GWIRP BACKGROUND AND OVERVIEW

Population-based studies indicate that approximately 25% to 32% of the men and women who served in the 1990-1991 Persian Gulf War (GW) continue to experience Gulf War Illness (GWI), characterized by symptoms including chronic headache, widespread pain, cognitive difficulties, unexplained fatigue, gastrointestinal problems, respiratory symptoms, and other abnormalities that are not explained by traditional medical diagnoses or standard laboratory tests. Department of Defense (DoD)-funded GWI research began in 1994 with the establishment of the GW Veterans’ Illnesses Research Program (GWVIRP) to study the health effects of Service members deployed in the 1990–1991 Persian GW. From fiscal year 1994 (FY94) to FY05, the GWVIRP was managed by the USAMRMC Military Operational Medicine Research Program (MOMRP). Research pertaining to GWI also was funded intermittently through the CDMRP’s Peer Reviewed Medical Research Program, which supports selected military health-related research topics on an annual basis. The MOMRP shared management responsibility for the GWVIRP with the CDMRP in FY06, with separate $5 million (M) Congressional appropriations. Although the GWVIRP was not funded in FY07, the program received a $10M appropriation in FY08; was renamed the GWI Research Program (GWIRP); and was designated to be managed fully by the CDMRP. Congressional directives for the GWIRP in FY08, which the program continues to follow today, included (1) studies of treatments for the complex of symptoms known as GWI, (2) no studies based on psychiatric illness and psychological stress as the central cause, and (3) competitive selection and peer review to identify research with the highest technical merit and military value.

In 2010, a National Academy of Sciences, Health and Medicine Division (Formerly Institute of Medicine) report, Gulf War and Health, Vol. 8, Update of Health Effects of Serving in the Gulf War, agreed with the myriad of studies published in the medical literature that GWI is a multisymptom illness that is a diagnostic entity and is associated with
Service in the 1991 GW, and that its symptoms “cannot be ascribed to any known psychological disorder,” but instead, “it is likely that Gulf War illness results from an interplay of genetic and environmental factors.” The report called for “a renewed research effort with substantial commitment to well-organized efforts to better identify and treat multisymptom illness in Gulf War veterans . . . to alleviate their suffering as rapidly and completely as possible.” The report’s preface emphasized the need “to speed the development of effective treatments, cures, and, it is hoped, preventions.” Most significantly, the preface stated the encouraging and prescriptive views of the IOM committee with regards to future research direction: “We believe that, through a concerted national effort and rigorous scientific input, answers can likely be found.”

With each Congressional appropriation, the GWIRP has been funding research to fill gaps and address program priorities. By applying advances in scientific knowledge in the annual Vision Setting meetings, developing topics of special interest, and releasing focused funding opportunity announcements, the GWIRP maintains a culture of collaboration, knowledge growth, accountability, vision aim, and mission focus. The vision and mission of the GWIRP are as follows:

**VISION:** Improved health and lives of Veterans who have Gulf War Illness

**MISSION:** Fund innovative Gulf War Illness research to identify effective treatments and accelerate their clinical application, improve definition and diagnosis, and better understand pathobiology and symptoms

**GWIRP INVESTMENT HISTORY**

The program has built a broad research portfolio of 155 awards funded by Congressional appropriations received from FY06 to FY16. An additional 13 awards are anticipated in FY17. The GWIRP has funded research within the VA, DoD, and both public and private organizations such as universities, colleges, hospitals, laboratories, and companies. The figure to the right summarizes the research funded by the program. Award data and abstracts of funded research applications can be viewed on the CDMRP website (http://cdmrp.army.mil).

**HISTORICAL FUNDING APPROACH**

The GWIRP’s strategy has evolved over the history of the program. The figure to the right illustrates the funding priorities since the program’s inception.

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*New funding opportunities developed to fill gaps and address program priorities*

<table>
<thead>
<tr>
<th>FY06-11</th>
<th>FY12-14</th>
<th>FY15-16</th>
<th>FY17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment Basic Research</td>
<td>Treatment Preclinical Research Detection Consortia</td>
<td>Treatment Clinical Translation Focused Topics</td>
<td>Treatment Quality of Life Research Resources Focused Topics</td>
</tr>
<tr>
<td>Disease Models Detection</td>
<td>Consortium</td>
<td>New Investigators</td>
<td></td>
</tr>
<tr>
<td>Gap/Priority</td>
<td></td>
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</tbody>
</table>

- Clinical Trial
- Innovative Treatment Evaluation
- Investigator-Initiated Research

- Clinical Trial
- Innovative Treatment Evaluation
- Investigator-Initiated Research

- Clinical Trial
- Treatment Evaluation
- Clinical Partnership
- Investigator-Initiated Focused Research
- Epidemiology
- New Investigator

- Clinical Consortium
- Qualitative Research
- Biorepository
- Investigator-Initiated Focused Research

- 51 awards
- 48 awards
- 56 awards
- 13 awards
In the early years of the program, the GWIRP focused funding on basic research under Investigator-Initiated Research Award mechanisms, as well as pilot clinical trials of symptoms-based treatments. These mechanisms have been offered in nearly every year that the program received an appropriation; however, in certain FYs, the program also emphasized specific GWI community needs.

In FY12, the GWIRP funded the development of diagnostic and treatment discovery research consortia to build strong partnerships and collaborations in the scientific community and to more effectively advance GWI treatment development. One consortium studies brain-immune interactions to understand the central roles of neurotoxic and neuroinflammatory reactions as underlying causes of the health problems in GW Veterans. The other consortium is focused on a “systems biology” approach consisting of combining basic research data with clinical results to identify biomarkers and possible treatments for GW Veterans. These multi-institutional organizations engage the scientific community by addressing overarching issues in GWI research, combining and sharing resources, and fostering real-time communication of research results.

In FY15 and FY16, other innovative funding opportunities were offered, including a New Investigator Award to encourage the participation of investigators outside of the GWI community who might bring new or unique approaches to problems in GWI research; an Expansion Award to continue previously funded high-impact research along the pipeline toward clinical application; a Gulf War Illness Epidemiology Research Award to assess symptomatology and comorbidities over time; a Clinical Partnership Award to support a two-way continuum between clinicians and laboratory scientists and accelerate the movement of promising research hypotheses into clinical practice; and a Qualitative Research Award for the purpose of generating data to inform new and GWI-specific clinical practice guidelines, with consideration of implementation strategies, as well as educational tools for ill GW Veterans and their families. Each of these awards adds to the growing portfolio of GWIRP-funded research designed to help our ill GW Veterans.

In FY17, the GWIRP took a bold step by offering two large funding mechanisms that supported both clinical research and infrastructure. A Clinical Consortium Award was offered to support a group of institutions, coordinated through an Operations Center that will conceive, design, develop, and conduct collaborative Phase I and II clinical trials of promising therapeutic agents for the management or treatment of GWI. The treatments being tested will have been identified by the previously established and funded diagnostic and treatment discovery consortia. A Biorepository Resource Network Award was offered to support development and maintenance of a GWI biorepository through a collaborative network that will collect, process, annotate, store, and distribute clinical specimens and clinical research data. These mechanisms will build on the achievements of the previously established consortia to further promote collaboration and resource sharing.

**GWIRP RESEARCH ACCOMPLISHMENTS**

The GWIRP portfolio consists of clinical trials and mechanistic research, as well as studies addressing chemical exposures and GWI symptomatology. Significant treatment outcomes, objective findings, and exploratory avenues resulting from GWIRP-funded research are shown below. Additional outcomes can be gauged in part by the innovative collaborations, resulting follow-on VA grants, publications, clinical trials, and other researcher resources reported by awardees.

**Treatment and Alternative Therapy Successes**

- Coenzyme Q10 (CoQ10) – Found to reduce pain, fatigue, and cognitive symptoms in Veterans with GWI. The VA is currently funding a Phase III study using ubiquinol, the reduced form of CoQ10.
- Carnosine – Found to reduce cognitive symptoms in Veterans with GWI (but not to impact their pain, fatigue, or other outcomes).
- Acupuncture – Shown to improve GWI symptoms, including pain, fatigue, sleep quality, and cognitive symptoms.
- Nasal irrigation (saline or Xylitol) – Early results show improvement of sinus and fatigue symptoms.
- Mind-body bridging – Shown to be an effective intervention in the management of disturbed sleep.

The GWIRP portfolio currently has numerous pilot clinical trials of investigative treatments (see http://cdmrp.army.mil/gwirp/resources/cinterventions).

**Genetics and Genomics**

Various research studies that are either completed or underway have begun to establish associations between GWI and the following genetic features: Paraoxonase activity and genotype; abnormalities in mitochondrial and nuclear genetics; varieties of human leukocyte antigen genes; genome instability (reflected as elevated frequencies of non-clonal chromosome aberrations); persistently elevated somatic mutations; MicroRNA regulation; and patterns of gene-environment interaction.

**Molecular and Cellular Mechanisms**

Objective evidence from various GWIRP-supported studies using clinical samples or preclinical models of GWI have demonstrated that the following dysfunctions are associated with GWI: mitochondrial dysfunction; neuro/immune system dysfunction; and inflammation.
dysregulation; autonomic imbalance; altered brain structure and function; microvascular injury; evidence of small fiber nerve polyneuropathy; gut microflora dysbiosis; microtubule dysfunction; Na\(^+\) and K\(^+\) channel dysfunctions; alterations in axonal transport; altered lipid homeostasis; altered calcium homeostasis; toll-like receptor priming; tau pathology; epigenetic alterations; DNA breakage; and single nucleotide polymorphisms.

**Systems Biology**

The GWIRP has additionally supported research investigating connections between GWI and fatigue, chronic pain, small-fiber polyneuropathy, sleep disorders, chronic rhinosinusitis, chronic bronchiolitis, gut biome alterations, headache, and memory disorders.

**Animal Models**

Development of the following animal models has been supported by the GWIRP: low-dose sarin nerve agent exposure in mice; rats dermally exposed to GW pesticides DEET and permethrin (PER); pyridostigmine bromide (PB) nerve agent protectant and PER in mice; diisopropyl fluorophosphate (DFP, a surrogate for sarin) exposure preceded by corticosterone in mice and rats; repeated exposure in mice and/or rats to another GW pesticide, chlorpyrifos (CPF); DEET, PER, or CPF, all with or without PB.

**GWI Cohorts**

The GWIRP has supported assessments of the following established cohorts: the Ft. Devens Cohort, Pest Control Personnel from the GW, Navy Seabee Cohort, Kansas Cohort, Haley Cohort, GWI Consortium (GWIC) Cohort, and a GWI Women’s Cohort. GWIRP-supported research has also investigated smaller, study-specific cohorts, as well as extensive clinical research under the multi-institutional consortia, including the GWIC and Boston Biorepository, Recruitment, and Integrative Network (BBRAIN) at Boston University, and the Understanding GWI and GWI Clinical Trials and Interventions Consortia at Nova Southeastern University.

**Additional Observations**

Research on animal models of GW exposure support the occurrence of multi-system health complaints, including both persistent and delayed effects. Research suggests the trajectory of symptoms appears to be different for women than for men. Preliminary results also indicate that mild traumatic brain injury, both during deployment and post-deployment, may be important in the chronicity of health symptoms in GW Veterans.

**GWIRP-INITIATED COMMUNITY RESOURCES**

The GWIRP published The Gulf War Illness Landscape, a broad overview of what is currently known about topics related to the mission of the program. This document, which is publicly available at http://cdmrp.army.mil/gwirp/pdfs/GWIRP_Landscape.pdf, also describes research gaps and GWI community needs. The intention is to provide the GWI community with concise information about the state of GWI research. Prospective applicants for program funding are strongly encouraged to read the GWI Landscape before preparing their applications.

The GWIRP compiled a list of various research and Veteran resources that are products of GWIRP funding, including published biomarkers, molecular profiles, exposure-relevant animal models, established GW Veteran cohorts, completed and ongoing evaluations of clinical interventions, and clinical sample biorepositories. This publicly available list, which is updated as needed, describes the resources and gives a direct point of contact for more information, potential resource or data sharing, and collaboration. This is intended to facilitate collaborations, speed GWI research, and serve as an information hub for the GWI community. The resources list can be accessed from the GWIRP webpage (http://cdmrp.army.mil/gwirp/resources/gwirpresources.shtml).

Successful GW Veteran subject recruitment for research requires adequate and realistic planning. In order for GWIRP-funded investigators to establish an effective and sustainable outreach and recruitment plan, the GWIRP, in collaboration with a GW Veteran who served in the 1990-1991 Persian GW, developed a document titled, General Guidance for Gulf War Veteran Outreach and Recruitment. This guidance is posted on the GWIRP webpage (http://cdmrp.army.mil/gwirp/pdfs/General%20_Courcelle%20General%20Guidance%20for%20Gulf%20War%20Veteran%20Outreach%20and%20Recruitment.pdf).

**RESEARCH AND FUNDING ENVIRONMENT**

In FY08, the GWIRP was fully assigned to the CDMRP in response to Congressional directives. Those directives called for a divergence in focus from past VA, DoD, and Department of Health and Human Services (HHS) efforts and centered around studies of treatments for the complex of symptoms known as GWI, prohibited research studies based on psychiatric illness and psychological stress as the central cause, and recommended competitive selection and peer review to identify research with the highest technical merit and military value. The overall goal of the GWIRP is to fund scientifically meritorious research in accordance with the original and any new directives received from Congress. The GWIRP is conducted according to the two-tier review model recommended
by the NASEM which has received high praise from the scientific community, advocacy groups, and Congress. Veterans with GWI participate as full members on all GWIRP peer review panels and the Programmatic Panel to enrich the scientific review and research focus with personal perspective, passion, and a sense of urgency. Medical technologies and treatments developed as part of the GWIRP can be leveraged to support healthy and fit military forces and their families.

To identify significant research gaps in the GWI research field, it is important to consider which research areas are already actively funded. GWI research funding opportunities for scientists and clinicians are made possible through support from the Federal Government. The VA, DoD, and HHS have funded over 500 distinct projects related to health problems affecting GW Veterans from FY92 through FY16. The CDMRP GWIRP is funded through the DoD, via annual Congressional legislation known as the Defense Appropriations Act. Funding for the GWIRP does not appear as part of the DoD core funding in the President’s budget; instead, Congress assesses the needs of GW Veterans and other consumer advocates and adds funding to the DoD budget that is designated specifically to meet those needs on an annual basis. Unlike other federally funded agencies that receive funding in the President’s budget every FY, each CDMRP program develops an investment strategy based on a single yearly Congressional appropriation. Full project funding is obligated at the start from the single FY appropriation, ensuring multiyear research projects are not at funding risk. This method is in contrast that of other agencies, including the VA and HHS, which fund projects in budget years.

The scope of the federal research portfolio is broad, from small pilot studies to large-scale epidemiology studies involving large cohorts. Each year the VA, with input from the GWIRP, prepares an Annual Summary to Congress on federally sponsored research on GW Veterans’ Illnesses. Funding trends, cumulative numbers of funded projects, and new research projects and initiatives can be found in these reports (https://www.research.va.gov/pubs/pubs_individual.cfm?Category=Gulf War Reports).

Federally sponsored GWI research funding in millions of dollars is summarized in the table below.

<table>
<thead>
<tr>
<th>Fiscal Year (FY)</th>
<th>VA Merit Review</th>
<th>VA Contract</th>
<th>GWIRP</th>
<th>HHS</th>
<th>Total FY06-FY17</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>$13.0 M</td>
<td>-</td>
<td>$4.11 M</td>
<td>$0.5 M</td>
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<tr>
<td>2007</td>
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<td>$15.00 M</td>
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<td>2008</td>
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<td>$15.00 M</td>
<td>$8.48 M</td>
<td>$0.5 M</td>
<td>$30.91 M</td>
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<tr>
<td>2009</td>
<td>$ 9.63 M</td>
<td>$6.97 M</td>
<td>$7.14 M</td>
<td>-</td>
<td>$23.74 M</td>
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<tr>
<td>2010</td>
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<td>$2.29 M</td>
<td>$7.07 M</td>
<td>-</td>
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<tr>
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<td>$ 5.54 M</td>
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<td>$5.07 M</td>
<td>-</td>
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<tr>
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<td>$18.99 M</td>
<td>-</td>
<td>$31.33 M</td>
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<tr>
<td>2017</td>
<td>$13.55 M</td>
<td>-</td>
<td>$17.95 M*</td>
<td>-</td>
<td>$31.55 M</td>
</tr>
<tr>
<td><strong>Total 2006-2017</strong></td>
<td><strong>$115.64 M</strong></td>
<td><strong>$39.29 M</strong></td>
<td><strong>$132.83 M</strong></td>
<td><strong>$1.50 M</strong></td>
<td><strong>$289.26 M</strong></td>
</tr>
</tbody>
</table>

*FY17 funding estimated

Program Announcements and Requests for Applications have been issued by the DoD GWIRP and the VA, respectively. Each agency reviews their portfolios of GW research on a regular basis in order to determine research gaps and expand successful research topic areas. The Federal GW research portfolio is increasingly focused on identifying potential new treatments for ill GW Veterans and identifying new diagnostic markers of disease. The GWIRP and VA program managers meet regularly to share information regarding funded GW research projects, and a goal of the GWIRP is to coordinate activities in order to maximize combined program impact. Other examples of DoD GWIRP and VA coordination include VA GW Veterans’ Illnesses Program Manager (PM) attendance at the annual GWIRP Programmatic Review and Vision Setting meetings; contribution of GWIRP funding data and project information to the VA GW Veterans’ Illnesses Report to Congress; GWIRP PM attendance at the VA Research Advisory
Committee on Gulf War Veterans’ Illnesses (RACGWVI) meetings and current and past GWIRP Programmatic Panel members serving on the RACGWVI; GWIRP PM and consumer reviewer participation on VA-convened working groups and in VA field-based meetings; and electronic coordination through the Federal RePORTER website.

STRATEGIC DIRECTION

A quarter of a century after the ceasefire marking the end of hostilities of the 1991 GW, military personnel have suffered from lasting repercussions of chronic GWI that, in many cases, remain poorly managed. The development of targeted treatments has fallen short of clearly understanding the pathways tied to the disease. However, there have been significant advances in identification of potential mechanisms of action through strong epidemiologic, clinical, and underlying biology investigations. The GWIRP’s near-term strategic direction remains focused on prioritizing translational research facilitating expeditious testing of treatments for Veterans with GWI.

The GWIRP seeks to invest in the following priorities/strategic goals. The GWIRP enables investigators to propose their best research ideas that are aligned with these priorities/goals.

1. Direct resources toward accelerating identification of effective GWI treatments and their clinical translation.
   a. Support treatment approaches derived from the current understanding of GWI mechanistic pathways (target-based).
   b. Support investigation of viable treatments based on the current understanding of symptoms of GWI (symptoms-based).
   c. Encourage trial designs that target subgroups of Veterans sharing the same symptoms.
   d. Support research and research protocols to generate resources to facilitate information sharing and collaboration between GWI researchers.
   e. Support research and research protocols to improve education of and outreach to GWI clinicians, patients, and their caregivers.
   f. Support research protocols that enhance the recruitment of ill (i.e., GWI) and healthy 1991 GW Veteran study subjects.

2. Inform treatment development by directing resources toward understanding the pathobiology underlying GWI symptoms.
   a. Support investigation into biological and molecular pathways underlying GWI symptoms, including validation/reproducibility studies.
   i. Molecular and cellular signatures (e.g., biomarkers) underlying symptom clusters via genomic, proteomic, metabolic, or epigenetic technologies.

As clinical and model system research expand our knowledge into molecular mechanisms, genetics/genomics, and systems biology underlying gwi, the gwirp enables researchers to build on these research findings and pursue novel approaches to therapeutic discovery and development.
ii. Dysregulation of, or abnormal crosstalk between, human body organ systems (e.g., neuroinflammation, autonomic dysfunction, etc.). Particular emphasis is placed on the systems listed below. In these investigations, examination of parameters at both baseline and after challenge (stress, exercise, immune, etc.) and attention to long-term and latent effects of toxic exposures to closely represent the current status of GWI patients are strongly encouraged.

1. Nervous system (central, peripheral, and/or neuromuscular)
2. Immune system
3. Endocrine, exocrine, and/or excretory systems, with special interest in kidney and liver (including Cytochrome P450 abnormalities)

b. Support investigation into the relationship and impact of environmental factors on GWI symptoms.
c. Support the use of models to characterize the multi-symptom nature of GWI.

3. Inform treatment development by directing resources toward improving definition and diagnosis.
   a. Support collaborative research efforts, including outside the GWIRP, to improve or refine GWI’s case definition.
b. Support investigations of all effects of GWI, including non-neurological effects.
   i. Dermatological, gastrointestinal, respiratory, sinus, or sleep abnormalities as a component of GWI
   ii. Entanglement of symptom effects, such as non-refreshing sleep, with other GWI symptoms
c. Support for investigations into genetic factors that predispose individuals to GWI, impact the prognosis of GWI, or contribute to future gene-exposure vulnerabilities.
d. Support the discovery and validation/reproducibility of objective GWI biomarkers.
   i. Biomarkers of illness, including severity and/or stages of GWI
   ii. Biomarkers of exposure and exposure effects
   iii. Support biomarker research of animal models of GW exposure, GW Veterans, and correlation of the two
e. Through coordination with, and being informed by, the VA epidemiology research portfolio, support for epidemiology of comorbidities and mortality, including gender and ethnic differences, and the potential for increased incidence/prevalence of comorbid neurological conditions, cancers, and downstream long-term impacts on other organs and systems.

INVESTMENT STRATEGY

This investment strategy outlines the GWIRP’s approach to soliciting the type of research that will facilitate accomplishment of its strategic goals in the short term. The program sets out to invest in distinct steps along the GWI research pipeline. In parallel, the program will invest in the development of widely accessible research and clinical resources. This investment strategy will be re-evaluated and updated as necessary during the program’s Vision Setting meetings.

1. Investigator-Initiated Focused Research
   a. Tier 1: Discovery and proof of concept; preliminary data is not required.
b. Tier 2: Validation, further development and preclinical translation; preliminary data in the GWI field is required; can be used for increasing power of previous observations.

2. Clinical Trials and Clinical Consortium Initiative
   a. Moves preclinical candidates into pilot clinical trials.
b. Supports symptom- or target-based treatments.
c. Leverages existing GWI consortia organizations and collaborations.

3. Qualitative Research
   a. Aims to fill gaps in knowledge of GWI treatment and care.
b. Has dual tracks for materials aimed at clinicians and for GWI patients/their caregivers.
c. Allows funding projects, not only to improve care and treatment, but also to reduce barriers to clinician, patient, and/or caregiver knowledge and communication.
4. Biorepository Resource Network
   a. Intended to serve as a long-term resource for the GWI research community.
   b. Leverages existing repository.
   c. Intended to be a repository for data, as well as samples.
   d. Establishes common data elements and sample standardization, which are critical as GWI research expands and advances.

MEASURING PROGRESS

To maintain transparency of GWIRP-supported outcomes, the GWIRP will publish the following on its website: updates to the Gulf War Illness Landscape document, the Gulf War Illness Researcher Resources document, the Gulf War Illness Research Program booklet, and updates to the General Guidance for Gulf War Veteran Outreach and Recruitment document on an as needed basis.

The GWIRP will measure anticipated short-term outcomes based on successful investments in areas that are important to the program strategy. Longer term-outcomes will be evaluated based on contributions to the GWI treatment-development scientific community and by following research linked to GWIRP funded projects.

NEAR-TERM OUTCOMES (1-3 YEARS)

1. Investments in the GWI treatment development pipeline
   a. Support for pre-clinical GWI treatment development research
   b. Support for Phase I/II clinical trials of GWI treatments, including mechanistic (target-based) and symptomatic relief, with consideration of a best practices approach to recruitment and retention by GWIRP award recipients

2. Investment in research leading to improved detection and diagnosis in the clinic
   a. Support for tests/tools to objectively measure GWI and GWI symptoms
   b. Support for validation of objective GWI biomarkers
   c. Support for research that can inform new and GWI-specific clinical practice guidelines, with consideration of implementation strategies, as well as educational tools for Veterans suffering from GWI or their caregivers

3. Investment in research defining the pathobiology underlying GWI symptoms
   a. Support for the use and enhancement of models to characterize the multi-symptom nature of GWI, including etiologic and pathobiologic investigations
   b. Support for further discovery and clinical validation of the biological and molecular pathways underlying GWI symptoms, including genetic predisposition/susceptibility studies
   c. Support for studies of GWI subpopulations, including those based on gender, race, sleep disturbances, comorbidities, and age-related comorbidity studies

4. Investment in a widely accessible repository for GWI research samples and data that incorporates standardization of common data elements, methods, and samples for GWI research

LONG-TERM OUTCOMES (3-5+ YEARS)

1. Contributions to the scientific community, including publications and patents, that provide tangible contributions to the understanding of GWI and identify or validate GWI diagnostic markers and GWI treatment targets

2. Availability of surrogate markers of GWI that are viable as a monitor of GWI’s progression and to serve as readouts of the efficacy of GWI treatment testing

3. Completed GWI treatment trials (Phase I/II) and publication of outcomes, including their mechanistic/biopathological rationale
4. Publically accessible educational materials, guidelines, and/or tools for Veterans suffering from GWI, their caregivers, or their healthcare providers

5. Widespread use by GWI researchers of a physical repository for research data and samples

6. Widespread use by GWI researchers of common data elements and standardized research protocols

REFERENCES


Research Advisory Committee on Gulf War Veterans’ Illnesses (RACGWVI) (https://www.va.gov/rac-gwvi/)