INFORMATION PAPER

Military Vaccine Agency 6 January 2005

SUBJECT: Typhoid Fever and Typhoid Vaccines

1. Purpose. To describe typhoid fever and the vaccines to prevent it.

2. Facts.

a. Microbiology. Typhoid fever is an acute infectious disease of the intestine caused by *Salmonella enterica typhi* (*S. typhi*) bacteria. This disease results from consuming food or water contaminated with bacteria from the feces of active cases or carriers of the disease. These bacteria infect the lining of the intestinal tract for 10 to 14 days and then symptoms develop. In cases where the bacteria invade the gall bladder, a patient can become a chronic carrier of typhoid bacteria and shed the organism for years.

b. Epidemiology. *S. typhi* lives only in human beings. People with typhoid fever carry the bacteria in their bloodstreams and intestinal tracts. Typhoid is spread when people practice poor personal hygiene and then handle food or beverages. It can also spread via contaminated sewage that enters water sources used for drinking or washing food. Typhoid fever is still endemic in many developing countries with inadequate water treatment, where it is mainly a disease of school-age children. About 2% to 4% of acute typhoid cases result in the chronic-carrier state. Symptomless carriers are the natural reservoir for *S. typhi*. There are approximately 400 cases of typhoid fever reported annually in the United States, most acquired during foreign travel. Symptoms include fever, myalgia, anorexia, abdominal discomfort, loss of appetite, constipation, and headaches. The fever rises over a period of days and then remains at 102º to 104ºF. A skin rash described as “rose spots” may appear. Severe cases of typhoid fever may involve intestinal perforation, hemorrhage, and even death.

c. Vaccine. There are two kinds of typhoid vaccine distributed in the United States.

(1) Inactivated Vaccine. The inactivated vaccine is marketed under the name *Typhim Vi* (Aventis Pasteur). It consists of polysaccharides purified from bacterial capsules. This vaccine is given in a single 0.5-mL intramuscular dose, with a booster dose needed every 2 years to sustain immunity. This vaccine protects at least 74% of recipients from contracting disease after 20 months of follow-up.

(2) Live Vaccine. The second vaccine, *Vivotif* (Berna Biotech), is a live oral vaccine that contains the attenuated Ty21a strain. These bacteria are filled into capsules. The patient takes 1 capsule every other day, for a total of four capsules. This vaccine affords greater than 67% protection against disease. The capsules must be refrigerated between doses and swallowed 1 hour before meals, using a cold or luke-warm drink. Another series of four capsules are needed as a booster dose every 5 years to sustain immunity

d. Immunization. *Typhim Vi* vaccine is indicated for people 2 years or older. *Vivotif* vaccine is indicated for people 6 years or older.

e. Cautions. The following people should not receive either typhoid vaccine: people with a history of serious allergic reaction to a previous dose of typhoid vaccine; those who are moderately or severely ill, have infections, or severe immune system disorders; and those taking immune-suppressing medicine (e.g., prednisone). Additionally, do not give *Vivotif* to people receiving sulfonamides or certain other antibiotics, because these agents may be active against the vaccine strain and prevent a sufficient degree of multiplication to induce a protective response. Routine typhoid vaccination is not recommended within the United States. Give either typhoid vaccine to pregnant women only if clearly indicated.

f. Adverse Events. The most common adverse reactions to Intramuscular typhoid vaccination are redness, swelling, and discomfort at the injection site Nausea, skin rash, headaches, or a mild fever may occur. More serious reactions are rare. The oral vaccine may cause mild abdominal pain, nausea, headache, fever, diarrhea, and vomiting.

g. DoD Policy. Vaccination is required (either in oral or injectable form) for alert forces during deployment or travel to typhoid-endemic areas and other areas with poor sanitation systems. Typhoid immunization is generally required for members of units designated to be ready to deploy outside of the U.S. within 10 days of notification.

3. References.

a. Advisory Committee on Immunization Practices. Typhoid immunization. MMWR 1994;43(RR-14):1-7. ftp.cdc.gov/pub/Publications/mmwr/rr/rr4314.pdf

b. CDC disease information. www.cdc.gov/ncidod/dbmd/diseaseinfo/typhoidfever_g.htm

c. CDC Vaccine Information Statements: www.cdc.gov/nip/publications/VIS/

d. Package Inserts:
Typhim Vi: www.vaccineshoppe.com/US_PDF/790-01_4327.pdf
Vivotif: www.bernaproducts.com/PDFs/VivotifUSPIL2003.pdf

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