Army's 101st Airborne Division. The materials, stored in barrels and buried, had not been weaponized and might simply be pesticides, Freakly said.

On Friday, elements of the 101st Airborne Division visited two sites in an area south of Baghdad near Karbala. One site had been used for military training and the other as an agricultural compound.

At the military camp, tests found no conclusive evidence of chemical weapons being present. In fact, tests there indicated pesticides were likely present, Freakly said.

At the agricultural compound, the division found 10 25-gallon drums and three 55-gallon drums buried within bunkers 4 to 6 feet deep, Freakly said. The 63rd Medical Company

tested substances found in the drums to see whether chemical agents were present. Initial tests proved inconclusive, he said.

Monday, a new, higher-level test was administered using special testing vehicles called FOX vehicles, Freakly said. Those tests indicated the presence of nerve and blister agents, but the tests sometimes show false positives, according to Freakly.

The substances may be pesticides or they may be chemical agents that are "non-weaponized," he said. "It's a liquid chemical, but it hasn't been put in a delivery means or anything that could be dispersed against our soldiers."

If it were weaponized, Freakly said, "We would see it in probably an artillery projectile or in an artillery missile, or perhaps in an aircraft bomb or something that the enemy would spray troops with."

At the United Nations, Iraqi Ambassador Mohammed Aldouri was asked about the find and said any speculation about chemical weapons was American "propaganda."

"We have no chemical areas," Aldouri said. "We say that several times and we underline that right now. We don't have chemical weapons."

Freakly also said the 101st Airborne found a large cache of conventional weapons at the agricultural site.

As part of Iraq's cease-fire agreement ending the 1991 Persian Gulf War, Baghdad promised to destroy all its weapons of mass destruction, biological, chemical or nuclear, and submit to United Nations weapons inspections.

The Bush administration has insisted Iraq has not accounted for its alleged weapons of mass destruction.

Asked whether it appeared that U.N. weapons inspectors had visited the site, Freakly said he would find it "hard to believe" that inspectors would have found the two sites, which are located behind a civilian complex near the Euphrates River.

Former chief U.N. weapons inspector Terry Taylor said it is likely Iraq has stashes of chemical agents hidden at civilian sites "which they would pull out to fill munitions at the right time." It is too soon to tell whether that is the case in this instance, he added.

Some soldiers involved in the raid at the military camp reported feeling ill, but it appears they were suffering from dehydration, Freakly said. They're all feeling fine now, he added.

Asked whether the found materials were a "smoking gun," a military official at the Pentagon said, "It has potential."

U.S. Defense Secretary Donald Rumsfeld declined comment on the find, saying more tests must be conducted.

Mr. Edward J. Bryan
Researcher For Gulf War Illnesses
685 Broadway Street Apt. # 74
Malden, Ma. 02148
Tel. 1-781-321-3161

March 29, 2004

To The American Medical Association
515 North State Street
Chicago, Illinois. 60610
Tel. 312-464-5618
Fax. 312-464-5543

Subject: Resolution 203 (A-99), Voucher Style Medical Insurance

Dear Donald J. Palmisaco M.D. Persian gulf war veterans of 1991, are still looking for treatments from the U.S. Government (DOD / VA), there is a stalemate among medical doctors on how the treatment should be told to physicians. From 250 Million Dollars in studies and Millions of dollars wasted in other research, look at February 26, 2003 **U.S. Government Book. Research Roundtable March 11-12, 2003.** Compliance with these new requirements has required a substantial commitment of institutional resources and has greatly increased the burden on administrators and faculty, how could they focus on issues, and hearings on Capitol Hill, never mind how much the war cost from the 1980's till now ? The veterans are giving a diagnoses of MCS / CFS / or FM, of course with other ailments to cancers. **The DOD / VA have no treatment plan in effect for the near future or help with any of these ten or so diseases left and what ever they find with DNA testing with blood samples.** As your office can see, there turning a blind eye on veterans. **The AMA must look at the letter from the Advisory Committee on Gulf War Veterans Illnesses on December 16, 2003. The committee is looking for Alternative or Conventional ways to help veterans.** When I was at Walter Reed, they discouraged me from seeing a neurólogist, or other doctors that would help my condition. This approach will cause more illnesses, by not paying attention to your body signals. **The two laws PL 103-446, 105-368, should provide advise and make recommendation to the Secretary of Veterans Affairs, this remains to be seen, this is why we need help.**

The DOD / VA should just take care of the veterans and treat as what they see, **there must be a standard of testing.** also see **(PL-103-446), (105-368)**, and **VA report IL 10-94-010 (a treatment plan)**, but not followed ! The gulf war veterans were in the most toxic battlefield in U.S. History since World War 11, the first chemical exposures since WW11, is Sarin nerve gas from the 1980's, just ask Lee Friedman, Director of Social Policy Research Institute, 8423 Monticello Ave. Skokie, Illinois. 60076. Tel. # 847-530-7926, the DOD / VA say otherwise. After all we did find the WMD (WWW. NTI.ORG) in 1991, 1994, and 2003. So I would say, we were exposed to low levels of chemicals while we were in the Combat zone in the 1991 war I think. The troops now, are in trouble with chemical exposures from inside of Iraq. There must be a way to test for exposures, a fat test. We need answers and treatment for our exposures, just look at the troops returning from Iraq today, more injuries and deaths, chemicals can only be related to these injuries from a down wind exposure, this is how we as soldiers are taught, and this is what happened to U.S. Soldiers in 1991, see Field Manual **(FM 8-285)** of February of 1990. The Field Manual (FM 8-285) is not peer reviewed, Sept 7, 2000 IOM Issue (Dr. Soxs), this is what we as soldiers today rely on for combat injuries. This is the main problem with NAS / IOM.

Congressman Sanders told the Committee on Chemical Exposures in February 28-March 2, 1999 at the CDC Conference that we should be seen outside DOD / VA facilities for our help with injuries, we should get the gold credit card and go to local Hospitals. We are at a stand still of no lessons learned from the 1991 war.

Can you please reply on how your organization will help our Medical Vouchers get to local Hospitals nationwide, a point of contact is myself and others,

Mrs. Denise Nichols RN, BSN,
4050 Cody Drive
Wheat Ridge, Colorado. 80033.
Ph. 1-303-424-6235

NGWRC (Director)
Mr. Steven Robinson
8605 Cameron Street Suite 400
Silver Springs, MD. 20910.
Ph. 1-800-882-1316x162

David L. Johnson PH.D.,PE,CIH
College of Public Health
P.O. Box 26901
Oklahoma City, Oklahoma 73190
Ph. 405-271-2070
Fax. 405-271-1971

Representative Christopher Shays
Committee Chairman of Government Reform and National Security, Emerging Threats, and International Relations.
B-372 Rayburn House office Building
Washington, DC 20515
Ph. 202-225-2548
Fax. 202-225-2382
Attn: Lawrence J. Hollaran

Representative Bernard Sanders
2202 Rayburn House office Building
Washington DC 20515
Ph. 202-225-4115
Fax. 202-225-6790

Sincerely,

Mr. Edward J. Bryan

fax cover

September 11, 2000

Edward Bryan
c/o
Walter Reed Army Hospital

Here is the report from the American Medical Association about resolution#203

Please distribute to VSO's, VA, DoD and to Congress and GAO, and any other interested parties

Thank you,
Janyce Brown
Janyce Brown

5 pages including cover

American Medical Association
Physicians dedicated to the health of America

Nancy W. Dickey, MD
Immediate Past President

515 North State Street
Chicago, Illinois 60610

312 464-5618
312 464-5543 Fax

November 22, 1999

Mr. Edward J. Bryan
Health Care Liaison
685 Broadway Street, #74
Malden, Massachusetts 02148

Dear Mr. Bryan:

Thank you for your letter in which you addressed various issues related to veterans who served in the Persian Gulf War. As you know, our American Medical Association's (AMA) House of Delegates referred Resolution 203, Medical Care for Persian Gulf War Veterans, to the AMA Board of Trustees. Implementation of this resolution was assigned to the AMA's Council on Scientific Affairs (CSA).

I have taken the liberty of forwarding your letter and the testimony you supplied to the CSA. Thank you for your continued attention to this matter.

Sincerely,

Nancy W. Dickey, M.D.

Nancy W. Dickey, MD

To: The American Medical Association

June 16,1999

From: Persian Gulf Veterans

Dear Nancy W. Dickey, M.D.,

In regards to resolution 203 on 21 June 99 conference I would like the opportunity to address the gulf war issues, such as:

1). **unemployability,**

2). **Spec - scans,**

3). **Alzheimer's disease** (most gulf veterans have abnormal scans),

4). **carbon monoxide poisoning** (oil well fires),

5). **Leishmaniasis** - sand fly fever, yellow fever, river blindness and phlebotomus fever,

6). **chronic fatigue syndrome.**

As for my thorough research for gulf war illnesses, **I hope with the grace of god your conference delivers the vouchers to gulf war veterans.** Because the veterans administration is lacking discipline and the presidential oversight team will also send us outside the VA. for treatment.

Attn: speaker
Richard F. Corlin, M.D.

Vice speaker
John A. Knote, M.D

Edward J. Bryan

Health Care Liasion (GWI)
Gulf War Consultant "National"
Firefighter "Retired"
686 Broadway St. #74
Malden, MA. 02148
Tel. # 781-321-3161

AMERICAN MEDICAL ASSOCIATION HOUSE OF DELEGATES

Resolution: 203
(A-99)

Introduced by: Pennsylvania Delegation

Subject: Medical Care for Persian Gulf War Veterans

Referred to: Reference Committee B
(H. C. Alexander III, MD, Chair)

---

1 Whereas, U.S. Congress gave the Departments of Defense (DoD) and Veterans' Affairs
2 (VA) authority and funds for assisting Persian Gulf War veterans with post-deployment
3 health problems; and
4
5 Whereas, Congress asked the VA to register and provide outreach for Gulf War veterans
6 (Public Laws 102-585, 103-337, 103-446); and
7
8 Whereas, Congress asked the VA to provide medical care (PL-103-210, 103-446), process
9 medical claims, and complete relevant unbiased research and investigation (PL 103-337)
10 on Persian Gulf War veterans' health problems and new diseases occurring after
11 Operations Desert Shield and Desert Storm; and
12
13 Whereas, Twenty-nine (29) percent of Gulf War veterans rate VA quality of care as fair to
14 poor (GAO/HEHS-98-197, August 19, 1998, Treatment for Gulf War Illnesses, p.19) and
15 many suffered from VA and military hospital registrations and treatments given with
16 disrespect and a lack of sensitivity as documented in 13 General Accounting Office reports,
17 several Congressional hearings, and documents from veterans and veterans' groups; and
18
19 Whereas, After seven years and the expenditure of $65 million dollars, DoD and VA have
20 completed few if any of the functions of the Public Laws passed in order to help Persian
21 Gulf War veterans; therefore be it
22
23 RESOLVED, That our American Medical Association support:
24
25 1. Congressional establishment of a voucher-style of medical insurance options using
26 VA's present operational funds in order to provide long-term health care for Persian Gulf
27 War veterans and military subcontract workers with new and unexplained illnesses which
28 presented after working in the Arabian desert between 1991 and 1996.
29
30 2. Congressional action mandating that, at the present time, VA provide free medical
31 care for all Persian Gulf War veterans and military subcontract workers who fell ill with any
32 chronic illness extending over six (6) months duration after working under U.S. government
33 contract in the Arabian desert anytime between 1990 and 1993.
34

3. Congressional action to transfer the authority and funds for assisting Persian Gulf War veterans with novel post-deployment health problems from Veterans' Affairs and DoD to an independent nonprofit foundation.

4. Congressional action stating that a task force of representatives from at least five major Gulf War veterans' groups, the Centers for Disease Control, the National Institutes of Health, the American Society for Tropical Medicine, and independent experts on biological and chemical warfare be funded to oversee the management of the foundation and the data collection, analysis, and reporting of Persian Gulf War veterans' diseases.

5. Congressional action calling for the funding of a panel of independent scientific experts who have clinical experience with Persian Gulf veterans' medical problems (i.e., those who have treated at least 100 Persian Gulf veterans) to review the foundation's registration and medical management of Persian Gulf veterans.

Strategic Plan Component: 2.2, 3.2
Fiscal Note: No Significant Fiscal Impact

H-40.980 Armed Forces Personnel
The AMA (1) commends civilian health care facilities and physicians who voluntarily developed contingency plans during the Persian Gulf crisis; (2) commends those physicians who served during the Desert Shield and Desert Storm crisis; and (3) supports studying the extent and severity of the problems of returning physicians who were called up to serve in Operation Desert Storm and consider ways to assist them when appropriate. (Res. 77, A-91)

REPORT OF THE BOARD OF TRUSTEES

B of T Report 9-A-00

Subject: Medical Care for Persian Gulf War Veterans
(Resolution 203, A-99)

Presented by: D. Ted Lewers, MD, Chair

Referred to: Reference Committee B
(MD, Chair)

Resolution 203, introduced by the Pennsylvania Delegation at the 1999 Annual Meeting and referred to the Board of Trustees, asks that the American Medical Association support:

1. Congressional establishment of a voucher-style of medical insurance options using the Department of Veterans Affairs' (VA) present operational funds in order to provide long-term health care for Persian Gulf War veterans and military subcontract workers with new and unexplained illnesses which presented after working in the Arabian desert between 1991 and 1996;

2. Congressional action mandating that, at the present time, VA provide free medical care for all Persian Gulf War veterans and military subcontract workers who fell ill with any chronic illness extending over six (6) months duration after working under U.S. government contract in the Arabian desert anytime between 1990 and 1993;

3. Congressional action to transfer the authority and funds for assisting Persian Gulf War veterans with novel post-deployment health problems from Veterans' Affairs and the Department of Defense to an independent nonprofit foundation;

4. Congressional action stating that a task force of representatives from at least five major Gulf War veterans' groups, the Centers for Disease Control, the National Institutes of Health, the American Society for Tropical medicine, and independent experts on biological and chemical warfare be funded to oversee the management of the foundation and the data collection, analysis, and reporting of Persian Gulf War veterans' diseases; and

5. Congressional action calling for the funding of a panel of independent scientific experts who have clinical experience with Persian Gulf veterans' medical problems (i.e., those who have treated at least 100 Persian Gulf veterans) to review the foundation's registration and medical management of Persian Gulf veterans.

Many of the approximately 700,000 veterans of the Persian Gulf War have complained of illnesses since the war's end in 1991, and over 10% have sought and completed examinations through the VA or the Department of Defense. An organized and systematic approach to this matter was not undertaken until 1993, but there remain extensive and ongoing federally funded efforts by Congress, the Departments of Defense, Veterans Affairs, Energy, and Health and Human Services, the Central Intelligence Agency, the Environmental Protection Agency, the National Security Council, the General Accounting Office, and the National Academy of Sciences and Institute of Medicine to study the issue

of possible health effects attributable to service in the Gulf War. The Persian Gulf Veterans' Coordinating Board coordinates federally funded activities. While federally sponsored studies have resulted in some descriptive information concerning symptom complexes, uncertainty about the actual numbers of veterans with unexplained symptoms and the course of illness remains. Recently, the possibility of neurotoxicity attributable to pyridostigmine exposure has received attention. Nevertheless, there presently exists no medical consensus about the root causes of symptoms possibly comprising Gulf War illnesses, although more than 185 articles on this subject have been published in the peer-reviewed medical literature.

Also, it is not clear whether the health status of those veterans who have received care in VA facilities is improving or worsening. Research on treatment began only recently. Difficulties in identifying specific exposures and reaching agreement on working case definitions persist, the lack of which hampers the conduct of quality epidemiologic research. Proposed working case definitions overlap to some degree in emphasizing unexplained fatigue, neurocognitive symptoms, and musculoskeletal complaints.

These federal efforts have been met with skepticism on the part of many veterans and their advocates, particularly considering governmental delay in confirming the fact that low level exposure to nerve gas agents occurred during post-war demolition activities, and the initial emphasis on many symptoms as stress-related. The majority of federal research efforts are ongoing or in a stage of review and the Research Working Group of the Persian Gulf Veterans' Coordinating Board has not completed an assessment of the extent to which previously identified research objectives have been satisfied.

The Board of Trustees does not believe that the American Medical Association can establish medical consensus on this issue at this time. Furthermore, several research initiatives are ongoing that may help answer basic research questions. Whether this agenda can be enhanced by transferring federal authority or by forming new task forces or independent panels is not clear at this time.

RECOMMENDATION

The Board of Trustees recommends that in lieu of Resolution 203 (A-99), the following statement be adopted, and the remainder of this report be filed.

> That the Council on Scientific Affairs and Council on Legislation continue to monitor developments in the identification of possible Gulf War illnesses and Congressional initiatives related to the health care of those who served in the Persian Gulf during the early 1990s, and respond as appropriate. **(Directive to Take Action)**

INSTITUTE OF MEDICINE
NATIONAL ACADEMY OF SCIENCE
2101 CONSTITUTION AVENUE, N.W.
WASHIINGTON, DC 20418

SEPTEMBER 16,1999.

Good Morning (CHAIRMAN) Harold C. Sox, Jr., MD and Committee Members:

As researcher for Gulf War Illnesses and Health Care Liaison for Massachusetts Gulf War Veterans with Boston University in conjunction with the Veteran's Administration in Boston, I declare with great respect that the Specialized Care Program (SCP) run by Dr. Engel and his staff at Walter Reed Army Medical Center is performing a tremendously wonderful job. Although, with some adjustments to the Bio-Medical Model for doctors to include an Occupational Doctor, a Neurologist, and a Psychiatrist.

There should also be an individual or persons to explore the issues of:

1. Petroleum Induced Illnesses above the Threshold Limit Value (TLV).

2. Dr. Hymen's Strep Throat Theory.

3. A Test for Urine for Nutritional Values by Dr. Crawford's Spectracel Lab in Texas (1-800-227-5227).

4. The Spec-Scan Issue for frontal lobes,not being addressed..

5. Hormone Screening Tests.

This multidisciplinary treatment of persistent symptoms and coping with uncertainty for chronic illness are now confirming as we see a person's response from a chemical or compounds that are above its TLV. which is a panic attack from environmental exposures. This treatment is addressed by Dr. Loew's chemical and electrical activity on pages 164 and 165 of the book entitled, "The Book of the Brain" by Dr. Richard M. Restak, M.D.

Dr. Nicolson's theory of "live bacteria" regarding the spilling and burning of the 250 billion gallons of crude oil was correct. This action would light up America for over ten plus years.

The issue of pesticides is going unnoticed. There is a need for the SCP to provide additional support and information to Veterans on this issue. I received them and I want the rest of the soldiers to received the same results.

This program helped me, but I want my fellow Veterans that do not know about the program to be informed. And, yes, The United States Marines do get sick. I have been following the testing and there should be a review group to look at this because this approach is not the policy or position of the Uniformed Service University of the Health Sciences, Walter Reed Army Medical Center, the Department of the Army, the Department of Defense or the United States Government. We need this approach with other testing added.

Dr. Haley's approach to Neurological Confusion/Ataxia or Musculoskeletal/Rheumatologic with Veteran's like myself or Michael Donnelly who need answers to current medicine to address the issues about the "Above Threshold Limit Values to include Material Safety Data Sheets (MSDS)", which I have training on. It should address the use of protection gear during the war. Dr. Heller should have given a direct order to wear respirators all of the time.

Retired General Vesser quoted on September 3, 1999 that. "the Gulf War Veterans were in the

most toxic battlefields since World War I."

The National Institute of Health has proven that acupuncture has a standard technique for treating pain which is no longer considered an "alternative".

Regarding Amyotropic Lateral Sclerosis (ALS) Reporting, Dr. Brown emphasized in the Congressional Second Report of September 15, 1997 to Congressman Shay's Committee that, "...there are now 9 or 11 cases of ALS in the Gulf War veterans population. This seems excessive to me." There are over sixty plus cases today and I feel we still have to look further.

EDWARD J. BRYAN

Researcher for Gulf War Illnesses
Health Care Liaison
685 Broadway Street, #74
Malden, MA 02148
(781) 321-3161

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

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Survey of Faculty Grant Administration Burdens: A Joint GCIRR-FDP Project for 2003
Marv Paule, FDP

The past decade has seen a substantial growth in federal regulations governing the conduct of sponsored research. Compliance with these new requirements has required a substantial commitment of institutional resources and has greatly increased the burden on administrators and faculty. The impact of the increased regulatory burden has been particularly profound for faculty, since the increased time that has to be devoted to administrative requirements has reduced the time available for research and teaching. Though expanded authorities and NIH modular grants have helped to reduce faculty time spent on grant administration, the administrative load borne by faculty members doing research funded by federal agencies continues to grow. Burdens include faculty performing administrative and clerical work on grants, and serving on regulatory compliance committees (human subjects, animal use and care, etc.) whose charges are continually expanding. Furthermore, post-9/11 legislation such as the Homeland Security and the Patriot Act promise to add yet more layers to this burden and further erode the time that faculty have available to perform research.

FDP is preparing to enter into discussions with granting agencies and rule-makers to alleviate some or all of these burdens. However, to make the case for change, anecdotes are an unscientific and insufficient basis for argument. A quantitative survey of a representative cross-section of the research community must be performed to ascertain the magnitude and impact of these additional burdens on scholarship and the effectiveness of grant expenditures. A case will be made for the funding of this survey.

MAJ. GEN. RANDALL L. WEST

SENIOR ADVISOR TO THE

DEPUTY SECRETARY OF DEFENSE

FOR CHEMICAL AND BIOLOGICAL PROTECTION

STATEMENT MADE ON OCTOBER 11, 2000.
2154 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, D.C.

" HE STATES THAT THE WINDS

BLEW FROM NORTH

TO SOUTH "

AFTER TEN YEARS OF LISTENING THAT
THE SMOKE FIRES WENT FROM WEST TO EAST.

NOW WE KNOW THE DEADLY CHEMICAL EXPOSURES
CAME OVER THE TROOPS
DURING OPERATION DESERT SHIELD / STORM.

EDWARD J. BRYAN

HEALTH CARE LIAISON FOR GULF WAR VETERANS

...T, MASSACHUSETTS

COMMITTEE ON
...ATION AND INFRASTRUCTURE

SUBCOMMITTEES:
SURFACE TRANSPORTATION
WATER RESOURCES AND ENVIRONMENT

Congress of the United States
House of Representatives
Washington, DC 20515–2103

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http://www.house.gov/mcgovern

October 14, 1997

The Honorable Bob Stump
Chairman
Committee on Veterans' Affairs
335 Cannon HOB
Washington, D.C. 20515

Dear ~~Congressman Stump~~ Mr. Chairman -

I recently met with Mr. Ed Bryan who is the Health Care Liaison for the Persian Gulf Veterans of Massachusetts. I would like to recommend that he testify before the Subcommittee on Persian Gulf Illness should the opportunity arise. While I understand that no hearings are scheduled at this time, I believe his testimony would offer the Subcommittee a valuable perspective on Gulf War Illnesses.

Mr. Bryan works at the State House in Boston and is well informed on the issues of Persian Gulf Veterans. Given his important position in my home state, his testimony would reflect the stories of many veterans from all across Massachusetts. His efforts have focused on solving veterans' difficulties and on educating veterans about the illness. In addition, Mr. Bryan is very knowledgeable on the various organizations and hospitals conducting research in this subject matter.

If you would like more information, please contact Karl Moeller at my Washington, D.C. office. Thank you for your time and the consideration of this request.

Sincerely,

Jim McGovern

James P. McGovern

cc: Congressman Lane Evans
Ed Bryan

THIS STATIONERY PRINTED ON PAPER MADE OF RECYCLED FIBERS

TYPICAL PROPERTIES OF
PETROLEUM FRACTIONS

1 thru 18 are from McGraw Hill Encyclopedia (1987). 19 thru 26 are from research. 27 thru 31 are found in National Geographic (1992). 32 is from the EPA.

*NOTE: Some of this information was also found in the Americana Encyclopedia in the Melrose public library. And NFPA hand book. Along with various fire department hand books.

TYPICAL PROPERTIES OF PETROLEUM FRACTIONS

1). Asphalt
2). Crude Petroleum
3). Fuel oil #1 Kerosene effects atmospheric pollution, Smoky flame.
4). #2 Causes skin cancer, and is highly toxic.
5). #4
6). #5
7). #6 Bunker oil (heavy) highly toxic, Carbon monxide, skin irritant.
8). Gasoline (500 ppm.) for 8 hours (166 ppm.)for 24 hours. Highly toxic, skin irritant.
9). Lubricating oil. Skin cancer, Highly toxic.
10). Mineral oil. Skin cancer.
11). Naphtha. Solvent (toxic). from coal tar.
12). Naphtha V.M.P.
13). Petroleum. Ether or Ligroin, Headache; Nausea, Intoxication, Loss of Judgement.
14). Benzene. Hydrocarbons (Benzol) Carcinogen (35-100 ppm) for 8 hours. (21.6ppm) for 24 hours, Toxic, Anemia, Fatigue, Leukopenia, Nausea.
15). Naphtha (Coal Tar).
16). Naphthalene (White Tar) Highly irritating.
17). Toluene (Toluol) or Methylbenzene (upper respiratory irritant). Fatigue, Loss of Judgement.
18). Xylene. Irritating eyes, Nose, Throat, Carbon Monoxide (200 ppm) for 8 hours (66.6 ppm) for 24 hours.
19). Coal Tar Naphtha is mixed to Toluene and Xylene.
20). Ether (400 ppm) for 8 hours. (133 ppm) for 24 hours.
21). Grease. Causes skin cancer.
22). Paraffin.
23). Coke.
24). Liquid Petroleum Gas (LPG) is an Asphyxiant. Highly flammable.
25). Carbon Monoxide. (35 ppm) for one hour (9 ppm) for 8 hours.
26). Smoke effect. (Nuclear Winter Scenario).
27). Smog effect. BK 1 Air pollution (Americana Encyclopedia pages 387,389,392). Melrose public library.
28). O Zone. (.01 ppm) for 8 hours, (.003 ppm) for 24 hours
29). Particles. (30% soot), 12,000 metric tons per day. This is Carbon Monoxide for incomplete combustion the 12,000 metric tons per day is equal to 26,460,000 million pounds per day, Soot increased the burning rate.

*Carbon Dioxide CO_2 1.9 metric tons per day, This is equal to 4,189,400,000 pounds per day. The 8 hour limit is 1,666 ppm. for a total of 255 days that the Oil Wells were burning.

(#29). Contd. Next Page).

TYPICAL PROPERTIES OF PETROLEUM FRACTIONS

29). Continued:
*Sulfur Dioxide 20,000 metric tons per day, This is equal to 44,100,000 pounds per day (6-12 ppm). The 24 hour limit is 4 ppm. High toxic level. The health effects are: Irritation of Nose, Throat and Upper Respiratory Region.

***New york city. 200 people died in 1953 from high levels of SO2.**

*The government says there were 4 chemicals in smoke fires. There are really 27 chemicals.

*Dust. The U.S. Bureau of Mines, and the U.S. Department of Interior.

*Patty's Industrial Hygiene and Toxicology, Hazardous Chemicals NFPA - 49 LNG is an Asphyxiant.

***Not according to Federal activities related to the health of the Persian Gulf Veterans. Page 36, Petroleum. The Government states that their is 5 chemicals in smoke. Not so, I have found over 27 different chemicals and more in variety through out the Gulf War.**

30). Bahrain was 4 degrees C. Below normal. This was the coldest May in 35 years. (National Geographic Feb. 1992), Research News.

31). The smoke in the gulf region was a Batch effect. Not the traditional building effect. The smoke stayed low, and thick, and was Black, Gray, Brown, and White in color for 24 hours a day.

***YOU HAD TO BE MORE THAN 1,000 MILES AWAY FROM THE FIRES TO BE IN AN AREA OF EQUAL QUALITY TO THE UNITED STATES.**

32). There are 46 known carcinogens in cigarette smoke. This information is from the EPA.

*There was a total of 252 billion gallons of Crude Oil that spilt and went in to the Gulf. Also the remaining burned off in oil well fires. That filled the air with incomplete combustion.

*There was a threshold limit of 8 hours. This is wrong. We were over there for a total of 24 hours per day, Not 8 hours a day. This brings the ppm down to a very low scale and it is dangerously Hazardous.

(#32). Contd. Next Page).

TYPICAL PROPERTIES OF PETROLEUM FRACTIONS

32). Continued:

* There was a cocktail mix of chemicals in the Gulf Region, to include Sarin, Tabun, and Mustard Gas, all the way to Bug Killers and Tide Laundry Detergent.

*This is a Gulf War chemical study of smoke and oil properties. Also various other chemicals.

*All veterans should be compensated on Multiple Chemical Syndrome. Chemical and Neurological problems.

33). All the Threshold Limit Values (TLV) have to be adjusted.

***THE ABOVE CAPTIONED STATEMENTS ARE, IN ONE FORM OR ANOTHER, HEALTH HAZARDS, IN RELATION TO THE VARIOUS CHEMICALS THAT HAVE BEEN KNOWN TO CAUSE BIRTH DEFECTS, NEUROLOGICAL DAMAGE, AND NERVE DAMAGE.**

***THE MOVIE ON DEADLY GROUND BY KEVIN SEGAL (MOVIE ACTOR). THAT AIRED IN THE BOSTON AREA ON CHANNEL 7 AT 9:00 P.M. ON 9/22/96. IT WAS ABOUT OIL AND THE ENVIRONMENT.**

*The movie "SPILL", a toxic leak at National Park Such high levels of Toxicity are surpressed by the White House and DOD. (Don't tell the press the real info. on Bio-Chemical Warfare Agents released, that was secretly being transported in this movie. This is simular of Gulf War releases, only six years later; and like Operation Rainbow. See SHOWTIME 2 Friday 5:45 P.M. Sept. 19,1997.

*The Alaskan oil spill on March 29,1989 spewing 11 million gallons of oil. And the other oil that had a different DNA, has been leaking for an undetermined amount of years. National Geographic Jan. 1990 and other Scientific magazines.

*The book Psychic Warrior tells the truth about the nerve agents that were released at the bottom of the oil wells. In lieu of these facts we need the presumption law to be carried out to its' fullest extent.

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United States General Accounting Office

GAO

Report to Congressional Committees

September 2003

MILITARY PERSONNEL

DOD Needs More Data to Address Financial and Health Care Issues Affecting Reservists

GAO-03-1004

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