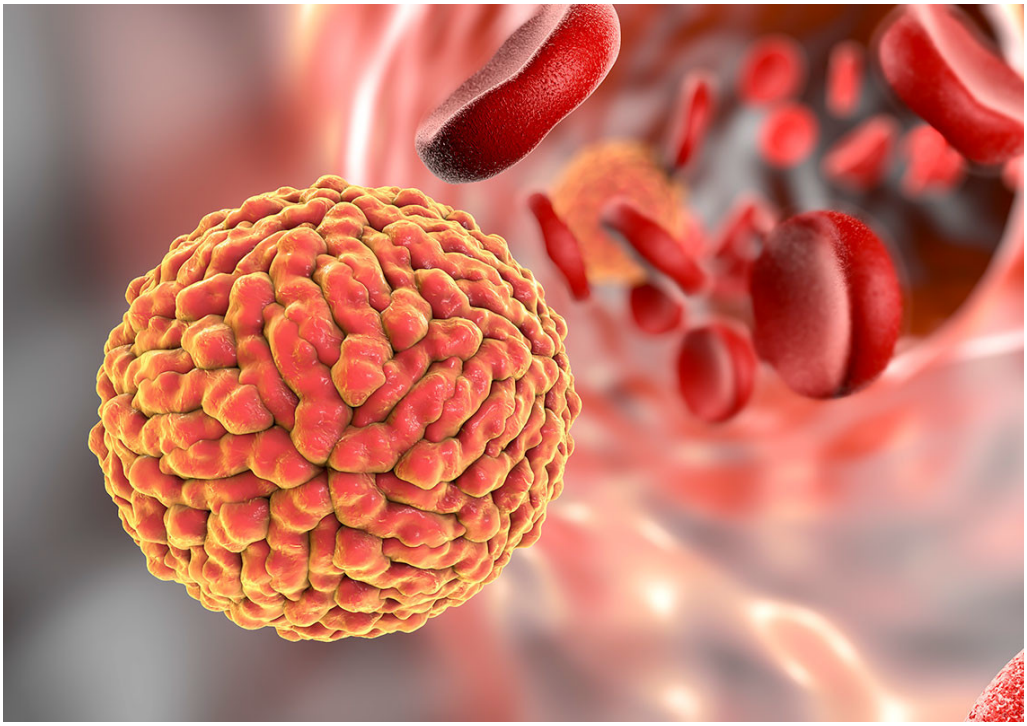

EPI Newsletter
The Emerging Pathogens Institute

GIVING YOU THE LATEST NEWS ABOUT THE EMERGING PATHOGENS INSTITUTE

IN THIS ISSUE

Long-term global threat posed by Zika Virus remains unknown

GAINESVILLE, Fla. — The Zika virus could become endemic in parts of Central and South America, but the long-term global threat posed by the virus remains unclear without more research, according to the authors of a paper published online in today's issue of the journal Science.

"One of the big questions about this outbreak is whether Zika virus will stick around or disappear after causing this sizeable outbreak across many countries in the region," said Derek Cummings, a professor of biology at the Emerging Pathogens Institute and a co-author of the review. "Two major determinants of the ability of the virus to persist are the role of immunity and the breadth of host species that can contribute to the ongoing transmission of the virus."

Genetic analysis of the Zika virus suggests that there are already permanent viral reservoirs in other regions.

Discovered in the Zika forest of Uganda in 1947, the virus soon split into African and Asian "clades" or viral strains. The African strain is maintained in an enzootic cycle of transmission, where transmission between non-human primates occurs regularly and the role of transmission among humans is unclear.

"The clear split of Asian and African Zika virusisolates into distinct clades provides some evidence of endemic transmission in these regions," said Kyra Grantz, a research assistant working with Cummings. Grantz, a contributing author to the paper, conducted the phylogenetic analysis of Zika virus for the review.

Said Cummings: "Humans may be infected regularly in many settings in Africa, supporting long-term transmission, or they may be infected only occasionally, and non-human primates play the central role of maintaining the virus.

(***continued on page 3***)

Leading virologist and Italian Parliament member moves to UF to lead "One Health"

Ilaria Capua, DVM, PhD, trained as a veterinarian and has worked ever since graduation as a virologist. In June she became the director of the Center for Excellence in One Health Research. Additionally, she is a professor at IFAS and a member of the Emerging Pathogens Institute. In February 2013 she was elected as a member of the Italian Parliament, and previously she was the director of the Division of Comparative Biomedical Sciences at the Istituto Zooprofilattico Sperimentale delle Venezie, Legnaro (Padova, Italy), which hosts the National OIE/FAO ReferenceL aboratory for Avian Influenza and Newcastle Disease, the OIE Collaborating Center for Diseases at the Human-Animal Interface and the FAO Reference Center for Rabies.

She is passionate about inter- and trans-disciplinary research and intends to develop a new One Health vision by bridging and capitalizing on existing areas of excellence at UF.

Non-travel Zika cases in Fla. could reach 400

GAINESVILLE, Fla. — Nearly 400 non travel-related Zika infections will occur in Florida before the end of the summer, according to a new study by biostatisticians at the University of Florida and other institutions.

In addition, the virus is projected to spread to several other Southeastern states with handfuls of cases projected to pop up from Texas to South Carolina and even Oklahoma.

The projections come weeks after the Florida Department of Health identified the nation's first locally acquired cases of the Zika virus in Miami-Dade County. UF researchers had already produced projections for other countries, which have experienced local Zika virus transmission for months – and in some cases, years.

Though the virus has been in South America for more than a year, some scientists doubted that it would ever come to the United States.

"It wasn't clear at first whether mosquito densities were high enough to sustain an outbreak in the U.S.," said Dr. Ira Longini, a professor of biostatistics in the UF College of Public Health and Health Professions and the College of Medicine.

Once the first cases of locally transmitted Zika fever were identified in Miami, however, Longini and his colleagues felt more comfortable publishing 2016 estimates projecting the number of locally transmitted cases that they expect will occur in Florida.

The model projects 395 Zika infections in Florida by Sept. 15 due to local transmission and 79 symptomatic cases by the same date. In addition, they forecast that a median of eight of the infections will be in pregnant women during their first trimester.

Other states expected to see locally acquired Zika are below, followed by the number of locally acquired cases and the number of symptomatic cases:

Alabama – 11, 2
Arkansas – 3, 1
Georgia – 6, 1
Louisiana – 4, 1
Mississippi – 10, 2
Oklahoma – 12, 2
South Carolina – 16, 3
Texas – 5, 1

Longini, a senior researcher at UF's Emerging Pathogen Institute, partnered with Dr. Alessandro Vespignani at Northeastern University, Dr. Elizabeth Halloran at the University of Washington, and scientists from several other institutions to produce a website showing how Zika virus has spread through Mexico, the Caribbean, and Central and South America, and projecting how it might spread in the future.

Much of the analysis presented on the website was published last July in bioaRchive.

At UF, Longini worked with Dr. Natalie Dean, a postdoctoral fellow in the department of biostatistics, and Dr. Diana Patricia Rojas, a third-year graduate student in the department of epidemiology, to contribute to the publication.

The three also collaborated with UF biostatisticians Dr. Yang Yang and Dr. Eben Kenah to produce an article in Eurosurveillance on Zika epidemiology and transmissibility in Colombia.

"In Colombia, we're trying to estimate the proportion of women infected in the first trimester who get microcephaly and other birth defects," Longini said.

The researchers are partnering with the Colombia National Institute of Health, which has assembled a cohort of 15,000 pregnant women who are either known to have been infected with Zika virus while pregnant or who suspect they were infected.

"That's the largest cohort in all of Latin America," Rojas said. "It will give very good information about the exact proportion of pregnant women infected with Zika that can develop birth defects."

While many researchers have performed retrospective analyses of Zika infection outcomes using data from Brazil and elsewhere in Latin America, none to date have involved prospective cohorts. This cohort will allow investigators to follow pregnant mothers through time, measuring the pregnancy outcomes of those who were likely infected in the in the first trimester of their pregnancy. (***continued on page 3***)

New mosquito-borne disease detected in Haiti

University of Florida researchers have identified a patient in Haiti with a serious mosquito-borne illness that has never before been reported in the Caribbean nation.

Known as "Mayaro virus," it is closely related to chikungunya virus and was first isolated in Trinidad in 1954. Most reported cases, however, have been confined to small outbreaks in the Amazon. Whether this case signals the start of a new outbreak in the Caribbean region is currently unknown.

"While current attention has been focused on the Zika virus, the finding of yet another mosquito-borne virus which may be starting to circulate in the Caribbean is of concern," said Glenn Morris, M.D., M.P.H., director of the UF Emerging Pathogens Institute. "Hopefully we will not see the same massive epidemics that we saw with chikungunya, dengue and now Zika. However, these findings underscore the fact that there are additional viruses 'waiting in the wings' that may pose threats in the future, and for which we need to be watching.

The case was identified from a blood sample taken in January 2015 from an 8-year-old boy in rural Haiti. The patient had a fever and abdominal pain but no rash or conjunctivitis. Because faculty from the UF Emerging Pathogens Institute were in the region during and after the 2014 chikungunya outbreak, plasma samples were obtained from febrile children and analyzed for the presence of chikungunya virus RNA using a genetic identification technique known as reverse transcription polymerase chain reaction.

The plasma samples, which were examined by UF's Maha Elbadry, Ph.D., in Gressier, Haiti, were then sent to EPI for additional virology and molecular analyses, focusing on the detection of chikungunya, dengue and Zika viruses. Dengue virus was detected in the patient, in addition to a "new" virus that was subsequently identified as Mayaro.

"The virus we detected is genetically different from the ones that have been described recently in Brazil, and we don't know yet if it is unique to Haiti or if it is a recombinant strain from different types of Mayaro viruses," said John Lednicky, Ph.D., an associate professor in the environmental and global health department

Anopheles gambiae

at the UF College of Public Health and Health Professions and the study's lead author.

The findings were published online Aug. 26 in the Centers for Disease Control and Prevention's journal Emerging Infectious Diseases.

The symptoms of Mayaro fever are similar to those of chikungunya fever: fever, joint pain, muscle pain and rashes. Abdominal pain is also a feature of Mayaro fever, however, and joint pain can last longer.

(*ZIKA threat* continued from page 1)

"In all places where there is evidence of persistent transmission of Zika, there is a plausible role for non-human primates in contributing to the maintenance of transmission," he added. "In the Americas, non-human primates could also contribute to Zika persisting after this initial outbreak, as ZIKV has been detected in two species of non-human primates."

While scientists have shown that the Zika virus is enzootic within Sub-Saharan Africa, they're still not sure whether primate species, including humans, are the only group of animals that can host the Zika virus, or whether the range of potential hosts includes other animals groups as well.

The role of genetically related pathogens in determining the global pattern of Zika is also unclear.

"Zika is closely related to dengue and several other flaviviruses whose epidemiology, natural history, and public health impact is much better studied," Grantz said. "Yet it remains to be seen just how similarly Zika virus will behave to its genetic relatives. It is also possible that past exposure to closely related flaviviruses could give rise to protective immunity against Zika virus, or even enhance risk of Zika virus infections and severe clinical outcomes."

The durability of immune responses mounted in response to a Zika virus infection will also be an important determinant of the persistence of Zika virus. Other flaviviruses induce a protective immune response that is long-lived, suggesting that if Zika virus follows suit, people can only be infected with Zika virus once in their lives, reducing the probability that Zika virus transmission will be maintained after a large outbreak.

The duration that people maintain infection and can transmit to others by either sexual transmission or by mosquito-borne transmission could also impact the probability that Zika is transmitted persistently in any setting. Sexual transmission has been observed in this outbreak and in other settings.

The Zika virus caught the world's attention last January as reports from Brazil indicated that infection of pregnant women could lead to microcephaly in newborn babies. The report indicates that those infected with the Zika virus have an increased risk of developing Guillain-Barré syndrome.

A rare neurological disorder, Guillian-Barré syndrome occurs when the immune system attacks the peripheral nervous system. Depending on the strength of the disease, symptoms can range from mild discomfort in the legs to severe pain and paralysis.

The article suggests that the risk of attaining Guillian-Barré after contracting the Zika virus is 24 per 100,000 Zika virus infections. Though still extremely rare, that number is more than 10 times the general risk for the disease in the U.S., which is 1.8 per 100,000 people.

Several other birth complications associated with the Zika virus are also discussed in the article. Brazilian researchers found that only 1 in 4 babies born with abnormalities from Zika virus-infected mothers met the standards for microcephaly. Other complications include intracranial calcifications, ocular impairment, intrauterine growth restriction (IUGR) and fetal demise.

(*ZIKA in Fla.* continued from page 2)

The results of this study will help Longini and others further codify the range of birth defects that fall under congenital Zika syndrome, as well as the likelihood of microcephaly and other birth defects.

Zika Virus and the Emerging Pathogens Institute

In early 2016, Brazil shocked the world with its finding that the Zika virus had caused a sharp rise in the number of babies born with birth defects such as microcephaly.

Many Floridians were infected with the Zika virus while traveling abroad, and in July, Florida Department of Health officials confirmed Florida mosquitoes are transmitting the virus, opening the possibility of contracting Zika without ever leaving the state.

The Emerging Pathogens Institute has assembled the best minds in virology, genetic sequencing, and public health to produce superior research and recommendations to keep Floridians safe.

Aedes aegypti mosquito – the primary mosquito responsible for transmitting the Zika virus

Dr. J. Glenn Morris, director of the Emerging Pathogens Institute

"We knew the virus was present in Haiti in 2014," said Glenn Morris, M.D., M.P.H., professor of medicine and director of the Emerging Pathogens Institute at the University of Florida.

"By using the sophisticated culturing and sequencing capabilities we have here at the Emerging Pathogens Institute, we were able to begin to fill in some of the unknown areas in the history of the Zika virus, leading us toward a better understanding of what caused this outbreak to suddenly occur at the magnitude it did in Brazil."

While the institute has received funds to study Zika in the Caribbean, the federal government has not yet designated resources to support research on eradicating local Zika transmission in Florida.

We Need Your Help

Release of national and state funding for Zika research is critical. In the meantime – by donating to the Emerging Pathogens Institute, you can directly support the Institute's efforts to combat the Zika virus within Florida.

Visit epi.ufl.edu/donors to make a gift to EPI!

UF | Emerging Pathogens Institute
UNIVERSITY of FLORIDA