

## To understand and to combat the virus

On 1<sup>st</sup> of February of 2016 World Health Organization (WHO) declared the Zika virus infection and associated diseases to be a Public Health Emergency of International Concern. This virus is transmitted by mosquitoes and was known already since 1947, yet for all these years it never drew broader attention. The first sign that the virus may pose a threat to humans appeared already in 2007, when it spread to French Polynesia islands. The real danger was spotted last year, when it expanded its range to Americas. At present, we may not be sure about the actual range of the virus during summer months, as we are not sure what is the range of mosquitoes, which may transmit the disease. The symptoms of infection are not really severe – self-limiting fever, skin rashes, conjunctivitis, muscle and joint pain, malaise, and headache. Why the panic? Strikingly, the infections seem to be associated with increased frequency of Guillain-Barré syndrome occurrence in adults and the number of babies born with microcephaly. Both these conditions are very severe and no vaccines or drugs are available.

The Zika virus has a very peculiar mode of replication. After it enters the cell, its genetic material serves as a template for production of a single, very long protein. This protein is non-functional, and needs to be cut into small pieces that eventually will serve as viral enzymes and structural bricks forming progeny virions. Most of these scissions is carried out by the fragment of the protein – region called non-structural protein 3 (NS3) – and its inhibition results in complete blockade of virus replication. Similar enzymes are produced by other viruses, and some drugs targeting these proteases (e.g., for hepatitis C virus or HIV-1) were already proved to be useful in the clinic.

Responding to the emergence of a new threat of Zika virus we are planning to understand how the NS3 protein produced by the Zika works and what it does in the human cell. All these information will be extremely interesting to us, but they will also enable us to make an effort to combat the virus in the future.