## Zika virus: high infectious viral load in semen, a new sexually transmitted pathogen?

The recent, rapid spread of Zika virus in South America and increasing reports of cases of congenital abnormalities spatiotemporally associated with Zika virus infections led WHO to declare a Public Health Emergency of International Concern on Feb 1. WHO also recently described measures that pregnant women should take to avoid infection.

This infection was a neglected tropical disease before 2015 and its natural history is still understudied. Male to female sexual transmission seems possible[1] and infectious virus was detected in semen from a patient with haematospermia during the 2013–14 French Polynesia outbreak.[2]

We describe the case of a 32-year-old man whose Zika virus infection was identified in January in the Toulouse University Hospital (Toulouse, France). He presented with clinical symptoms typical of an arbovirus infection 2 days after returning to France from Brazil and French Guyana. Molecular tools (RealStar Zika Virus RT-PCR Kit 1.0; Altona Diagnostics GmbH, Hamburg, Germany) were used to rapidly diagnose Zika virus infection, while finding no evidence of either chikungunya or dengue using an in-house RT-PCR system.

He completely recovered in a few days and further blood, urine, and semen samples were collected 2 weeks after diagnosis. Zika virus RNA loads were quantified with a commercial synthetic RNA transcript (Altona diagnostics GmbH, Hamburg, Germany). The RNA virus loads were 2·8 $\log_{10}$ copies per mL in plasma, 3·1 in urine, and 8·6 in semen. The viral load in the semen was roughly 100 000 times that of his blood or urine more than 2 weeks after symptom onset. The reason for this difference is unknown and needs investigation. Perhaps the virus can replicate specifically in the male genital tract, fill a specific genital reservoir, or both. Furthermore, we noted that Zika virus in semen could replicate in African green monkey cells—viral load increased by 4 $\log_{10}$ in culture fluid on days 3 and 8 after inoculation. This infectious viral load in semen possibly suggests that Zika virus is a sexually transmitted pathogen. The duration of excretion is unknown, but the virus might persist for many months. Ebola virus RNA has been detected in semen 7–9 months after disease onset.[3]

The presence of Zika virus in semen is a significant challenge, as is the possible teratogenicity of the virus. First, more than 80% of infected people are probably asymptomatic,[4] making them an enormous potential reservoir. Hence, pregnant women in areas where Zika virus is widespread should protect themselves not only from mosquitoes, but also from infectious virus in the semen of their partners—at least during pregnancy. Second, countries currently most affected by Zika virus have varying laws on womens' sexual and reproductive rights.[5] New efficient strategies to prevent unintended pregnancy and also the provision of easy access to contraception or medical abortions must be implemented quickly. But this emergency response to the outbreak proposed by WHO must be appropriate, accounting for the economic, ethical, educational, cultural, social, juridical, and religious factors dominant in affected regions.

Our findings confirm that infectious Zika virus is excreted into semen resulting in a high viral load that could lead to sexual transmission. Guidelines for women of reproductive age as well as women already pregnant must be widely implemented, understood, and put into practice. Furthermore, in many countries, especially those most affected by Zika virus, sexual transmission should lead to adaptation of current laws of womens' concern.

Lastly, the presence of Zika virus in semen (and potentially in a woman's follicular fluid) must be accounted for by reviewing all protocols used for gamete preservation or conservation.

We declare no competing interests. We would like to thank Isabelle Da Silva for technical contribution.

*Jean Michel Mansuy, Marine Dutertre, Catherine Mengelle, Camille Fourcade, Bruno Marchou, Pierre Delobel, Jacques Izopet, Guillaume Martin-Blondel*
**mansuy.jm@chu-toulouse.fr**

Laboratoire de Virologie, Institut Fédératif de Biologie, Centre Hospitalier et Universitaire, Toulouse 31059, France (JMM, CM, JI); Services des Maladies Infectieuses et Tropicales, Centre Hospitalier et Universitaire, Toulouse, France (MD, CF, BM, PD, GM-B); and INSERM U1043—CNRS UMR 5282, Centre de Physiopathologie Toulouse-Purpan, France (MD, BM, PD, JI, GM-B)

1 Foy BD, Kobylinski KC, Chilson Foy JL, et al. Probable non-vector-borne transmission of Zika virus, Colorado, USA. *Emerg Infect Dis* 2011; **17:** 880–82.
2 Musso D, Roche C, Robin E, Nhan T, Teissier A, Cao-Lormeau VM. Potential sexual transmission of Zika virus. *Emerg Infect Dis* 2015; **21:** 359–61.
3 Deen GF, Knust B, Broutet N, et al. Ebola RNA persistence in semen of Ebola virus disease survivors—preliminary report. *N Engl J Med* 2015; published online Oct 14. DOI:10.1056/NEJMoa1511410.
4 Duffy MR, Chen TH, Hancock WT, et al. Zika virus outbreak on Yap Island, Federated States of Micronesia. *N Engl J Med* 2009; **360:** 2536–43.
5 Roa M. Zika virus outbreak: reproductive health and rights in Latin America. *Lancet* 2016; published online Feb 12. http://dx.doi.org/10.1016/S0140-6736(16)00331-7.

*Lancet Infect Dis* 2016
Published Online
March 3, 2016
http://dx.doi.org/10.1016/S1473-3099(16)00138-9