

# **The long term safety of anthrax vaccine, pyridostigmine bromide (PB) tablets, and other risk factors among Reserve Component Veterans of the First Persian Gulf War**

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## **Abstract**

Data from several hundred Reserve Component Persian Gulf War veterans were analyzed to assess associations between Gulf War illness as defined by both the CDC and Kansas classifications and a variety of potential risk factors. The most significant risk factors, in order of importance for their possible contributions to Gulf War illness were perceived exposure to nerve agent, ciprofloxacin pills, gum problems, insect repellent, anthrax vaccination, use of personal insecticide, reported reactions to vaccines, and botulinum toxin vaccine. Of those, PB tablets, gum problems, insect repellents, insecticide use, and anthrax vaccination were more significant statistically when veterans reported that they had experienced reactions to vaccines. Insect repellent and insecticide remained significantly related to Gulf War illness among veterans who remained in the United States during the war; among those non-deployed veterans, anthrax vaccine was associated with Gulf War illness (10% versus 4% for those with or without anthrax vaccine), but the relationship was not statistically significant if those who were “not sure” about their vaccination were removed from the analysis. For anthrax vaccine, Gulf War veterans needed only to report a “mild reaction” to maintain a significant relationship with Gulf War illness under the reaction condition. Anthrax vaccine seemed to be more reactive than other vaccines, especially for female veterans. A dose-response relationship was observed for PB tablets. Recall bias was reduced in several ways but may not have been eliminated. It is recommended that PB tablets, ciprofloxacin pills, as well as insect repellents and insecticides be used with caution, especially not exceeding recommended daily amounts. Anthrax vaccine should be administered on a voluntary basis only, given the long-term safety risks observed here, especially for those who experience even mild reactions.

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*Keywords:* Gulf War illnesses, anthrax vaccine, pyridostigmine bromide, vaccine safety, insecticides, insect repellents, ciprofloxacin