# Japanese Encephalitis

FACT SHEET 18-021-0317

## Just the Facts...

- Japanese encephalitis is a potentially severe viral disease that is spread by infected mosquitoes in the agricultural regions of Asia.
- Japanese encephalitis is one of several mosquito-borne virus diseases that can affect the central nervous system and cause severe complications and death.
- Japanese encephalitis can be a risk to travelers to rural areas where the disease is common.
- There is no specific treatment for Japanese encephalitis, only supportive care.
- Prevention centers on controlling mosquitoes and avoiding mosquito bites. A vaccine is licensed for use in travelers whose itineraries put them at risk for Japanese encephalitis.

**What is Japanese encephalitis (JE)?**
Japanese encephalitis is a disease that is spread to humans by infected mosquitoes in Asia. It is one of a group of mosquito-borne virus diseases that can affect the central nervous system and cause severe complications and even death.

**What is the infectious agent that causes Japanese encephalitis?**
Japanese encephalitis is caused by the Japanese encephalitis virus, an arbovirus. Arbovirus is short for arthropod-borne virus. Arboviruses are a large group of viruses that are spread by certain invertebrate animals (arthropods), most commonly blood-sucking insects. Like most arboviruses, Japanese encephalitis is spread by infected mosquitoes.

**Where is Japanese encephalitis found?**
Japanese encephalitis is found throughout rural areas in Asia. Transmission can also occur near urban areas in some developing Asian countries. Japanese encephalitis is a seasonal disease that usually occurs in the summer and fall in the temperate regions of China, Japan, and Korea. In other places, disease patterns vary with rainy seasons and irrigation practices.

**How do people get Japanese encephalitis?**
The Japanese encephalitis virus has a complex life cycle involving domestic pigs and a specific type of mosquito, Culex tritaeniorhynchus, which lives in rural rice-growing and pig-farming regions. The mosquito breeds in flooded rice fields, marshes, and standing water around planted fields. The virus can infect humans, most domestic animals, birds, bats, snakes, and frogs. After infection, the virus can invade the central nervous system, including the brain and spinal cord.

**What are the symptoms of Japanese encephalitis?**
Most infected persons develop mild symptoms or no symptoms at all. In people who develop a more severe disease, Japanese encephalitis usually starts as a flu-like illness, with fever, chills, tiredness, headache, nausea, and vomiting. Confusion and agitation can also occur in the early stage. The illness can progress to a serious infection of the brain (encephalitis), and 30-percent of these cases can be fatal. Among the survivors, up to 30-percent will have serious brain damage.

**How soon after exposure do symptoms appear?**
Symptoms usually appear 6-8 days after the bite of an infected mosquito.

**How is Japanese encephalitis diagnosed?**
Diagnosis is based on tests of blood or spinal fluid.

**How common is eastern equine encephalitis?**
Japanese encephalitis is the leading cause of viral encephalitis in Asia where 30,000 to 50,000 cases are reported each year. The disease is very rare, however, in U.S. travelers to Asia. The chance that a traveler to Asia will get Japanese encephalitis is very small: 1) only certain mosquito species can spread Japanese encephalitis; 2) in areas infested with mosquitoes, only a small portion of the mosquitoes are usually infected with Japanese encephalitis virus; 3) among persons who are infected by a mosquito bite, only 1 in 50 to 1 in 1,000 will develop an illness. As a result, less than 1 case per year is reported in U.S. civilians and military personnel traveling to and living in Asia. Only 5 cases among Americans traveling to or working in Asia were reported from 1981-1992. A sixth case was reported in 2004.

**Who is at risk for Japanese encephalitis?**
Anyone can get Japanese encephalitis, but some people are at increased risk:

- People living in areas where the disease is common;
- Active duty military deployed to areas where the disease is common;
- Travelers to rural areas where the disease is common.

**What is the treatment for Japanese encephalitis?**
There is no specific treatment for Japanese encephalitis. Antibiotics are not effective against viruses, and no effective antiviral drugs have been developed. Therapy is supportive only, directed at relieving the symptoms and preventing complications.

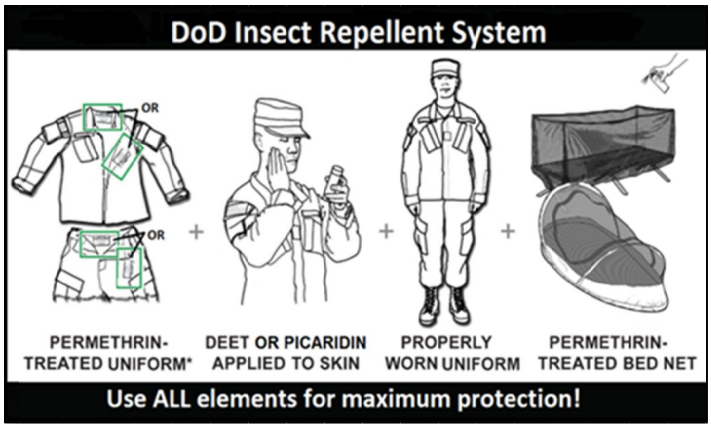
***Army Public Health Center, Entomological Sciences Division***
***5158 Blackhawk Road, APG, MD 21010-5403***
***COM 410-436-3613 / DSN 312-584-3613 / Website: http://phc.amedd.army.mil***

**Is a vaccine available to prevent Japanese encephalitis?**
A vaccine is licensed for use in U.S. travelers to rural areas where the disease is common. The vaccine is recommended only for persons who plan to travel in these areas for 4 weeks or more with extensive outdoor activities in rural areas, especially where rice cultivation or pig farming is common, except in special circumstances such as an ongoing outbreak of disease.

Current DoD policy* is to administer the Japanese encephalitis vaccine to personnel who are or who will be stationed in rural areas of Asia in which the disease is endemic and where they have substantial risk of exposure to the virus, especially during prolonged field operations at night. The main groups needing Japanese encephalitis immunization are designated special-operation units, Navy mobile construction battalions, Marine expeditionary units operating in the Western Pacific, and troops assigned or deploying to Okinawa with extended field exposure. Under normal circumstances, this immunization is not warranted for personnel assigned to or deploying to Korea.

**What else can I do to prevent Japanese encephalitis?**
Because of the potential for Japanese encephalitis, as well as other mosquito-borne diseases in Asia, all travelers should take steps to avoid mosquito bites. The mosquitoes that transmit Japanese encephalitis virus feed mainly outside during the cooler hours at dusk and dawn. Travelers should minimize outdoor activities at these times, use mosquito repellent on clothing and exposed skin, and stay in air-conditioned or well-screened rooms.

- Use bed nets if sleeping in areas that are not well-screened or air-conditioned.
- When outdoors during times that mosquitoes are biting, wear long-sleeved shirts and long pants.
- Use mosquito repellents on skin and clothing.
- Use insect repellents that have been approved by the Environmental Protection Agency (EPA). They are safe and effective.
- For your skin, use a product that contains 20-50% DEET (N, N-diethyl-meta-toluamide). DEET in higher concentrations is no more effective.
- Use DEET sparingly on children, and don't apply to their hands, which they often place in their mouths.
- Apply DEET lightly and evenly to exposed skin; do not use underneath clothing. Avoid contact with eyes, lips, and broken or irritated skin.
- To apply to your face, first dispense a small amount of DEET onto your hands and then carefully spread a thin layer.
- Wash DEET off when exposure to mosquitoes ceases.
- For your clothing, use an insect repellent spray to help prevent bites through the fabric. Use a product that contains permethrin. Permethrin is available commercially as 0.5% spray formulations. In addition, factory permethrin-impregnated clothing is now available.
- Permethrin will withstand numerous launderings.
- Permethrin should only be used on clothing, never on skin.
- When using any insect repellent, always FOLLOW LABEL DIRECTIONS.
- Do not inhale aerosol formulations.




- For optimum protection, soldiers should utilize the DOD INSECT REPELLENT SYSTEM. In addition to proper wear of the army combat uniform (ACUs), which provides a physical barrier to insects, this system includes the concurrent use of both skin and clothing repellents:
    - Standard military skin repellent: 33% DEET lotion, long-acting formulation, one application lasts up to 12 hours, NSN 6840-01-284-3982. Apply to all exposed skin.
    - Standard military clothing repellents, either aerosol spray, 0.5% permethrin, one application lasts through 5-6 washes, NSN 6840-01-278-1336; or impregnation kit, 40% permethrin, one application lasts the life of the uniform (approximately 50 washes), NSN 6840-01-345-0237.
    - Since mosquitoes can bite through fabric, particularly if it is pulled taut against the skin, it is especially important to treat the uniform fabric with permethrin.

- Under field conditions, sleep or rest under a bed net. Treat the net with permethrin.

**Where can I get more information on Japanese encephalitis and other forms of mosquito-borne viral encephalitis?**
Contact the Army Public Health Center (APHC), Aberdeen Proving Ground, Maryland 21010-5403; DSN 584-3613; CM (410) 436-3613; FAX -2037; or visit our website at: http://phc.amedd.army.mil/topics/envirohealth/epm/Pages/default.aspx. Additional information can also be obtained from your local, county or state health departments, your health care provider or by visiting the website of the Centers for Disease Control and Prevention (CDC): http://www.cdc.gov/ncidod/dvbid/index.htm

Much of the information on Japanese encephalitis that is contained in this fact sheet was obtained from the Directors of Health Promotion and Education (DHPE). The information in this fact sheet is intended as guidance only and is not meant to be used for self-diagnosis or as a substitute for consultation with a health care provider.

* Information Paper, Subject: "Japanese Encephalitis and Japanese Encephalitis Vaccine," 6 January 2005, Military Vaccine Agency, (877) GET-VACC, www.vaccines.mil.


***For more information please consult the APHC website - http://phc.amedd.army.mil***