



## VA research on GULF WAR VETERANS

*VA researchers are learning about conditions affecting Gulf War Veterans and identifying the best ways to diagnose and treat them.*

### ABOUT GULF WAR VETERANS

- Nearly 700,000 men and women served in the Persian Gulf during Operation Desert Shield and Operation Desert Storm in the early 1990s.
- A prominent condition affecting Gulf War Veterans is a cluster of medically unexplained chronic symptoms that can include fatigue, headaches, joint pain, indigestion, insomnia, dizziness, respiratory disorders, skin problems, and memory impairment. These illnesses are referred to as chronic multisymptom illness or Gulf War illness (GWI).
- According to a 2020 DOD report, GWI is estimated to affect 175,000 to 250,000 Veterans who were deployed to the Gulf War theater from 1990 to 1991. Gulf War-era Veterans who were deployed continue to report poorer health than Veterans who served during the same period but were not deployed, 20 years after the war.
- VA has determined that nine infectious diseases are related to military service in Southwest Asia during the first Gulf War and Afghanistan: malaria, brucellosis, campylobacter jejuni, Coxiella burnetii (Q fever), mycobacterium tuberculosis, nontyphoid salmonella, shigella, visceral leishmaniasis, and West Nile virus.

- VA also presumes certain chronic, unexplained symptoms to be connected to Gulf War service, such as chronic fatigue syndrome, fibromyalgia, functional gastrointestinal disorders, and other undiagnosed illnesses.

### VA RESEARCH ON GULF WAR VETERANS: OVERVIEW

- VA research efforts are guided by a [strategic plan](#) for Gulf War research developed with input from leading scientists, researchers, physicians, and Veterans themselves.
- VA investigators are conducting research in many areas important to Gulf War Veterans. These include studies on pain, autoimmune diseases, neurodegenerative diseases, sleep disorders, gastrointestinal disorders, respiratory problems, and other chronic diseases.
- The [Research Advisory Committee on Gulf War Veterans' Illnesses](#) makes recommendations to the Secretary of Veterans Affairs on proposed research and strategies related to understanding and treating the health consequences of military service in the Southwest Asia theater of operations during the 1990–1991 Gulf War.

- VA's [Longitudinal Health Study of Gulf War Era Veterans](#) is one of the largest studies to examine the health of Veterans who served during the Gulf War. The study aims to compare changes in health over time for deployed and non-deployed Veterans from the Gulf War era. Approximately 30,000 Veterans took part in the original study.

- The VA Gulf War Era Cohort and Biorepository was established to learn more about health conditions affecting Veterans who served between 1990 and 1991. Members of the GWI cohort have completed a health survey and provided blood samples for DNA analysis.

### SELECTED MILESTONES AND MAJOR EVENTS

- 1995** – [Initiated](#) the Longitudinal Health Study of Gulf War-era Veterans
- 2012** – Developed the first Gulf War research [strategic plan](#)
- 2016** – Published follow-up [results](#) for the second wave of the Longitudinal Health Study
- 2017** – [Found](#) evidence that Veterans with GWI might have greater mitochondrial DNA damage than Veterans without GWI

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**2020** – [Held](#) a Joint VA/DOD GWI state of the science conference to coincide with the 30-year anniversary of Operation Desert Shield

**2021** – [Found](#) that toxic exposures during the Gulf War may cause changes in the hippocampus, contributing to memory problems

**RECENT STUDIES: SELECTED HIGHLIGHTS**

• **Veterans who deployed during the Gulf War continue to report an increase in chronic disease**, found a follow-up to the Longitudinal Health Study of Gulf War Era Veterans. The study included 6,300 Veterans who participated in the original 2000 study and multiple follow-ups. Not only were these Veterans more likely to report health problems than their non-deployed peers, but they also reported problems earlier in life. ([Journal of Occupational and Environmental Medicine](#), Oct. 1, 2021)

• **Women Gulf War Veterans exposed to toxic substances were more likely to have GWI** than women Veterans without toxic exposure, found a study by VA Boston researchers and colleagues. Self-reported exposure to pesticides, oil well fires, and pyridostigmine bromide pills (an anti-nerve gas medication) during deployment increased the likelihood of meeting GWI criteria. Women exposed to particular toxic substances may benefit from more

targeted treatment strategies based on how they were exposed. ([Life Sciences](#), Sept. 1, 2021)

• **Pain places greater stress on the thinking of Gulf War Veterans with chronic pain**, according to a William S. Middleton Memorial Veterans Hospital study. Using MRI, researchers found that Gulf War Veterans with chronic pain required more neural resources to sustain cognitive performance during pain stimuli, compared with healthy controls. The findings suggest these Veterans may have abnormal pain processing. ([Life Sciences](#), Aug. 15, 2021)

• **Psychotherapy for insomnia improves GWI symptoms**, found a study by San Francisco VA researchers. Cognitive behavioral therapy for insomnia was administered to Veterans with GWI by telephone. Six months after treatment, CBT produced significant improvements in insomnia symptom severity and sleep quality, compared to a control group. ([Life Sciences](#), Aug. 15, 2021)

• **A survey of Gulf War Veterans found evidence of sustained, multisystem illness decades after deployment**. Researchers surveyed more than 1,000 Veterans of the Gulf War era for GWI symptoms. Of those, 84% met the CDC definition of GWI. Veterans who were deployed had higher odds of having symptoms related to GWI compared to non-deployed Veterans. Symptom differences between deployed and non-

deployed Veterans have diminished since initial reports. ([Life Science](#), Aug. 1, 2021)

• **Toxic exposure during the Gulf War may alter gene expression in the hippocampus**, which could cause memory problems, found a VA New Jersey study. Exposure to two insecticides and an anti-sarin prophylactic—simulating common Gulf War exposures—in mice resulted in inflammation and other changes in gene expression in the hippocampus. Genes involved in neuron health were downregulated, suggesting the toxic exposure could cause chronic neurodegeneration. ([Life Sciences](#), July 20, 2021)

• **An ingredient in Concord grape juice may improve cognitive function in Veterans with GWI**, found a study by VA New Jersey researchers and colleagues. Concord grape juice contains high concentrations of polyphenols, molecules that have an antioxidant effect on the body. Researchers found high concentrations of several polyphenols in the blood of some study participants after they drank grape juice. They observed strong links between changes in cognitive function and changes in levels of two polyphenols. ([Life Sciences](#), July 5, 2021)

**For more information on VA studies on Gulf War Veterans and other key topics relating to Veterans’ health, please visit [www.research.va.gov/topics](http://www.research.va.gov/topics)**

*Gulf War-era Veterans who were deployed continue to report poorer health than Veterans who served during the same period but were not deployed.*

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