Brain Immune Interactions as the Basis of Gulf War Illness

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A growing body of evidence indicates that GWI is associated with diverse central nervous system (CNS) and immune alterations, but the specific pathobiological processes driving GWI symptoms have not been clearly elucidated. Animal studies indicate that a chronic CNS inflammatory state can develop in response to an insult—chemical injury, infection, or physical trauma—that mobilizes CNS defense systems via activation of microglia, the brain’s primary immune response cells, and release of chemical messengers that precipitate a complex of “sickness behavior symptoms” identified by measures of impaired memory and learning, increased pain sensitivity, and persistent fatigue, a symptom complex similar to that of GWI. Recent studies have also demonstrated CNS inflammatory effects of GW-related exposures and additional immune and cellular processes plausibly explain the mechanisms contributing to the full spectrum of GWI symptoms.

To leverage recent findings and bring a broad range of techniques to bear on GWI, the CMDRP GWIRP has funded the Brain-Immune Interaction as the Basis of Gulf War Illness Consortium (GWIC) whose objective is to provide a cohesive understanding of the pathobiological mechanisms responsible for the symptoms of GWI in order to provide a targeted and efficient basis for identifying beneficial treatments and diagnostic markers.

The GWIC will perform studies of microglial activation and neuroinflammation in GWI. The GWIC will build upon the prior work of very experienced GWI researchers from diverse specialties and other experts in the fields of the proposed mechanisms of GWI. This includes experts in the immune system, brain structure, signaling mechanisms and genetics coming together from government agencies, universities, and industry to help solve the perplexing pathobiology of GWI by working together and learning from each other. By working together as a collaborative team, the GWIC will maximize research study funds to translate results from human, animal, and cell studies into effective and targeted human treatment trials of GWI. This could be particularly important as new treatments are currently available that specifically target brain-immune cross-talk pathways and reduce chronic neuroinflammation. Initial studies with animals will be conducted to assess which treatments may be most promising for treating GWI and for identifying those that may not be as effective without the high costs associated with human clinical treatment trials.