Protection from the own immune system

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Some 80,000 people in Germany suffer from multiple sclerosis – their immune system attacks and destroys healthy nerve tissue. Researchers at the Heidelberg University Hospital and the German Cancer Research Center in Heidelberg have succeeded in vaccinating mice with specially treated, autologous immune cells and preventing them from developing encephalitis, which is similar to multiple sclerosis in humans. A protein of the nervous system, that is the target of the harmful immune reaction in multiple sclerosis, was placed on the surface of the cells; the cells were treated with an agent that suppresses immune defense.

The Heidelberg researchers have published their results – initially online – in the prestigious journal "Proceedings of the National Academy of Sciences USA".

The team around Professor Dr. Peter Terness is working in the Department of Transplantation Immunology (Director: Professor Dr. Gerhard Opelz) of the Institute of Immunology at the Heidelberg University Hospital. Professor Terness and his colleagues work primarily on developing methods to prevent rejection of donor organs without impairing the immune system.

"The vaccine against multiple sclerosis works on the same principle," explains Professor Terness. "We have to teach the immune system not to fight the donor organ, or in this case its own nerve cells, as a foreign body."

In the course of their research on organ rejection, the scientists

successfully treated immune cells (known as dendritic cells) of a donor animal with the chemotherapeutic agent mitomycin and injected them into the organ recipient before transplantation – the modified cells were not attacked. The immune system of the transplant recipient subsequently accepted the tissue of the donor animal as well. The results were published in "Transplantation" in 2007.

Subsequently, Professor Terness's team used this procedure to suppress the harmful immune response in multiple sclerosis – in cooperation with Dr. Thilo Oelert from the Department of Molecular Immunology at the German Cancer Research Center they loaded immune cells from mice with a self protein from the nervous system, treated them with mitomycin, and reinjected them into the animals. Afterwards, experimental autoimmune encephalitis – the equivalent of multiple sclerosis in humans – could no longer be induced in these mice; they were resistant. "The treated cells express the target protein and simultaneously suppress the immune response. In this manner, the immune cells become accustomed to the protein and do not attack it later, even without the inhibitor," explains Professor Terness.

The researchers now want to study whether this method is also effective for treating already-existing multiple sclerosis. They will use animal experiments to study whether the vaccine with treated autologous cells has not only a preventive effect, but a therapeutic effect as well.

Source: University Hospital Heidelberg