

Proving that the Zika virus causes microcephaly

Written by The Conversation USA

When the Zika virus was first discovered in Uganda in the 1940s, it was thought to be harmless. It caused a rash and, in some cases, a slightly elevated temperature. But in the past few months in Brazil, it has been linked with something far worse: [microcephaly](#) (an abnormally small brain and head) in newborn babies. In adults an increased incidence of a rare neurological disorder called

[Guillan-Barre syndrome](#)

has also been linked with Zika infection. This is associated with muscles weakness, paralysis and

[can be fatal](#)

. Zika is anything but harmless.

The World Health Organisation (WHO) has declared [Zika a global emergency](#) and predicted up to

[infections](#)

[4m Zika](#)

in the Americas alone in 2016. Infection rates of Zika in Brazil have skyrocketed and so too has the incidence of microcephaly. Microcephaly rates in Brazil were about five cases per 100,000 live births before the Zika outbreak, but in the past six to nine months this has reached

[200 per 100,000](#)

. Microcephaly can lead to a wide range of disabilities which includes learning problems, physical problems, such as difficulties with balance and coordination, hearing and visual problems, and epilepsy.

The first Zika virus pregnancy case has now been [confirmed in Europe](#) .

Zika's family

Zika is from the flavivirus family, a group of viruses that cause yellow fever, Nile fever and dengue fever. Some of these viruses cause encephalitis, inflammation of the brain in adults, and can be life threatening.

We already know that some viral infections during pregnancy can cause birth defects. Perhaps the best example is German measles (rubella), which in early pregnancy can cause damage to the heart, ears and brain.

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We know that flaviviruses related to Zika cause [microcephaly in newborn animals](#) following an infection during pregnancy. What is frightening is the huge increase in numbers of microcephaly cases in Brazil since the Zika outbreak. There is a strong correlation between the spread of Zika in Brazil and the [growing number of babies born with microcephaly](#).

While this does not prove that the Zika virus is the direct cause of the microcephaly, genetic material from the virus has been detected in both mothers and in their amniotic fluid (a pregnant woman's "waters"), indicating Zika has the potential to [infect an unborn baby while in the womb](#).

Given that other members of this virus family cause microcephaly in newborn animals, there is good reason to believe that [microcephaly and the Zika virus epidemic](#) are [linked](#).

How could Zika virus cause microcephaly?

Microcephaly is rare in humans. In some cases it's caused by chromosomal abnormalities (such as Down syndrome). It can also be caused by viral infections, for example, if the mother has German measles or chickenpox while pregnant. In other instances, microcephaly [can occur](#) if the foetus is exposed to alcohol, drugs or certain toxic chemicals in the womb.

Of course, the simultaneous increase in the rate of Zika infections and the rate of microcephaly could be coincidental. Yet scientists know that there is a strong association between the Zika virus and microcephaly and there is the evidence of Zika transmission between mother and foetus.

However, to definitively prove that Zika virus causes microcephaly requires several more pieces of information. This includes determining if the affected children have other developmental problems which could associate the microcephaly with a genetic or chromosomal disorder, and monitoring women throughout their pregnancy to determine when the damage to the foetus is caused, as well as ruling out other causes.

Researchers will also need to carry out "case-control" studies that look at babies born with

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microcephaly in a Zika virus affected area (the “cases”) and compares them with children that don’t have microcephaly from the same area (the “controls”). Presence of the Zika virus will be determined in each of the groups. If the children with microcephaly all have the Zika virus but the unaffected children don’t, then this will suggest Zika virus does cause microcephaly. Sadly, this will take time.

Neil Vargesson receives or has received funding for his research group from the Royal Society, Wellcome Trust, Imperial College London, University of Aberdeen.

Lavinia Faccini receives funding from Brazilian National Research and Technology Council (CNPQ - Conselho Nacional de Pesquisa e Desenvolvimento Tecnológico).

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