WRITTEN TESTIMONY OF

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Dr. Garth Nicolson is currently the President, Chief Scientific Officer and Research Professor at the Institute for Molecular Medicine in Huntington Beach, California. He was formally the David Bruton Jr. Chair in Cancer Research, Professor and Chairman at the University of Texas M. D. Anderson Cancer Center in Houston, and Professor of Internal Medicine and Professor of Pathology and Laboratory Medicine at the University of Texas Medical School at Houston. He was also Adjunct Professor of Comparative Medicine at Texas A & M University. Among the most cited scientists in the world, having published over 520 medical and scientific papers, edited 14 books, served on the Editorial Boards of 20 medical and scientific journals, including the *Journal of Chronic Fatigue Syndrome*, and currently serving as Editor of two (*Clinical & Experimental Metastasis* and the *Journal of Cellular Biochemistry*), Professor Nicolson has held numerous peer-reviewed research grants. He is a recipient of the Burroughs Wellcome Medal of the Royal Society of Medicine, Stephen Paget Award of the Metastasis Research Society and the U. S. National Cancer Institute Outstanding Investigator Award.

The most important question that this subcommittee must ask is whether the United States military health system failed in its important mission of Force Protection before, during and after the Gulf War. I believe strongly that it did, and the reason for this failure must be determined in order to better treat the chronic illnesses displayed by over 100,000 U.S. veterans of the Gulf War, including in some cases their immediate family members [1], and to prevent history from repeating itself in future deployments.

First, there is the issue of the initial denial the Gulf War veterans were ill in numbers more than expected for a deployed population of approximately 600,000 men and women. This has now been conclusively shown, and the data indicate that there are much higher prevalence rates of Gulf War Illnesses (GWI) in deployed than in non-deployed forces [2-4]. Case control studies of Gulf War veterans showed higher symptom prevalence in deployed than in non-deployed personnel from the same units [3,4]. For certain signs and symptoms, this difference was dramatic (some over 13-times greater in deployed than in the non-deployed group [3]). Steele [4] showed that in three studies, Gulf War-deployed forces had excess rates of GWI symptom patterns, indicating beyond a doubt that GWI is associated with deployment to the Gulf War.

Second, since it is now clear that the Gulf War produced delayed casualties beyond those expected, it is important to determine what caused these casualties so that measures can be employed to prevent this from occurring in future conflicts. An important corollary of this is that illnesses that occur in deployed personnel must be prevented from spreading to civilians [1]. We believe that GWI is caused by accumulated toxic insults (chemical, biological and in some cases radiological [5-8]) that result in chronic illnesses with relatively nonspecific signs and symptoms [5,9,10]. Unfortunately, some of these illnesses are apparently transmittable and can be passed to family members [1] and possibly to the general public.

POST-TRAUMATIC STRESS DISORDER AND OBTAINING A DIAGNOSIS OF GWI

For years the Departments of Defense (DoD) and Veterans' affairs (DVA) promoted the notion that Post-Traumatic Stress Disorder (PTSD) was a major factor in GWI [11]. Most researchers doubt that stress is a major cause of GWI [6-9], and it certainly does not explain after the war why some immediate family members presented with GWI signs and symptoms [1,6-8]. Psychiatrists who have studied GWI do not believe that most GWI is explainable as PTSD [12], and researchers studying GWI find that it differs from PTSD, depression, somatoform disorder and malingering [8,13]. Although most GWI patients do not appear to have PTSD, they are often placed in this diagnosis category by DoD and DVA physicians. GWI can be diagnosed within ICD-10-coded diagnosis categories, such as fatiguing illness (G93.3), but they often receive a diagnosis of 'unknown illness.' This, unfortunately, results in their receiving reduced disability assessments and benefits and essentially little or no effective treatments because they don't fit within the military's or DVA's diagnosis systems. In addition, many active-duty members of the Armed Forces are hesitant to admit that they have GWI, because they feel strongly that it will hurt their careers or result in their being medically discharged. Officers that we have assisted eventually retired or resigned their commissions because of imposed limits to their careers [14].

In the absence of contrary laboratory findings, some physicians feel that GWI is a somatoform disorder caused by stress, instead of organic or medical problems that can be treated with medicines or treatments not used for PTSD or other somatoform disorders [14]. The evidence offered as proof that stress or PTSD is the source of most GWI is the assumption that veterans were in a stressful environment during the Gulf War [14,15]. However, most GWI patients feel that PTSD is not an accurate diagnosis of their illnesses [14,15], and testimony to the House questions the notion that stress is the major cause of GWI [16]. The GAO has concluded that while stress can induce some physical illness, it is not established as a major cause of GWI [17]. Although stress can exacerbate chronic illnesses and suppress immune systems, most officers that we interviewed indicated that the Gulf War was not a particularly stressful war, and they strongly disagreed that stress was the origin of their illnesses [18]. However, in the absence of physical or laboratory tests that can identify possible origins of GWI, many physicians accept that stress is the cause [14,15,18]. The arthralgias, fatigue, memory loss, rashes and diarrhea found in GWI patients are nonspecific and often apparently lack a physical cause [19], but this may simply be the result of inadequate workup and lack of availability of routine tests that could define the underlying organic cause [6-8].

We have been trying for years to get the DoD and DVA to acknowledge that different exposures can result in quite different illnesses, even though signs and symptoms profiles may overlap [14,18]. Illness clusters similar to GWI can be found in non-Gulf War veterans deployed to Bosnia [2]. Although such epidemiological analyses have been criticized on the basis of self-reporting and self-selection [19], it remains important to characterize signs and symptoms and identify exposures of Gulf War veterans in order to find effective treatments for specific subsets of GWI patients [14,15,18]. Our contention is that GWI patients that suffer from chemical, biological or radiological exposures should receive different treatments based on their exposures [6-8].

Patients with GWI can have 20-40 or more chronic signs and symptoms [1-8]. Civilian patients with similar signs and symptoms are usually diagnosed with Chronic Fatigue Syndrome (CFS), Fibromyalgia Syndrome (FMS) or Multiple Chemical Sensitivity Syndrome (MCS) [6-8]. Although clear-cut laboratory tests on GWI, CFS and FMS are not yet available, some tests that have been used in recent years for GWI are not consistent with a psychiatric origin for GWI [20-26]. These results argue against a purely somatoform disorder. Recently the DVA has agreed to accept diagnoses of CFS and FMS for Gulf War veterans without confirmation of the origin of illness. This is a step in the right direction toward rectifying the problem of diagnosis of 'illness of unknown origin' or somatoform disorder.

CHEMICAL, BIOLOGICAL & RADIOLOGICAL EXPOSURES DURING THE GULF WAR

During the Gulf War personnel may have been exposed to chemical, biological and/or radiological substances that could be among the underlying causes of their illnesses [6-8]. Gulf War veterans were exposed to a variety of chemicals, including insecticides, such as the insect repellent N,N-dimethyl-m-toluamide, the insecticide permethrin and other organophosphates, fumes and smoke from burning oil wells, the anti-nerve agent pyridostigmine bromide, solvents used to clean equipment and a variety of other chemicals, including in some cases, possible exposures to low levels of Chemical Warfare (CW) agents [6-8]. Some CW exposure may have occurred because of destruction of CW stores in factories and storage bunkers during and after the war as well as possible offensive use of CW agents [27]. Although some feel that there was no credible evidence for CW exposure [19], many veterans have been notified by the DoD of possible CW exposures. Exposures to mixtures of toxic chemicals can result in chronic illnesses, even if the exposures were at low-levels [20,21,28,29]. Such exposures can cause a wide variety of signs and symptoms, including chronic neurotoxicity and immune supression. Combinations of pyridostigmine bromide, N,N-dimethyl-m-toluamide and permethrin produce neurotoxicity, diarrhea, salivation, shortness of breath, locomotor dysfunctions, tremors, and other impairments in healthy adult hens [28]. Although low levels of individual organophosphate chemicals may not cause signs and symptoms in exposed, non-deployed civilian workers [30], this does not negate a causal role of multiple chemical exposures in causing chronic illnesses such as GWI. Organophosphate-Induced Delayed Neurotoxicity (OPIDN) [31] is an example of chronic illness that may be caused by multiple, low level chemical exposures (Figure 1). Multiple Chemical Sensitivity Syndrome (MCS) has also been proposed to result from multiple low level chemical exposures [32]. These syndromes can present with many of the signs and symptoms found in GWI patients, and many GWI cases may eventually be explained by complex chemical exposures.

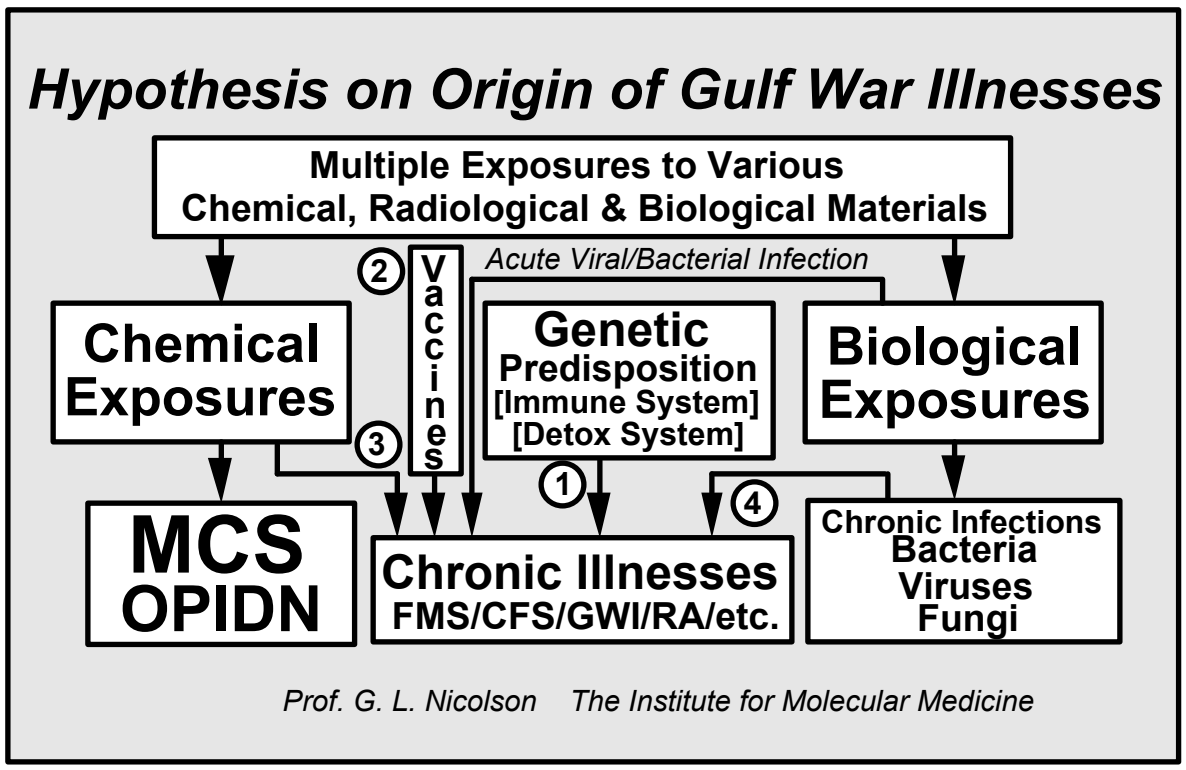

Figure 1. Hypothesis on how multiple toxic exposures, including multiple vaccines (2), chemical (3), radiological and biological (4) exposures, may have resulted in GWI in predisposed, susceptible individuals (1) [modified from Nicolson et al., ref. 8].

In chemically exposed GWI patients, memory loss, headaches, cognitive problems, severe depression, loss of concentration, vision and balance problems and chemical sensitivities, among others, typify the types of signs and symptoms characteristic of organophosphate exposures. Arguments have been advanced by former military physicians that such exposures do not explain GWI, or that they may only be useful for a small subset of GWI patients [19]. These arguments for the most part are based on the effects of single agent exposures, not the multiple, complex exposures that were encountered by Gulf War veterans [33]. The onset of signs and symptoms of GWI for most patients was between six months and two years or more after the end of the war. Such slow onset of clinical signs and symptoms in chemically exposed individuals is not unusual for OPIDN [34]. Since low-level exposure to organophosphates was common in U.S. veterans, the appearance of delayed, chronic signs and symptoms similar to OPIDN could have been caused by multiple low-level exposures to pesticides, nerve agents, anti-nerve agents and/or other organophosphates, especially in certain subsets of GWI patients. Alternatively, chemically-exposed patients are known to be more susceptible to opportunistic infections, and the combination of chemical and biological exposures may be important for a large subset of GWI patients.

In addition to chemical exposures, personnel were exposed to burning oil well fires and raw petroleum as well as fine, blowing sand. The small size of sand particles (much less than 0.1 mm) and the relatively constant winds in the region probably resulted in some sand inhalation. The presence of small sand particles deep in the lungs can produce a pulmonary inflammatory disorder that can progress to pneumonitis or Al-Eskan Disease [35]. Al-Eskan disease, characterized by reactive airways, usually presents as a pneumonitis that can eventually progress to pulmonary fibrosis, and possibly immunosuppression followed by opportunistic infections. Although it is doubtful that many GWI patients have Al-Eskan Disease, the presence of silica-induced immune suppression in some soldiers could have contributed to persisting opportunistic infections in these patients.

Radiological exposures occurred in some personnel, probably a small number overall, during the Gulf War. Depleted uranium (DU) was used extensively in the Gulf War, and it remains in the environment as a contaminant. When a DU penetrator hits an armored target, it ignites, and between 10% and 70% of the shell aerosolizes, forming uranium oxide particles [36]. The particles that form are usually small (less than 5 μm in diameter) and due to their high density settle quickly onto vehicles, bunkers and the surrounding sand, where they can be easily inhaled, ingested or re-aerosolized. Following contamination, the organs where DU can be found include the lungs and regional lymph nodes, kidney and

bone. However, the Armed Forces Radiological Research Institute (AFRRI) also found DU in blood, liver, spleen and brain of rats injected with DU pellets [37]. Studies on DU carriage should be initiated as soon as possible to determine the prevalence of contamination and extent of body stores of uranium and other radioactive heavy metals. Procedures have been developed for analysis of DU metal fragments [38] and DU in urine [39]. However, urine testing does not detect uranium in all body sites [37]. So far, analysis of DU-contaminated Gulf War veterans has not shown them to have severe signs and symptoms of GWI [39], but few Gulf War veterans have been studied for DU contamination. As with chemical exposures, radiological exposures result in immune suppression can contribute to an increased susceptibility to opportunistic infections.

BIOLOGICAL EXPOSURES AND GWI

The variable incubation times, ranging from months to years after presumed exposure, the cyclic nature of the relapsing fevers and other signs and symptoms, and the types of signs and symptoms of GWI are consistent with diseases caused by combinations of biological and/or chemical or radiological agents (Figure 1) [6-8]. System-wide or systemic chemical insults and/or chronic infections that can penetrate various tissues and organs, including the Central and Peripheral Nervous Systems, are important in GWI [6-8]. When chronic infections occur, they can cause most if not all of the complex signs and symptoms seen in CFS, FMS and GWI, including immune dysfunction and changes in blood chemistry [24,25]. Changes in environmental responses as well as increased titers to various endogenous viruses that are commonly expressed in these patients have been seen in CFS, FMS and GWI. Few infections can produce the complex chronic signs and symptoms found in these patients; however, the types of infection caused by *Mycoplasma* and *Brucella* species that have been found in GWI patients, can cause the complex signs and symptoms found in GWI [reviews: 23,40,41]. These microorganisms are now considered important emerging pathogens in causing chronic diseases as well as being important cofactors in some illnesses, including AIDS and other immune dysfunctional conditions [23,40,41].

Evidence for infectious agents has been found in GWI patients' urine [5] and blood [1,23,42-44]. We [1,42,43] and others [44] have found chronic pathogenic bacterial infections, such as *Mycoplasma* and *Brucella* infections, in a large subset of GWI patients. In studies of over 1,500 U. S. and British veterans with GWI, approximately 40-50% of GWI patients have PCR evidence of such infections, compared to 6-9% in the non-deployed, healthy population [review: 23]. This has been confirmed in a large study of 1,600 veterans at over 30 DVA and DoD medical centers (VA Cooperative Clinical Study Program #475). Historically, mycoplasmal infections were thought to produce relatively mild diseases limited to particular tissues or organs, such as urinary tract or respiratory system [23,40,41]. However, the mycoplasmas detected in GWI patients with molecular techniques are highly virulent, colonize a wide variety of organs and tissues, and are difficult to treat [23,45,46]. The mycoplasma most commonly detected in GWI, *Mycoplasma fermentans* (found in >80% of those GWI patients positive for any mycoplasma), is a slow-growing bacteria found inside cells in tissues. It is unlikely that this type of infection will result in a strong antibody response, which may explain the DoD's lack of serologic evidence for these types of intracellular infections [47]. When civilian patients with CSF or FMS were similarly examined for systemic mycoplasmal infections 50-60% of these patients were positive, indicating another link between these disorders and GWI [23]. In contrast to GWI, however, several species of mycoplasmas other than *M. fermentans* were found in higher percentages of CSF/ME and FMS patients [48,49].

SOME GWI INFECTIONS CAN SPREAD TO IMMEDIATE FAMILY MEMBERS

Recently we have documented the spread of GWI infections to immediate family members [1]. According to one U. S. Senate study [50], GWI has spread to family members, and it is likely that it has also spread in the workplace [18]. Although the official position of the DoD/DVA is that family members have not contracted GWI, these studies [1,50] indicate that at least a subset of GWI patients have a transmittable illness caused by a chronic infection. Laboratory tests revealed that symptomatic GWI family members have the same chronic infections [1] that have been found in ~40% of the ill veterans [42-44]. We examined military families (149 patients; 42 veterans, 40 spouses, 32 other relatives and 35 children) with at least one family complaint of illness) selected from a group of 110 veterans with GWI who tested positive (~41% overall) for mycoplasmal infections [1]. Consistent with previous results, over 80% of GWI patients who were positive for blood mycoplasmal infections had only one *Mycoplasma* species, *M. fermentans*. In healthy control subjects the incidence of mycoplasmal infection was 7%, several mycoplasma species were found, and none of these subjects were found to have multiple mycoplasmal species (significant difference between patients and control subjects, $P<0.001$). In 107 family members of mycoplasma-positive GWI patients, there were 57 patients (53%) that had essentially the same signs and symptoms as the veterans and were diagnosed with CFS or FMS. Most of these patients (70.2%) also had mycoplasmal infections compared to non-symptomatic family members (significant difference between symptomatic family members and non-symptomatic family members, $P<0.001$). The most common species found in CFS patients in the same families as *M. fermentans*-positive GWI patients was also *M. fermentans*. Thus the most likely explanation is that certain subsets of GWI patients can transmit their illness and airborne *M. fermentans* infections to immediate family members who then present with CFS or FMS [1].

AUTOIMMUNE DISEASES AND INFECTIONS IN GULF WAR VETERANS

As chronic illnesses like GWI, CFS and FMS progress, there are a number of accompanying clinical problems, particularly autoimmune signs/symptoms, such as those seen in Multiple Sclerosis (MS), Amyotrophic Lateral Sclerosis (ALS or Lew Gehrig's Disease), Lupus, Graves' Disease, Rheumatoid Arthritis and other complex autoimmune diseases. In part, this might be explained by intracellular microorganisms, such as mycoplasmal infections that can penetrate into nerve cells, synovial cells and other cell types [40,41]. The autoimmune signs and symptoms may be caused when intracellular pathogens, such as mycoplasmas, escape from cellular compartments and stimulate the host's immune system. Microorganisms like mycoplasmas can incorporate into their own structures pieces of host cell membranes that contain important host membrane antigens that can trigger autoimmune responses or their surface antigens may be similar to normal cell surface antigens. Thus patients with such infections may have unusual autoimmune signs and symptoms.

An example of this is Amyotrophic Lateral Sclerosis (ALS), an adult-onset, idopathic, progressive degenerative disease affecting both central and peripheral motor neurons. ALS is present at higher incidence rates in Gulf War veterans than expected. Patients with ALS show gradual progressive weakness and paralysis of muscles due to destruction of upper motor neurons in the motor cortex and lower motor neurons in the brain stem and spinal cord, ultimately resulting in death, usually by respiratory failure [51]. We have recently investigated the presence of systemic mycoplasmal infections in the blood of Gulf War veterans and civilians with ALS [52]. Almost all ALS patients (~83% overall) show evidence of system-wide mycoplasmal infections, including 100% of Gulf War veterans with ALS. All Gulf War veterans with ALS were positive for *M. fermentans*, except one that was positive for *M. genitalium.* In contrast, the 22/28 civilians with detectable mycoplasmal infections had *M. fermentans* as well as other *Mycoplasama* species in their blood, and two of the civilian ALS patients had multiple mycoplasma species [52]. Of the few control patients that were positive, only two patients (2.8%) were positive for *M. fermentans* (significant difference between ALS patients and control subjects, $P<0.001$). The results support the suggestion that infectious agents may play a role in the pathogenesis and/or progression of ALS, or alternatively ALS patients are extremely susceptible to systemic mycoplasmal infections [52]. In the GWI patients mycoplasmal infections may have increased their susceptibility to ALS, which may explain the recent VA studies showing that there is an increased risk of ALS in Gulf War veterans.

SUCCESSFUL TREATMENT OF INFECTIONS IN GWI PATIENTS

Treatment of GWI can be complex and dependent on the types of exposures found in GWI patients. We have found that mycoplasmal infections in GWI, CFS, FMS and RA can be successfully treated with multiple courses of specific antibiotics, such as doxycycline, ciprofloxacin, azithromycin, clarithromycin or minocycline [45,46,53-55], along with other nutritional recommendations. Multiple treatment cycles are required, and patients relapse often after the first few cycles, but subsequent relapses are milder and most patients eventually recover [42,43]. GWI patients who recovered from their illness after several (3-7) 6-week cycles of antibiotic therapy were retested for mycoplasmal infection and were found to have reverted to a mycoplasma-negative phenotype [42,43]. The therapy takes a long time because the slow-growing microorganisms are localized deep inside cells in tissues where it is more difficult to achieve proper antibiotic therapeutic concentrations. Although anti-inflammatory drugs can alleviate some of the signs and symptoms of GWI, they quickly return after discontinuing drug use. If the effect was due to an anti-inflammatory action of the antibiotics, then the antibiotics would have to be continuously applied and they would be expected to eliminate only some of the signs and symptoms of GWI. In addition, not all antibiotics, even those that have anti-inflammatory effects, appear to work. Only the types of antibiotics that are known to be effective against mycoplasmas are effective; some have no effect at all, and some antibiotics make the condition worse. Thus the antibiotic therapy does not appear to be a placebo effect, because only a few types of antibiotics are effective and some, like penicillin, make the condition worse. We also believe that this type of infection is immune-suppressing and can lead to other opportunistic infections by viruses and other microorganisms or increases in endogenous virus titers. The true percentage of mycoplasma-positive GWI patients overall is likely to be somewhat lower than found in our studies (41-45%) [1,42,43] and those published by others (~50%) [44]. This is reasonable, since GWI patients that have come to us are probably more advanced patients with more progressed disease than the average GWI patient. Our diagnostic results have been confirmed in a large study DVA/DoD study (~40% positive for mycoplasmal infections, VA Cooperative Clinical Study Program #475). This DVA study is a controlled clinical trial that will test the usefulness of antibiotic treatment of mycoplasma-positive GWI patients. This clinical trial is based completely on our research and publications on the diagnosis and treatment of chronic infections in GWI patients [42,43,53-55]. This clinical trial is complete but the treatment results have not yet been analyzed. There is a major concern that the DoD/DVA will not be forthcoming about this trial. We have also found *Brucella* infections in GWI patients but we have not examined enough patients to establish a prevalence rate among veterans with GWI.

MULTIPLE VACCINES GIVEN DURING DEPLOYMENT AND GWI

A possible source for immune disturbances and chronic infections found in GWI patients is the multiple vaccines that were administered close together around the time of deployment to the Gulf War. Unwin et al. [8] and Cherry et al. [56] found a strong association between GWI and the multiple vaccines that were administered to British Gulf War veterans. There is an association of the anthrax vaccine and GWI symptoms in British and Canadian veterans [2,57]. Steele [4] found a three-fold increased incidence of GWI in *nondeployed* veterans from Kansas who had been vaccinated in preparation for deployment, compared to non-deployed, non-vaccinated veterans. And Mahan et al. [58] found a two-fold increased incidence of GWI symptoms in U.S. veterans who recalled they had received anthrax vaccinations at the time of the Gulf War, versus those who thought they had not. These studies associate GWI with the multiple vaccines given during deployment, and they may explain the high prevalence rates of chronic infections in GWI patients [59,60].

Signs and symptoms similar if not identical to GWI have been found in personnel who recently received the anthrax vaccine [59,60]. On some military bases this has resulted in chronic illnesses in as many as 7-10% of personnel receiving the vaccine [60]. The chronic signs and symptoms associated with anthrax vaccination are similar, if not identical, to those found in GWI patients, suggesting that at least some of the chronic illnesses suffered by veterans of the Gulf War were caused by military vaccines [59,60]. Undetectable microorganism contaminants in vaccines could have resulted in illness, and may have been more likely to do so in those with compromised immune systems. This could include individuals with DU or chemical exposures, or personnel who received multiple vaccines in a short period of time. Since contamination with mycoplasmas has been found in commercial vaccines [61], the vaccines used in the Gulf War should be considered as a possible source of the chronic infections found in GWI. Some of these vaccines, such as the filtered, cold-stored anthrax vaccine, are prime suspects in GWI, because they could be easily contaminated with mycoplasmal infections and other microorganisms [62]. Minor contamination of military vaccines may not be a health problem under ordinary circumstances, but with the stress of deployment and the administration of multiple vaccines within a few days, personnel could have been immune suppressed and more susceptible to minor contaminants in some vaccine lots.

INADEQUATE RESPONSES OF THE DOD AND DVA TO GWI

I feel strongly that the response to the GWI problem has been inadequate, and it continues to be inadequate [14,15]. This response started with denial that there were illnesses associated with service in the Gulf War, it has continued with denial that what we (biological exposures) and others (chemical exposures) have found in GWI patients are important in the diagnosis and treatment of GWI, and it continues today with the denial that military vaccines could be a major source of GWI. For example, in response to our publications and formal lectures at the DoD (1994 and 1996) and DVA (1995), the DoD stated in letters to various members of Congress and to the press that *M. fermentans* infections are commonly found, not dangerous and not even a human pathogen, and our results have not been duplicated by other laboratories. These statements were completely false. The Uniformed Services University of the Health Sciences taught its medical students for years that this type of infection is very dangerous and can progress to system-wide organ failure and death [63]. In addition, the Armed Forces Institute of Pathology (AFIP) has been publishing for years that this type of infection can result in death in nonhuman primates [64] and in man [65]. The AFIP has also suggested treating patients with this type of infection with doxycycline [66], which is one of the antibiotics that we have recommended [53-55]. Interestingly, U.S. Army pathologist Dr. Shih-Ching Lo holds the U. S. Patent on *M. fermentans* ("Pathogenic Mycoplasma"[67]), and this may be the real reason that in the response to our work on *M. fermentans* infections in GWI, guidelines were issued that GWI patients should *not* be treated with antibiotics like doxycycline, even though in a significant number of patients it had been shown to be beneficial. The DoD and DVA have also stated that we have not cooperated with them or the CDC in studying this problem. This is also not true. We have done everything possible to cooperate with the DoD, DVA and CDC on this problem, and we even published a letter in the Washington Post indicating that we have done everything possible to cooperate with government agencies on GWI issues, including formally inviting DoD and DVA scientists and physicians to our Institute for Molecular Medicine to learn our diagnostic procedures. We have been and are fully prepared to share our data and procedures with government scientists and physicians. The DVA has responded with the establishment of VA Cooperative Clinical Study Program #475, but many Gulf War Referral Centers at VA Medical Centers continue to be hostile to the non-psychiatric treatment of GWI. The DoD and DVA continue to deny that family members of GWI patients can contract illness or that there could be an infectious basis to GWI.

DOD/DVA SCORECARD ON GWI FROM PREVIOUS TESTIMONY

In my testimony to the U. S. Congress in 1998 [14,18], some suggestions were made to correct for the apparent lack of appropriate response to GWI and the chronic infections found in GWI patients. It seems appropriate to go back and revisit these suggestions to see if any of these were taken seriously or corrected independently (*Updates in italics*). Note that similar comments were presented today to another House of Representatives subcommittee [15].

1. We must stop correct the notion that immediate family members cannot contract illnesses from veterans with GWI. Denial that this has occurred has only angered veterans and their families and created a serious public health problem,

including spread of illnesses to the civilian population and contamination of our blood supply. *This item has still not been taken seriously by the DoD. The DVA has initiated a study to see if veterans' family members have increased illnesses; however, they have decided to group GWI patients together independent of the possible origins of their illness. Since veterans who have their illness primarily due to chemical or environmental exposures that are not transmittable will be grouped with veterans who have transmittable chronic infections, it is unlikely that studying family members of both groups together will yield significant data. Whether intentional or not, this DVA study has apparently been designed to fail. Potential problems with the nation's blood and organ tissue supply due to contamination by chronic infections in GWI and CFS patients are considered significant [68,69], but no U.S. government agency has apparently taken this seriously. In a recent study in Europe approximately 6.4% of patients with CFS reported that their signs and symptoms were linked to blood transfusions [70].*

2. The diagnosis system used by the DoD and DVA to determine illness diagnosis must be overhauled and replaced by the ICD-10 system. The categories in the older ICD-9 system have not kept pace with new medical discoveries in the diagnosis and treatment of chronic illnesses. This has resulted in large numbers of patients from the Gulf War with 'undiagnosed' illnesses who cannot obtain treatment or benefits for their medical conditions. *The DoD and DVA should be using the ICD-10 diagnosis system where a category exists for chronic fatiguing illnesses (G93.3). Apparently little progress in this area has been made by the DoD or DVA.*

3. Denying claims and benefits by assigning partial disabilities due to PTSD should not be continued in patients that have organic (medical) causes for their illnesses. For example, patients with chronic infections that can take up to or over a year to successfully treat should be allowed benefits. *The DVA has recently shown some flexibility in this area. For example, Gulf War veterans with ALS will receive disability without having to prove that their disease was deployment-related. Similarly, GWI patients with M. fermentans infections (and also their symptomatic family members with the same infection) should receive disabilities. Thus far there has been no attempt to extend disability to GWI-associated infectious diseases. Instead of waiting for years or decades for the research to catch up to the problem, the DoD and DVA should simply accept that many of the chronic illnesses found in Gulf War veterans are deployment related and deserving of treatment and compensation. Progress has been made in the acceptance that CFS and FMS in GWI veterans will be considered for deployment-related disabilities.*

4. Research efforts must be increased in the area of chronic illnesses. Unfortunately, federal funding for such illnesses is often rebudgeted or funds removed. For example, Dr. William Reeves of the CDC in Atlanta sought protection under the 'Federal Whistle Blower's Act' after he exposed misappropriation of funds allocated for CFS at the CDC. It is estimated that over 3% of the adult U.S. population suffers from chronic fatiguing illnesses similar to GWI, yet there are few federal dollars available for research on the diagnosis and treatment of these chronic illnesses, even though each year Congress allocates such funds. *There has been some progress at NIH on this issue, but in general little has changed. The DoD and DVA have spent most of the hundreds of millions of dollars allocated for GWI research on psychiatric research. Most of these funds have been spent on studies that have had negligible effect on veterans' health. More effort must be put into chemical, biological and/or radiological causes for GWI rather than more psychiatric studies.*

5. Past and present senior DoD and DVA administrative personnel must be held accountable for the utter mismanagement of the entire GWI problem. This has been especially apparent in the continuing denial that chronic infections could play a role in GWI and the denial that immediate family members could have contracted their illnesses from veterans with GWI. This has resulted in sick spouses and children being turned away from DoD and DVA facilities without diagnoses or treatments. The responsibility for these civilians must ultimately be borne by the DoD and DVA. I believe that it is now accountability time. The files must be opened so the American public has a better idea how many veterans and civilians have died from illness associated with service in the Gulf War and how many have become sick because of an inadequate response to this health crisis. *Unfortunately, little or no progress has been made on these items for the last decade or more, and the situation has not changed significantly since my last testimony to the U.S. House of Representatives [14] in 1998. Similarly, our earlier testimony to House Subcommittees was apparently disregarded as well [71,72].*

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Under penalty of perjury, I swear that the statements above are true and correct to the best of my knowledge, information and belief.

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