

# Alcimed

Press Release

## How to organize the prevention and fight against Zika, Chikungunya and Dengue fever?

*Alcimed, a consulting company specialized in innovation and new business development, provides an update on the risks associated with arboviruses worldwide and the strategies to fight these viruses.*

**Lyon, June 21<sup>st</sup> 2018** – Contrarily to what their name suggests, arboviruses are not transmitted by trees but rather by arthropods and particularly by certain mosquitoes. They are a large family of several hundreds of viruses, whose most well-known members include the Chikungunya, responsible in 2006 for more than 270,000 infections in the French overseas territories, and whose symptoms are disabling and prolonged joint pain. Another member of the family, the Zika virus, is sadly known in Brazil for having been responsible for thousands of cases of childhood microcephaly or Guillain Barré syndrome before the Rio 2016 Olympic Games (with a total of more than 1 million Zika infections in 2015 in Brazil).

Arthropods, derived from the Greek *arthon* "joint" and *podos* "foot", are animals characterized by an external chitin skeleton (exoskeleton), commonly referred to as a shell. They include insects, crustaceans and arachnids. Those that carry and transmit diseases are called vectors of which the most known are: mosquitoes *Aedes aegypt*, *Aedes albopictus*, *Culex pipiens* and ticks. The word arbovirus comes from the contraction of the English expression "arthropod-born virus".

Less known in Europe, but the most widespread virus worldwide, is the Dengue fever. It is estimated that 3.9 billion people live in areas where they are at risk for infection and that the virus is responsible for 390 million infections per year<sup>1</sup>, causing approximately 30,000 deaths. Often asymptomatic, the virus can induce high fever in the least dramatic cases, or even fatal hemorrhagic fevers in the most severe forms. Many other arboviruses, such as the Yellow Fever, can be fatal if they are not taken care of quickly and properly.

Currently, these viruses are particularly present in Southeast Asia, Latin America and Africa. However, the vectors carrying them are likely to survive and establish themselves in other territories, particularly in temperate climate zones, making them a potential threat that is closely monitored in Europe.

### Prevention, diagnosis and treatment: a complex challenge.

To fight these viruses, countries are arming themselves and adopting customized strategies based on the scale and frequency of epidemics affecting them, the economic resources the health system can allocate to the cause and the technological means for diagnosis at their disposal. In France, less than 100 cases per year are reported, almost all of which are imported cases of travelers who have visited endemic countries. In order to counter a potential installation of the virus in France, drastic measures

Biological diagnosis is based on the use of complementary technologies: molecular biology (PCR or rapid test) for the detection of the virus within the first 7 days of infection and/or serology for the detection of antibodies 7 days after symptom onset.

<sup>1</sup> OMS - OMS épidémiologie

have been put in place: double biological diagnosis (PCR + serology systematically prescribed), mandatory reporting to the ECDC<sup>2</sup>, eradication of mosquitoes in the patients' living area, in-depth patient monitoring and media coverage to inform the population. In the French overseas territories (DOM-TOMs), where the population is more alert, informed and educated to cope with the seasonal nature of these viruses, diagnosis during an epidemic can be made by a simple clinical examination. In Singapore, an endemic country with high resources, the government has decided that all suspected cases should be tested regardless of whether it is an epidemic period. On the other hand, in Brazil, an endemic area with more limited resources, there are difficulties and disparities in the care of patients depending on their income and location. Although the government has introduced systematic reimbursement for diagnostic tests for these viruses to address inequalities in access to care, diagnosis and case reporting remain ineffective in fighting the spread of the virus.

The battle against arboviruses is a topic tackled by many experts. Modern approaches seek to combine several mechanisms: vector control (pesticides, destruction of egg-laying areas, etc.), population protection (vaccination, physical or repellent protection to avoid bites, etc.).

Moreover, it should be noted that no curative treatment for arboviruses exists. Only symptomatic treatments to control fever, dehydration, pain and other symptoms have been developed. The chronic difficulty in controlling these infections on a global scale shows that there is a global challenge in epidemic management.

Viruses, such as Zika or Chikungunya, emerge suddenly and have demonstrated the danger of the rapid spread of new arboviruses, which could occur again in the upcoming years. The number of cases of Zika and Chikungunya are naturally decreasing, especially since the affected population developed a lifelong immunity, but the danger they may present in the future should not be underestimated. Dengue, of which there are several strains, proves time and time again how difficult arbovirus containment is.

### The mosquito vector at the heart of the fight

Observations of the difficulties of managing epidemics have led many research groups to try to develop novel approaches for mosquito control, as the common feature between the vast majority of arboviruses that can infect humans is their transmission vector: the mosquito. Eliminating them is thus a possible way to eradicate the problem.

It has become clear that observing, understanding and controlling mosquito reproduction can reduce the risk of infections worldwide. For example, in Singapore, a mosquito breeding and location surveillance program has reduced the number of Dengue infections in the country by 30%. This system is based on national SMS and e-mail alerts indicating which neighborhoods/streets should be avoided before mosquito control services have intervened.

Unfortunately, this strategy is difficult to transpose to large countries such as Brazil, Mexico or even France. Hence, in New Caledonia, a team launched a program called "Eliminate Dengue"<sup>3</sup>. It is based on producing mosquitoes carrying the *Wolbachia* bacterium, naturally present in 60% of insects and having the ability to prevent mosquitoes from transmitting viruses. The mosquitoes will reproduce passing this characteristic on to their offspring. The first release of "anti-arbovirus" mosquitoes will take place in the district of Nouméa in the beginning of 2018.

Where traditional mosquito repellents are showing their limits, a team of researchers has identified new molecules, derived from the *Cinnamosma fragrans* plant, that act as a repellent, anti-feedant and toxic agent for *Aedes aegypti*, the main vector of Dengue, Zika, Chikungunya and Yellow Fever.

---

<sup>2</sup> ECDC - European Centre for Disease Prevention and Control

<sup>3</sup> [Eliminatedengue.com](http://Eliminatedengue.com)

Other preventive strategies are being studied, such as understanding and interrupting the 'dialogue' between male and female mosquitos by sterilizing male "tigers", bombarding them with X or gamma rays, or diffusing pheromones to disturb the reproductive phase.

All these new techniques combined provide hope for a better global control of current and future arbovirus infections. However, specialists believe that they need to be completed with other approaches, such as vaccination, and extensive education to fight and protect against vectors, in the hope of being able to drastically reduce the occurrence of the diseases and one day even eradicate them.

One thing is clear, mosquito bites are not harmless and global warming as well as increased population movements could increase the number of risk situations in the short term so let's stay vigilant!

**About Alcimed** - [www.alcimed.com](http://www.alcimed.com)

Founded in 1993, Alcimed is an Innovation and New Business Consulting firm specialized in sectors driven by innovation: life sciences (food, biotech, healthcare), energy, environment, aeronautics, chemicals, cosmetics, materials, building, transportation, space and defence. Our purpose is to help both private and public decision-makers exploring and developing uncharted territories, dealing with new technologies, new offers, new geographies, possible futures, and new ways to innovate. Alcimed's clients are: industrial leaders, start-ups, SMEs, major companies, private equity players and public institutions. Alcimed's team is made up of 200 highly-skilled, multicultural, passionate individuals with an experience in science/technology and business. The company, headquartered in Paris, accounts 8 offices in 6 countries: Belgium, France, Germany, Singapore, Switzerland and USA. Alcimed is a member of CroissancePlus and the ACI (Association des Conseils en Innovation).

**Press contacts: ComCorp Agency**

Marie-Caroline Saro | [mcsaro@comcorp.fr](mailto:mcsaro@comcorp.fr) | +33 1 58 18 32 58 | +33 6 88 84 84 81 74

Sabrina Russo | [srusso@comcorp.fr](mailto:srusso@comcorp.fr) | +33 1 58 18 32 48 | +33 6 82 92 92 94 45