

Therapeutic vaccines

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SARS, avian flu, Ebola – outbreaks of deadly viral infections are becoming increasingly frequent. And we still don't have vaccines for many of the pathogens responsible. One of the most dangerous classes of viral diseases is the zoonosis, which can be transmitted from animals to humans with sometimes fatal consequences.

One of these is caused by the West Nile virus (WNV), which was first identified in Uganda in 1937. The virus was carried to the United States in 1999 and had spread through the whole of North America within five years. There is now a risk that it will propagate worldwide. Since its first appearance in the United States, around 400 people have died there after coming into contact with the West Nile virus. A new vaccine promises to provide protection.

Scientists at the Fraunhofer Institute for Cell Therapy and Immunology IZI in Leipzig have developed the DNA vaccine. "In this type of vaccine, DNA molecules known as plasmids extracted from the pathogen are used for inoculation, instead of the whole virus. They contain the genetic code for the antigens that stimulate the body to produce antibodies. We can thus replicate the virus's natural infection route without actually triggering the disease," explains Dr. Matthias Giese, the IZI's head of vaccine development.

Conventional methods of vaccination involve injecting a dead or weakened form of the pathogen into the patient's body, which responds by producing the corresponding antibodies and developing immunity to the disease. An alternative is to inject a serum that already contains these

antibodies. Such vaccines are merely preventive. By contrast with live vaccines, which carry a risk of provoking the disease, DNA vaccines are absolutely biologically safe. Moreover, they activate all existing defense mechanisms in the body, are cheap to produce and can be stored without a refrigerator – which makes them ideal for use in subtropical and tropical climates.

"Since the human immune system is very similar to that of other mammals, we are developing a cross-species vaccine for use in both veterinary and human medicine. And unlike conventional vaccines, DNA vaccines can be used both as prophylactics and as therapeutics, i.e. in cases where the disease is already present," says Dr. Matthias Giese, citing the further benefits.

The WNV vaccine has already passed initial tests. Giese expects the laboratory research to be completed by the end of 2009. After that, another 3 years or so will be needed for the approval procedure including clinical trials. Then, it is hoped, the world's first therapeutic WNV vaccine will be ready for market.

Source: Fraunhofer-Gesellschaft

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