

# ***GULF WAR RISK FACTOR REPORT REPRINTS***

## **Pesticides**

*The following article originally appeared in the June 2000 issue of the Gulf War Review newsletter. For information about the newsletter, contact Mr. Donald J. Rosenblum, Deputy Director, Environmental Agents Service (131), VA Central Office, 810 Vermont Avenue, NW, Washington, DC 20420, telephone: 202-273-8580.*

## **Pesticides and Your Health – Researchers Search for Answers**

Although pesticides have been widely used in the United States and elsewhere for many years without apparent adverse health outcomes, a number of scientists and non-scientists have expressed concerns about the possible long-term health consequences of exposure to pesticides.

The Department of Veterans Affairs (VA) and several other government departments and agencies are currently pursuing important research projects to respond to these concerns. VA is particularly interested because many Gulf War veterans were exposed to these chemicals during their service in the Southwest Asia theater of operations in the Gulf War. Some of these veterans have reported a wide array of illnesses that some suspect may be related to their exposure to pesticides by themselves or in combination with other health risk factors present in the Gulf War.

### **Gulf War Pesticide Use**

Pesticides sent for use in the Gulf War can be divided into five major categories: organophosphorus (OP) pesticides, methyl carbamate organochlorine pesticides (lindane), pyrethroid pesticides (primarily permethrin), and DEET. The Environmental Protection Agency or Food and Drug Administration approved all pesticides shipped to the Gulf region for general use in the United States at the time of the War.

Although the Department of Defense has detailed information about the type and quantity of pesticides shipped to the Gulf region for use in Operation Desert Shield/Storm, there are virtually no available records on how these pesticides were used there. It is not known how much of these pesticides were actually used and which troops used them.

The use of pesticides in the Gulf was reported to have followed strict guidelines. They were to be used only after surveys identified the type of pests and their prevalence. Distribution of pesticides was prohibited unless approved by the local commander. Distribution or use for other than personal purposes was restricted to trained or certified

personnel or contractors. There are reports that some veterans used other, locally obtained, unapproved pesticides. There are also reports of the misuse of dog flea collars.

The insect repellent permethrin was used to treat uniforms in the Gulf War. Some troops apparently used DEET on their skin and treated their clothing with permethrin between August and October 1990, the peak occurrence of arthropods). From October 1990 to February 1991, the need for DEET and permethrin decreased as the weather became colder and the population of arthropods declined.

Personal application of the insect repellent provided to U.S. troops for use on their skin has been estimated based on the amount ordered and the amount returned. An average of about 2.7 tubes of repellent was available for use per soldier. The recommended deployment issue was two tubes per person. Each tube contained 60-ml, enough for about 24 applications (12 days). There was an average of 0.1 bottle (2 ounces) of 75 percent DEET per soldier to be used for personal application to clothing. This material could also have been applied to the skin.

All other pesticides shipped to the Gulf region were to be used only by specially trained individuals or for specific applications.

### **What We Know about the Health Problems Associated with Pesticides Used in the Gulf War**

OP pesticides when administered in high doses can cause nerve and nerve/muscle disorders. Immediate symptoms usually appear within a few hours of exposure. These symptoms include narrowing of the pupil of the eye, headache, nausea, dizziness, anxiety, and restlessness. Other symptoms include muscle twitching, weakness, tremor, in coordination, vomiting, abdominal cramps, diarrhea, sweating, salivation, tearing, runny nose, and production of phlegm. In addition, life-threatening symptoms include unconsciousness, incontinence, convulsions, and depression of breathing function. The Department of Defense reported no cases of immediate and severe OP symptoms in U.S. troops during the Gulf War.

Methyl carbamate pesticides can cause similar effects. Poisoning with methyl carbamates tends to be much shorter duration compared with OP pesticides.

A few people who have used large amounts of lindane on their skin have had blood disorders and seizures. Under conditions of extremely high exposure, lindane can cause liver and kidney disease. Long-term exposure to lindane by some laboratory animal has been reported to cause liver cancer. Some pregnant laboratory animals orally treated with high doses of lindane have produced offspring with birth defects.

Clinical signs of immediate permethrin poisoning following large oral doses become evident within two hours. These signs include coordination problems, ataxia, hyperactivity, and convulsions, followed by prostration, paralysis, and death. There is no evidence of long-term health problems from permethrin poisoning in humans.

DEET is used by at least 50 million Americans annually to repel insects. There are some reports of tingling, mild irritation and skin peeling following repeated skin application. In adult humans, ingestion of enormous doses of DEET has been associated with **immediate** toxic effects, but no long-term health effects have been documented.

### **What Review Groups Have Concluded**

In its final report, dated December 1996, the Presidential Advisory Committee (PAC) on Gulf War Veterans' Illnesses states that "it is unlikely that health effects and symptoms reported today by Gulf War veterans are the result of exposure to pesticides during the Gulf War. Lindane is an animal liver carcinogen, but it is too early to see an elevated liver cancer rate in Gulf War veterans." The PAC found that the current scientific evidence does not support a causal link between the symptoms and illnesses reported today by Gulf War veterans and exposure while in the Gulf to pesticides.

In its 1996 report, entitled Health Consequences of Service During the Persian Gulf War: Recommendations for Research and Information Systems, the non-governmental organization National Academy of Sciences' Institute of Medicine (IOM) indicated that "in general, it appears that the average personal usage of pesticides available in the PGW theater of operations was low and unlikely to be associated with the induction of chronic disease."

The Senate Special Investigation Unit (SIU) in its 1998 report noted that, with regard to pesticide exposure, "some troops reportedly developed rashes as a consequence of their use. However, no order acute health effects have been linked to the use of pesticides during the Gulf War. The SIU found most troops were likely exposed to some level of a variety of these chemicals although the amount or level of exposure is not known."

### **What We Don't Know -- Combination of Pesticides and Interaction with Other Possible Exposures or Risk Factors**

Some researchers have suggested that a combination of exposures may explain health problems currently experienced by some Gulf War veterans. Studies on cockroaches and chickens have suggested this possibility. It is unclear whether these "synergistic" effects may be applicable to humans. Ongoing federally-funded research efforts should help clarify this matter.

Some titles of federal research projects include Physiological and Neurobehavioral Effects in Rodents from Exposure to Pyridostigmine, Fuels, and DEET; Neurophysiologic and Neuropathologic Effects in Monkeys of Low Level Exposure to Sarin, Pyridostigmine, Pesticides, and Botulinum Toxoid; Toxic Interactions of Prophylactic Drugs and Pesticides; Evaluations of Immunotoxicity due to Concurrent Exposure to DEET, Pyridostigmine, and JP-8 Jet Fuel; and Percutaneous Absorption of Chemical Mixtures Relevant to the Gulf War.

Most of these projects are still ongoing. VA officials hope that these investigations will provide answers to many, if not all, of the questions that have been raised by Gulf War veterans and their families regarding the possible long-term health effects of exposure to pesticides used in the Gulf War, including the effects of their interaction with other possible health risk factors.

### **What a Concerned Gulf War Veteran Should Do**

All Gulf War veterans are encouraged to contact the nearest VA medical center for a Gulf War Registry health examination. The telephone number of the medical center can be found in local telephone directories under the Department of Veterans Affairs in the "U.S. Government" listings.

Veterans with service-related disabilities may wish to file a claim for disability compensation. A Veterans Benefits Counselor (VBC) at the nearest VA regional office or medical center can provide the application and any needed assistance. The national toll-free telephone number to reach a VBC is **1-800-827-1000**.

