Infectious Zika viral particles in breastmilk

Before 2007, no Zika virus outbreak had been recorded, and Zika virus was deemed to cause mild infections.[1] In 2013–14, an outbreak occurred in French Polynesia associated with an increased rate of Guillain-Barré syndrome following Zika infections.[2] Zika virus spread in the Pacific region in 2014 and then, in 2015, to Brazil where an association between Zika infection and microcephaly is under investigation.[2] There is a need for better comprehension of this disease.

In New Caledonia, in July, 2015, a 27-year-old febrile woman without any associated symptoms presented at hospital (day zero) at 37 weeks' gestation and naturally delivered a healthy baby (Agpar score 10) who was immediately breastfed. After delivery, the mother was febrile for 2 days, and a maculopapular rash arose which was decreasing on the day of discharge. The mother evolved favourably and clinical examination of the neonate remained normal until discharge.

Blood cell count, total protein, and C-reactive protein levels were in the normal range for both mother and neonate. Blood samples from the mother and neonate were collected and tested for Zika virus, dengue virus, and chikungunya virus by RT-qPCR. Breastmilk samples were collected before breastfeeding to avoid possible contamination from the neonate's saliva. Only the mother's serum (day three) and breastmilk (day four) were positive for Zika virus by RT-qPCR (35000 RNA copies per mL in the mother and 850000 RNA copies per mL in the breastmilk). The only serum from the neonate that was sampled on day three was ambiguous. Breastmilk was inoculated onto Vero cells. Infective viral particles were detected from the breastmilk sample and confirmed by the presence of a cytopathic effect and by RT-qPCR (39 million RNA copies per mL, appendix).

Zika virus is transmitted to human beings by mosquitoes (*Aedes* spp). However, other routes of transmission have been described, such as sexual or perinatal transmission.[3] Here, we report the presence of infective Zika virus particles in breastmilk with substantial viral loads. Arbovirus transmission via breastfeeding has been previously suggested for dengue,[4] West Nile,[5] and yellow fever,[6] but more information is needed. Zika infection in woman during pregnancy or during the perinatal period must be considered very seriously by practitioners.

We declare no competing interests. We acknowledge funding from New Caledonia Government and Institut Pasteur in New Caledonia. We thank Cyrille Goarant for helpful discussions and revision of the letter.

Myrielle Dupont-Rouzeyrol, Antoine Biron, Olivia O'Connor, Emilie Huguon, Elodie Descloux
mdupont@pasteur.nc

Institut Pasteur de Nouvelle-Calédonie, Réseau International des Instituts Pasteur, Noumea Cedex, New Caledonia (MD-R, AB, OO'C); and Centre Hospitalier Territorial, Noumea Cedex, New Caledonia (EH, ED)

1 Lanciotti RS, Kosoy OL, Laven JJ, et al. Genetic and serologic properties of Zika virus associated with an epidemic, Yap State, Micronesia, 2007. *Emerg Infect Dis* 2008; **14:** 1232–39.
2 World Health Organization. Epidemiological alert: neurological syndrome, congenital malformations, and Zika virus infection. Implications for public health in the Americas. 2015 http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&Itemid=270&gid=32405&lang=en (accessed Dec 17, 2015).
3 Petersen E, Wilson ME, Touch S, et al. Rapid spread of Zika virus in the Americas—implications for public health preparedness for mass gatherings at the 2016 Brazil Olympic Games. *Int J Infect Dis* 2016; **44:** 11–15.
4 Barthel A, Gourinat AC, Cazorla C, Joubert C, Dupont-Rouzeyrol M, Descloux E. Breast milk as a possible route of vertical transmission of dengue virus? *Clin Infect Dis* 2013; **57:** 415–17.
5 Centers for Disease Control and Prevention. Possible West Nile virus transmission to an infant through breast-feeding—Michigan, 2002. *JAMA* 2002; **288:** 1976–77.
6 Kuhn S, Twele-Montecinos L, MacDonald J, Webster P, Law B. Case report: probable transmission of vaccine strain of yellow fever virus to an infant via breast milk. *CMAJ* 2011; **183:** E243–45.

Zika virus infection in French Polynesia

On Feb 1, WHO issued an alert[1] on the potential fetal consequences of the Zika virus outbreak after the Brazilian authorities reported an abnormal increase in the number of cases of neonates born with microcephaly.[2] Although no causal link could be clearly established, circumstantial evidence was considered worrisome enough for several countries to discourage pregnant women from travelling to Central and South America.[3]

French Polynesia was affected by an epidemic of Zika between September, 2013, and March, 2014, with an estimated 28000 patients affected, representing around 11·5% of the Polynesian population.[4] In 2014, local clinicians were struck by an unusual rate of cerebral congenital anomalies. Within this territory, approximately 4000 births are recorded each year. All cases of suspected fetal abnormality detected during routine prenatal ultrasound examinations are referred to Papeete Hospital. When the referral examination confirms the presence of fetal cerebral anomalies, neuroimaging examinations (ultrasonography or MRI) are transmitted to the reference centre of Trousseau Hospital in Paris for evaluation by experts in fetal neuroimagery. In 2014, 13 cases of fetal cerebral anomaly were diagnosed, compared with four in 2013 and three in 2012. In addition, five neonates are currently under investigation for neurological signs of brainstem dysfunction. As part of the prenatal evaluation of the 13 cases of fetal cerebral anomaly, amniocentesis was offered to all women for fetal karyotype and cytomegalovirus detection by PCR, and performed in ten cases. Following the Brazilian alert on possible fetal cerebral damage secondary to maternal Zika infection, we retrospectively tested six available stored amniotic fluid samples using PCR. Among those, four were positive for Zika virus. The fetal brain anomalies depicted in these cases

Published **Online** March 1, 2016 http://dx.doi.org/10.1016/S0140-6736(16)00624-3

This online publication has been corrected. The corrected version first appeared at thelancet.com on March 10, 2016

Published **Online** March 1, 2016 http://dx.doi.org/10.1016/S0140-6736(16)00625-5

See **Online** for appendix