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Research in Graubünden

Hungry bacteria-eaters

Using Voracious Viruses to Treat Asthma

By Daniela Heinen

We are not alone. Millions of viruses, bacteria and fungi colonize our body. They exist on the skin, in the intestines or in the lungs. Their entirety, invisible to us, is called a microbiome. However, not every microbiome looks the same. For example, the microbiome of the lung differs from that of the intestine. Anja Heider and Ramazan Rozumbetov from the Swiss Institute for Allergy and Asthma Research (SIAF) in Davos are particularly interested in a group of particularly "voracious" inhabitants, the bacteriophages (phages for short). These viruses attack bacteria and can destroy them.

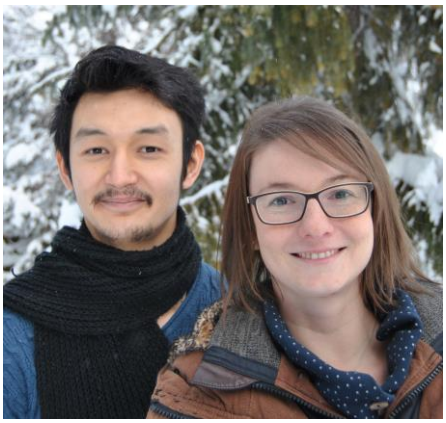
3D illustration of phage (stained red) infecting bacteria.
Image: Shutterstock

Heider and Rozumbetov intend to use this property in the future to treat asthma. They are investigating the effect of phages on epithelial cells of the respiratory tract, which are responsible for protecting the respiratory tract from allergens. The biotechnologist, the medical scientist, and other SIAF researchers are part of the European research project CURE, which aims to develop a new therapy for the treatment and possibly even cure of asthma. In addition to the SIAF, the ten research partners include the universities of Athens, Manchester and Umeå as well as the Georgian Eliava Institute.

According to the vision of the CURE research partners, phages will play an important role in the treatment of asthma in the future. In Europe, an estimated thirty million people are affected by chronic respiratory disease. "Currently, asthma can be treated, but not cured," explains Rozumbetov. CURE will determine the characteristics and dynamics of the microbiome of the human respiratory tract in healthy people and people with asthma. Researchers suggest that an imbalance in the respiratory microbiome may be responsible for the impaired immune response in asthma patients. With the development of a personalized phage therapy, they want to restore this balance and thus curb asthma.

Phages were already used to treat bacterial infections a hundred years ago. In 1919, the Franco-Canadian microbiologist Félix Hubert d'Hérelle for the first time cured a Ruhr patient with the help of phages. Together with Georgi Eliava, a Georgian bacteriologist, he founded the Eliava Institute for Phage Research in Georgia in the 1930s. Since antibiotics were often not available in their homeland during the Cold War era, Soviet researchers further developed phage therapy as an alternative to antibiotics. The East-West conflict in the second half of the 20th century hampered scientific exchange, so that the method was only revived in the West in recent years. Before phages could be approved for regular medical treatment of asthma and other diseases in the European Union and Switzerland, further studies and guidelines for their use are needed.

Find out more about research in Graubünden: www.academiaraetica.ch, www.graduateschool.ch.



The researchers Ramazan Rozumbetov and Anja Heider. Picture: D: Heinen

The Experts

Anja Heider studied biology at the University of Halle/Germany. For the last five years, she has been working as an engineer for biotechnology at the SIAF in Davos. The Institute for Immunology and Human Genomics in Tashkent sent Uzbek medical scientist Ramazan Rozumbetov to Davos for a six-month research fellowship. If you have any questions on the topic, please contact the two experts at info@graduateschool.ch. by February 6.

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