

Zika Virus

Notes

- **Origin:** Africa and SE Asia first isolated in 1947. In 2007 a large outbreak in Yap (island group in Western Pacific/Micronesia). Then went on major tour of the other Pacific Islands before it landed in Brazil. It spread rapidly to other parts of South America, Central America, Mexico and the Caribbean.
- **Why the sudden explosion?** There may have been big outbreaks in Africa and Asia that went undetected; scientists weren't paying much attention. The current massive epidemic was an event waiting to happen. Latin America has huge populations of *A. aegypti* (yellow fever mosquito), which is an important vector for Zika. On the rise around the world is *A. albopictus* (Asian tiger mosquito), which is believed to be a vector as well. In addition, no one in the Americas had the immunity to the virus. Travel makes it worse. *Aedes* mosquitoes don't fly more than a few hundred yards during their lives; Zika travels from city to city when infected people get on cars, buses, trains and planes. These combined factors meant that the virus had the ability to spread fast and far once it had arrived.
- **Will Zika spread to the U.S. and Europe?** It already has and both have seen "imported" cases. The key question is whether there will be local outbreaks—there is definitely a chance. *A. albopictus* occurs in Southern Europe, while the southern and eastern U.S. have populations of both mosquitoes. Scientists expect outbreaks to be much smaller if they do indeed occur based on past experience with mosquito-borne diseases. One reason being that people spend less time outside in these countries and live in houses that are more difficult for mosquitoes to enter; mosquito population sizes may play a role as well.
- **Does Zika cause birth defects?** There is strong circumstantial evidence, but it will take months before the results of the first case-control studies from women in Brazil will be available. The pattern of brain damage is distinct from other agents such as cytomegalovirus or rubella. Several clinical studies are now underway.
- **What drugs are available against Zika?** None. A vaccine is probably the best hope of preventing microcephaly. A vaccine will take years to develop and be tested clinically. The U.S. National Institute of Allergy and Infectious Diseases say it may be at least 5-7 years before a vaccine is commercially available.

- **What can we do to stop the spread of the virus?** Stop mosquitoes from biting people. Countries and communities can try to reduce mosquito populations by removing the small water reservoirs—such as flower pots, empty bottles, and discarded tires—in which *Aedes* mosquitoes like to breed. People can also reduce their personal exposure—especially important for women who are or might become pregnant—by putting screens on windows, covering their skin, and using insect repellent. However, history has shown that the impact of mosquito control on epidemics is modest at best, and they're difficult to sustain.
- **There must be better ways to control mosquitoes?** Not yet but they're in the works. A British biotech called Oxitec—which was recently purchased by Intrexon, a U.S. synthetic biology company—has developed *A. aegypti* mosquitoes containing a gene construct that will kill their offspring before they reach adulthood. When massive numbers of male individuals of this strain are released in the wild, they will mate with local females, producing offspring that are not viable, which has been shown to make a dent in the population. In another line of research, scientists are infecting *A. aegypti* with a bacterium named *Wolbachia*, which reduces mosquitoes' ability to transmit diseases. The researchers developing these approaches were mostly thinking about dengue, but Zika's surge is giving their attempts a new sense of urgency. But again, it will take several years before these strategies are ready for prime time.

Has anyone studied non-cancer effects from long-term exposure to DEET?

A trial was done on women to test the safety of using DEET to prevent malaria during pregnancy. Women used a product with 20% DEET on their legs and arms each day during their second and third trimesters of pregnancy. DEET crossed the placenta and was found in 8% of the cord blood samples. There was no increase in birth defects or problems with the survival in the young and there were no further problems in the first year of life.

Can DEET affect birds, fish, or other wildlife?

Tests were done to find out if DEET could affect fish or insects that live in the water. For freshwater fish and insects, DEET was toxic at extremely high levels. For instance, the level of DEET that killed half of the fish or insects was about 75,000 times greater than the highest concentration found in waste water or streams. DEET is not considered to be very toxic to birds.