



MAIL FROM ... Mozambique & South Africa

Tracking down virus types

A rotavirus infection can be life-threatening for young children in particular. Vaccines provide protection, but they are less effective in developing countries than in industrialised countries. Why is that? The German Federal Institute for Risk Assessment (BfR) and its partners set out to answer this question in sub-Saharan Africa specifically.

Vaccines have been protecting against infection with rotavirus for 15 years. The number of cases with serious disease progression was reduced on the African continent too. But the experts noticed something: “Overall the vaccines perform worse in Africa than in Europe or North America,” says Professor Dr. Reimar Johne of the BfR. He is leading the ‘AfRota’ (Antigens and Reassortant Strains for Rotaviruses Circulating in Africa) project which kicked off in 2018. Together with three partners from Mozambique and South Africa, the BfR team investigated the reasons for this lower effectiveness. The finding: “The approved vaccines are produced on the basis of virus strains from Europe and North America. Different virus strains occur in Africa, so the vaccines could lose effectiveness there,” explains Johne.

To understand the rotavirus, its strains and the possibilities of adapted vaccines for this region, samples from humans and animals were characterised at the Instituto Nacional de Saúde in Maputo (Mozambique) and a diversity of strains was detected. It was found that the virus types that were not present in the vaccines were the ones that spread. A team at the University of the Free State in Bloemfontein (South Africa) took a closer look at selected strains: so-called whole genome analyses show that they are constantly evolving and exchanging genetic material. They thus form completely new types, known as reassortants.

Johne: “In the future, we need new vaccines that are tailored to the changed viruses.” The BfR is already developing systems for a generation of reassortants with parts of the rotavirus types identified in Africa, which might be used in specific vaccines for the region.

Rotaviruses

Rotaviruses are prevalent worldwide, and can cause severe diarrhoea in young children in particular. The pathogens are highly infectious and transmitted via smear infection – from stools via the hands, objects, contaminated food and drinking water, and even via infected animals. There are hardly any deaths in Germany thanks to good medical care and high hygiene standards. In developing countries, the combination of poor hygiene and inadequate clinical treatment is fatal. According to one study, around 105,000 children under the age of five died of rotaviruses in 2016 in sub-Saharan Africa alone, out of 128,500 deaths globally.

In parallel, North-West University in Potchefstroom (South Africa) is working on producing rotavirus particles that cannot replicate. These could possibly be even safer to use as vaccines.

Many questions remain unanswered: Are the viruses and particles produced really suitable as vaccines? How can they be made highly effective, and at the same time safe? A further phase of the project plans to identify the necessary vaccine strains more precisely. ■

More information:

Falkenhagen, A. et al. 2020. Generation of Simian Rotavirus Reassortants with VP4- and VP7-Encoding Genome Segments from Human Strains Circulating in Africa Using Reverse Genetics. *Viruses*. 12, 201. DOI: 10.3390/v12020201