Do you think you encountered any extra hurdles as a female scientist?

My experience as a female scientist has been extremely varied (both positive and negative) depending on the institution in which I have been working and the colleagues with whom I interacted on a daily basis. In the case of negative experiences, I simply sought new opportunities within what I hoped would be a better environment.

Collaboration is now the foundation of research. For some early career researchers, especially women, it might be intimidating to make that first move and initiate conversation that might lead to collaboration. How did you manage this?

I tend to believe that collaboration works best when individuals both like and trust each other. Most of the collaborations I have built have come from first meeting a colleague at a conference or workshop. For this purpose, I prefer to attend smaller, more focused, meetings, where it is easier to interact with the principal investigators. I also treat such meetings as an opportunity not to be missed and force myself to approach and chat to people, even where I am feeling intimidated. More often than not, such moments end in a positive experience.

What can institutions do to support women in science?

For me, the strongest way institutions can support women is to ensure they are family friendly. This means supporting both men and women during pregnancy and maternity/paternity leave, to help create or access childcare structures, and to respect the needs of young parents (i.e., through enforcing meetings to be held only during working hours when childcare structures are open). Education and monitoring of senior staff sitting on recruitment committees are also key to ensuring male and female candidates have equal opportunities for employment.

If you were not a scientist, what would your alternative career be?

A surgeon or an educator.

[1]Global Health Institute, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne 1015, Switzerland

*Correspondence: nicola.harris@epfl.ch (N.L. Harris).

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Zika Virus and Microcephaly: Challenges for a Long-Term Agenda

Claudia Nunes Duarte dos Santos[1,*] and Samuel Goldenberg[2]

Since its introduction in Brazil in 2015, Zika virus (ZIKV) has begun to spread worldwide. One of the major infection outcomes is related to congenital malformations, but little is known about the pathogenicity of ZIKV. Here we discuss concerns about the ongoing ZIKV epidemic in the context of academic research, politics, and society.

The observation of atypical presumed cases of dengue fever by physicians in the states of Rio Grande do Norte and Bahia in Northeast Brazil in February 2014 (Figure 1) raised the possibility that they might be dealing with Zika fever. An analysis of samples by RT-PCR and sequencing confirmed the presence of ZIKV in the sera of these patients [1]. At that time, Brazil was experiencing a huge dengue epidemic that was far from controlled. Moreover, the introduction and spread of two different lineages of Chikungunya virus (CHIKV) in the north (Asian strain) and northeast (African strain) of the country since March 2014, contributed to a complex epidemiological picture, with the co-circulation of three different arboviruses, all apparently using the same urban mosquito species, *Aedes aegypti*, as a vector.

In February 2014, almost no data were available relating to ZIKV biology and pathogenesis, and only a few cases of mild, self-limited disease had been observed in humans. Epidemics caused by ZIKV were observed in the Yap Islands in Micronesia in 2013 and in French Polynesia in 2014, but no major clinical outcomes were reported [2].

In the following months, ZIKV spread to almost all Brazilian territories. More than 2 million human cases have been estimated by the Public Health Services, whereas CHIKV infections totaled only 26 900 cases (http://portalsaude.saude.gov.br/index.php/situacao-epidemiologica-dados-zika). Given that CHIKV was introduced a year earlier, in 2104, and both viruses are transmitted by the widely distributed *Ae. aegypti* mosquito, the discrepancy in the number of cases could indicate additional transmission mechanisms for ZIKV infection in humans (discussed below).

By October 2015, an unusual increase in the number of birth defects, such as microcephaly and other congenital malformations, was observed in the northeast region of Brazil. There was a strong temporal relation between the beginning of the ZIKV epidemic and the birth of these babies. Indeed, the common link among these cases was that the mothers reported clinical signs compatible with ZIKV during pregnancy, mostly within the first trimester [3]. The implication of ZIKV in these clinical outcomes provoked discussion among the scientific community in Brazil because this phenomenon was unprecedented in the literature. Furthermore, the correlation between the increase in microcephaly and ZIKV infection was criticized by some members of the scientific community because notification of microcephaly to health authorities was not compulsory and, thus, the

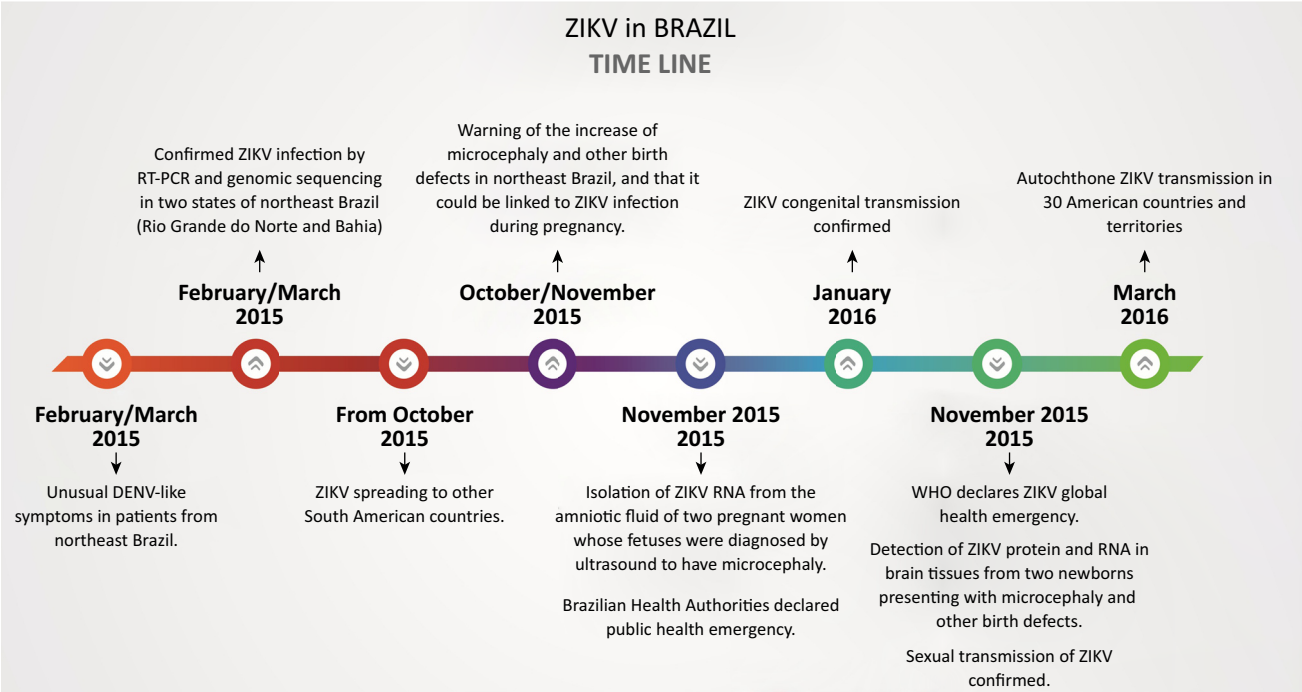

Figure 1. Timeline of Zika Virus (ZIKA) Outbreak in Brazil. Abbreviation: DENV, dengue virus.

numbers from past years could have been underestimated [4]. Interestingly, a short time after the description of these clinical outcomes in Brazil, the health authorities of French Polynesia recognized a putative association between microcephaly and ZIKV. The observation of fewer of these cases in French Polynesia could be a result of abortions due to diagnosed congenital defects during the epidemics in the islands because this procedure is not forbidden in the French territory, as opposed to Brazil.

In Brazil, 863 cases of microcephaly had been confirmed from October 2015 to March 2016, and 6480 cases are under investigation. While cohorts are being established and case-control studies are underway to definitely link ZIKV to microcephaly and other neurological manifestations, there is growing evidence to incriminate ZIKV in these congenital malformations. The first clue came from the isolation of viral RNA from the amniotic fluid of two pregnant women whose fetuses were found by ultrasound to have microcephaly [5]. Furthermore, ZIKV was detected in the placental and brain tissues of a fetus presenting with neurological birth defects, indicating vertical transmission from an expectant mother who had ZIKV symptoms at the end of the first trimester of pregnancy [6]. More recently, a study demonstrated the transplacental transmission of ZIKV through the detection of viral proteins and viral RNA in placental tissue samples from expectant mothers infected at different stages of gestation as well as in necropsy brain tissues from fetuses and newborns who died just after birth due to severe neurological disorders [7]. In this study, the possibility of a chronic placental infection was highlighted because, in two of the studied cases, both women reported ZIKV-compatible symptoms at the very start of pregnancy, and the virus persisted in their placentas until the birth of their babies. Despite the small number of cases studied, these results raise concerns about the persistence of ZIKV in some body tissues.

At the same time, an increase was observed in the number of reported cases of Guillain–Barre syndrome associated with previous clinical ZIKV infection. During the ZIKV epidemics in French Polynesia, an increase in Guillain–Barre cases was noticed, but only recently has a case-control study unequivocally implicated ZIKV infection in triggering this neurological syndrome [8]. The microcephaly and malformation cases are a major burden not only for the families, but also for the social security system, because these children will require assistance for their entire lives. Furthermore, because Brazilian law prohibits abortion, many expectant mothers are practicing illegal abortions and putting their lives at risk.

By the end of 2015, ZIKV had spread to other American countries, and it continues to move to other continents; the number of infections is increasing daily (www.paho.org/hq/index.php?option=com_content&view=article&id=11585&Itemid=41688&lang=en), and the first cases of