FAU scientists are working on a vaccine against Covid-19

Nothing less than the development of a passive vaccine against Covid-19 has been undertaken by a team of scientists from Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Universitätsklinikum Erlangen (UKER) and their partners from the Fraunhofer Institute for Cell Therapy and Immunology in Leipzig and the German Primate Centre in Göttingen.

The aim of the ambitious project is to develop monoclonal antibodies that can be used, for example, to protect medical personnel, staff in care homes and high-risk patients. In addition, such antibodies could be suitable for treating patients severely affected by Covid-19 infection. As part of the call for funding for Covid-19 research, the interdisciplinary project will receive 500,000 euros from the Federal Ministry of Education and Research from May onwards.

In the case of a passive vaccine, which FAU scientists are working towards, the patient is injected with antibodies that target a very specific pathogen in the event of a possible infection. However, immunity to the virus is maintained only for a limited time, since the body gradually breaks down the antibodies again. Active immunisation, on the other hand, means that the patient is vaccinated with a weakened pathogen or its components. The body learns to form the appropriate antibodies itself and at best can retain this ability for a lifetime.

‘Clearly an active vaccine is the better alternative,’ explains Prof. Dr. Thomas Winkler from the Nikolaus Fiebiger Centre for Molecular Medicine at FAU. ‘But until it is available, a passive vaccine is a very good option for certain risk groups. We expect this passive vaccine to offer about two to three months of protection.’

Important preparatory work has already been completed

FAU scientists have so far identified more than 25 antibodies that could be suitable for a vaccine. In view of the urgency of their project, they have organised two parallel investigations.

The team led by Prof. Dr. Thomas Winkler has analysed blood samples volunteered by the first German Covid-19 patients who had already fallen ill at the end of January. In the blood samples of five recovered patients, biologists have identified around 2,000 different antibody genes. Approximately one third of 20 antibodies tested so far are targeted towards the coronavirus. Prof. Dr. Hans-Martin Jäck, Head of the Department of Molecular Immunology, and his team have obtained antibodies from genetically modified mice. The mice, which were developed by Prof. Jäck in cooperation with the biotech company Trianni in Erlangen, were vaccinated with components of the coronavirus and formed human antibodies due to their genetic modification. This investigation has successfully identified 20 antibodies targeted towards the coronavirus.

The most promising antibodies are now being tested by FAU virologists led by Prof. Dr. Klaus Überla, Head of the Institute of Clinical and Molecular Virology, for their ability to prevent viral infection in a cell culture system. The FAU team is looking for a very specific ability: the antibodies must bind to the so-called spike protein of the coronavirus and...
thus deactivate it as completely as possible.

The spike protein is the sharpest weapon and a weak point of the coronavirus: the virus needs the protein to infect a cell. However, antibodies can recognise the virus by means of the distinctive spike protein, bind to it and prevent the virus from penetrating into the cell.

In the next step, scientists at the German Primate Centre in Göttingen will test whether the results obtained from cell cultures can also be confirmed in animal experiments. The scientists emphasise that the first clinical trials in human patients can be expected at the earliest in six months. ‘All these are indispensable steps on the way to treating patients soon with a passive vaccine that is safe, tolerable and above all effective,’ says Professor Winkler. ‘It is also crucial, however, that we involve biotech or pharmaceutical companies with experience in the production and approval of antibody therapy in a timely manner. If all goes well, a passive vaccine could be available in nine months.’

Further information

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