INFORMATION PAPER

Military Vaccine Agency
18 April 2008

SUBJECT: Rotavirus and Vaccine

1. Purpose. To describe rotavirus disease and the rotavirus vaccines.

2. Facts.

a. Microbiology. Rotaviruses have a characteristic wheel-like appearance when viewed by electron microscopy. The name rotavirus is derived from the Latin word “rota” meaning wheel. Rotaviruses are non-enveloped, double-shelled viruses that are about 70 nm in diameter and replicate in the cytoplasm after entering the cell by endocytosis. The genome is composed of 11 segments of double-stranded RNA, coded for six structural and five nonstructural proteins. Rotaviruses are very stable and are able to survive in the environment without disinfection for weeks or months. Disinfectants with 95% ethanol are the most effective in killing the virus.

b. Disease. Rotavirus disease is characterized by vomiting, watery diarrhea for 3–8 days, and dehydration, often accompanied by fever and abdominal pain. Once infected, the incubation period is 1–3 days. Symptoms are more severe during the first infection than subsequent infections, and immunity after infection is incomplete. Some infected individuals may be asymptomatic with self-limiting watery diarrhea. In infants and young children dehydration and electrolyte imbalance are often the cause of hospitalization and/or death.

c. Epidemiology. Rotavirus is the most common cause of severe diarrhea in infants and children, resulting in 55,000–70,000 hospitalizations and 20–60 deaths in the United States and over 600,000 deaths worldwide each year. Transmission is primarily fecal-oral, but can occur by contact with respiratory tract secretions and other body fluids. Because the virus is stable in the environment, transmission can occur through ingestion of contaminated water or food and contact with contaminated surfaces. In the United States and other temperate climate countries, rotavirus infections have a seasonal pattern with outbreaks occurring from November to May.

d. Vaccine. In the United States two rotavirus vaccines are approved for use to protect against rotavirus infections, RotaTeq and ROTARIX. RotaTeq, manufactured by Merck & Co., has been approved for use since 2006, while ROTARIX, manufactured by GlaxoSmithKline, was recently approved in April 2008. Both of the rotavirus vaccines are oral (swallowed) vaccines; they are not given by injection. RotaTeq is a live, oral pentavalent vaccine supplied in a container consisting of a squeezable plastic, latex-free dosing tube with a twist-off cap, allowing for direct oral administration. ROTARIX is a live, attenuated oral quadravalent vaccine containing no preservatives; however, the oral applicator contains dry natural latex rubber in the tip cap and rubber plunger. Please refer to the vaccine package inserts for more detailed information. Dosage and administration are outlined for each vaccine below:

- RotaTeq Vaccine: For oral use only. Three 2-mL ready-to-use liquid doses are administered orally starting at 6 to 12 weeks of age, subsequent doses administered at 4- to 10-week intervals. The third dose should not be given after 32 weeks of age.

- ROTARIX Vaccine: For oral use only. Two 1-mL doses are administered orally to infants beginning at 6 weeks of age, and the subsequent dose is administered at least 4 weeks after the first dose, but before the infant is 24 weeks of age.

e. Vaccine Handling. Both vaccines must be refrigerated immediately at 2°–8°C (36°–46°F) upon receipt; never freeze or expose the vaccines to freezing temperatures. Protect the vaccines from light at all times and use before the expiration dates. Packaging, storage and handling instructions for the vaccines are listed below:

- RotaTeq Vaccine

  - *Packaging:* Single-dose pouches with a single-dose tube containing 2 mL of the vaccine suspended in a buffered stabilizer solution that is a pale yellow but might have a pink tint. Package of 1 or 10 pouched single-dose tubes.

  - *Storage and handling:* Refrigerate at 2°–8°C (36°–46°F). Administer as soon as possible after removing vaccine from refrigeration.

- ROTARIX Vaccine:

  - *Packaging:* Package of 10 of each of the following: a vial of lyophilized vaccine, a pre-filled oral applicator of liquid diluent (1 mL) with a plunger stopper, and a transfer adapter for reconstitution.

  - *Storage and handling:* Refrigerate at 2°–8°C (36°–46°F). The diluent may be stored at controlled room temperature 20° to 25°C (68° to 77°F). Discard if the vaccine has been frozen. Reconstitute lyophilized vaccine in vial with a liquid diluent in a pre-filled oral applicator.

  - *Storage after reconstitution:* Once reconstituted, administer within 24 hours. It may be stored at 2°–8°C (36°–46°F) or at room temperature up to 25°C (77°F), after reconstitution. Discard the reconstituted vaccine if not used within 24 hours.

f. Immunization. Screen all vaccine recipients for contraindications and any precautions. Vaccine specific contraindications and precautions are listed below:

- RotaTeq Vaccine

  - *Contraindications:* Demonstrated history of hypersensitivity to the vaccine or any component of the vaccine.

  - *Precautions:* Safety or efficacy data are not available for infants who are potentially immunocompromised or who have a history of gastrointestinal illness, chronic diarrhea, failure to thrive, history of congenital abdominal disorders, abdominal surgery, and intussusception. Use caution when considering whether to administer RotaTeq to individuals with immunodeficient contacts.

- ROTARIX Vaccine

    - *Contraindications:* History of uncorrected congenital malformation of the gastrointestinal tract that would predispose the infant to intussusception.

    - *Precautions:* Previous hypersensitivity to any component of the ROTARIX® vaccine including latex rubber (oral applicator). For infants with acute diarrhea or vomiting, delay vaccination until symptoms resolve. Effectiveness and safety have not been evaluated for infants with immunodeficiency.

g. Caution. Both vaccines contain live virus and pose a potential risk for transmission of the virus to non-vaccinated individuals. The potential risk of transmission should be weighed against the risk of acquiring and transmitting the natural rotavirus.

h. Adverse Events.

- RotaTeq Vaccine: Common adverse events included diarrhea, vomiting, irritability, otitis media, nasopharyngitis, and bronchospasm.

- ROTARIX Vaccine: Common (≥5%) solicited adverse events included fussiness/irritability, cough/runny nose, fever, loss of appetite, and vomiting.

i. DoD Policy. Follow the Advisory Committee on Immunization Practices (ACIP) guidelines and product labels.

j. Special Precautions. RotaTeq has not been evaluated for safety and efficacy in infants less than 6 weeks or greater than 32 weeks of age. ROTARIX has not been evaluated for safety and effectiveness in infants less than 6 weeks or greater than 24 weeks of age. Safety and effectiveness have not been evaluated if ROTARIX were administered for the first dose and another rotavirus vaccine were administered for the second dose or vice versa.

3. References.

a. Centers for Disease Control and Prevention (CDC). Prevention of rotavirus gastroenteritis among infants and children. MMWR 2006;55(RR-12):1-16. www.cdc.gov/mmwr/pdf/rr/rr5512.pdf

b. CDC. Rotavirus. *In* Epidemiology and Prevention of Vaccine-Preventable Diseases. Department of Health and Human Services, 10th (ed.) 2007.

c. CDC. Rotavirus. www.cdc.gov/rotavirus/

d. Kapikian AZ, Shope RE. Rotaviruses, Reoviruses, Coltiviruses, and Orbiviruses. *In* Medical Microbiology. The University of Texas Medical Branch at Galveston, 4th (ed.) 1996.

e. GlaxoSmithKline Biologicals. ROTARIX (Rotavirus Vaccine, Live, Oral: Package insert. Rixensart, Belgium, 2008.

f. Merck & Co. RotaTeq (Rotavirus Vaccine, Live, Oral, Pentavalent): Package insert. Whitehouse Station, NJ. 2007.

g. Multiple resources (e.g., product insert, Vaccine Information Statements) assembled by Military Vaccine Agency: www.vaccines.mil/rotavirus

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