forcing federal officials to scramble for other stopgap funding of $600 million, a good deal short of the $1.9 billion that the Administration sought. “We find ourselves in a rare moment where we have advance warning on a disease,” a White House official blogged last April. “However, Congress continues to do nothing about the emergency funding.”

Public health officials say that recent research now convinces them that Zika virus “causes microcephaly”—a link that was considered likely but not conclusive a mere few months earlier. “No single piece of evidence provides conclusive proof that Zika virus infection is a cause of microcephaly and other fetal brain defects,” noted Tom Frieden, director of the Centers for Disease Control and Prevention (CDC) in Atlanta, Ga., citing a report by Lyle Petersen, Sonja Rasmussen, and others at CDC. “Rather, increasing evidence from a number of recently published studies and a careful evaluation using established scientific criteria supports those conclusions.” Their analysis appeared 13 April 2016 in the New England Journal of Medicine (doi:10.1056/NEJMsr1604338).

Several sets of experiments in which mice were infected with Zika virus further support those conclusions. The virus “crosses the placenta and causes microcephaly by targeting cortical progenitor cells, inducing cell death by apoptosis and autophagy, and impairing neurodevelopment,” note Patricia C. B. Beltrão-Braga of the University of São Paulo in São Paulo, Brazil, and her collaborators there, at the University of California, San Diego, and elsewhere. Similarly, early in pregnancy, the Zika virus infects the placenta and fetal brain of mice, causing a syndrome that resembles what happens in Zika-infected pregnant women, according to Michael Diamond of Washington University School of Medicine in St. Louis, Mo., and his collaborators.

On the Zika diagnostics front, Food and Drug Administration (FDA) officials in April issued an emergency use authorization to Quest Diagnostics of Madison, N.J., for its PCR-based test for Zika virus. That test, developed by Quest subsidiary Focus Diagnostics, detects viral RNA in human serum specimens. Separately, an experimental paper-based test rapidly detects Zika-specific RNA sequences within the viral genome, according to James Collins of Massachusetts Institute of Technology in Cambridge, Mass., and collaborators there and at nearby Harvard University. With amplification, the test can detect viral RNA concentrations as low as 2 or 3 parts per quadrillion in serum samples from monkeys infected with Zika virus, these researchers report.

Meanwhile, in May, CDC officials broadened their interim guidance for Zika virus testing, recommending that public health laboratories extend such testing to urine specimens from patients suspected to be infected by the virus, while continuing to test for Zika virus in serum samples. Moreover, for instances where PCR test results are negative, IgM-antibody testing should be done to cover those cases where reduced viremia might account for false-negative results, CDC officials note.

Jeffrey L. Fox is the Microbe Current Topics and Features Editor.

NEW FROM ASM

Point-of-Care Workable in Developing Countries: HPV in Self-Collected Specimens

David C. Holzman

Point-of-care testing appears workable even under highly difficult circumstances—specifically, when evaluated among women in Papua New Guinea, who are at risk for becoming infected with human papillomavirus, a cause of cervical cancer, according to Andrew Vallely of the University of New South Wales in Sydney, Australia, and his collaborators. Moreover, self-sampling by these women provides specimens that screen as accurately as do cervical samples that clinicians obtained, these investigators note. They call this finding “critical” for developing same-day, screening-and-treatment procedures for women in this and other developing...

Evaluating self-collected samples was a critical milestone towards enabling same-day screening and treatment, which is needed in high-burden, low-income countries such as Papua New Guinea, Vallely says. When such patients leave clinics, typically it becomes difficult or impossible to find them again for follow-up treatments.

“The majority of the country’s population lives in rural communities, many of which are very isolated,” he says. Few roads, difficult terrain, limited or absent mobile phones and Internet connectivity, and poor and unreliable postal services further exacerbate the situation.

The screening device that would enable same-day treatment is a high-speed, fully automated molecular assay for high-risk HPV infection, called the Xpert HPV Test. Self-sampling alleviates the need for clinical staff to screen such women directly, according to Vallely. “By readily identifying women who have a high-risk HPV infection, this clinic-based, self-sampling strategy would allow health services in low-income settings such as Papua New Guinea to focus their efforts on those women who are most at risk of cervical pre-cancer and cancer,” he says.

Once a woman is identified as being at increased risk for cervical cancer by the Xpert HPV Test, she immediately undergoes treatment, according to Vallely. “By readily identifying women who have a high-risk HPV infection, this clinic-based, self-sampling strategy would allow health services in low-income settings such as Papua New Guinea to focus their efforts on those women who are most at risk of cervical pre-cancer and cancer,” he says.

Within the lungs of CF patients, these long, negatively charged viruses interact with a broad variety of host and microbial polymers, including DNA molecules, mucin, and hyaluronan, forming stable liquid crystals as part of a larger and heterogeneous biofilm matrix. This structure confers multiple fitness advantages on the *P. aeruginosa* cells, helping to explain how biofilms enhance their pathogenic properties.

“One of the canonical features of biofilms is their ability to adhere to surfaces,” says Bollyky. “Filamentous phages make structural contributions to biofilms that increase adhesion.” In addition, the phage and bacterial cell-based liquid crystal structure increases the viscosity of mucosal secretions, a hallmark symptom for CF patients. Thus, *P. aeruginosa* biofilms are very difficult to dislodge from the lungs of such patients, obstructing airways.

Liquid crystals also retain water, protecting *P. aeruginosa* cells against drying out while promoting their survival and transmission. “The transmission of *P. aeruginosa* from one CF patient to another can occur through aerosols or contaminated surfaces, and desiccation tolerance is thought to be critical to transmission,” says Bollyky. Indeed, highly transmissible *P. aeruginosa* isolates harbor filamentous prophage capable of generating such liquid crystal biofilms.

These structures also protect bacteria against some types of antibiotics by sequestering positively charged drugs such as aminoglycosides within the negatively charged matrix, helping to explain why bacterial pathogens in biofilms resist treatment with such drugs, according to Bollyky. The matrix may also protect pathogens within them against host innate immune defenses by similarly sequestering cationic antimicrobial peptides. These data “suggest that filamentous phage contribute to the persistence of *P. aeruginosa* biofilm infections and may help explain how filamentous phage influence *P. aeruginosa* virulence in vivo,” he says.