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Will there soon be an anti-depression vaccination?

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(Translated) At constant stress, our brain inhibits the immune system. It decreases as the number of white blood cells. Less well known is that the immune system acts conversely on the brain. So far, however, was uncertain whether the immune system thus has an impact on our emotions. A new study now shows something amazing: immune cells of highly stressed mice act as an antidepressant to other mice.

There are in stress research the technical term of "chronic social defeat-stress." In German that describes the stress that you feel when you bullied for example, all the time. The phenomenon also appears in mice when they are taken out of their shared apartment and put in a new one. There they are bullied once vigorously.

The effects of social defeat stress in mice similar to those in humans: general anxiety and social withdrawal. This social stress leads unfortunately this has loss of nerve cells in the hippocampus, the part of the brain that is responsible for the storage of new (and possibly nicer) memories.

Also on the immune system affects social long-term stress rather unfavorable. The increased level of stress hormones (corticosterone in rodents) in the blood affects time-inflammatory and also reduces the number of white blood cells. Those who remain, also produce fewer antibodies. As a result, the immune system is inhibited and you, or mouse, is susceptible to disease.

Some white blood cells called lymphocytes, conversely affect cognitive abilities such as spatial orientation and emotional reactions such as anxiety proneness. For example there are mice with a genetic defect that causes they have almost no lymphocytes. These lymphocyte-free mice buried more marbles when what sets them in the cage. This is a clear sign of anxiety in mice. Sprayed these mice, however, the lack of white blood cells, which were bled from a donor mouse, so that they suddenly cease to behave so anxious.

Rebecca Brachman and colleagues from the National Institutes of Health in Bethesda (Maryland, USA) wondered whether this anxiolytic effect of white blood cells depends on what emotional state had the donor mouse. To answer this question, the researchers lymphocyte-free mice also injected with a very similar gene defect lymphocytes from donor mice. But here was a group of recipient mice lymphocytes from stress-free mice, and other animals that had previously 14 days the social defeat stress of a dominant male to endure in a strange cage.

The result is surprising: "mice that received lymphocytes from stress mice showed less anxiety and nerve cells in their hippocampus increased more rapidly compared to those who received

their white blood cells of unstressed donors," the researchers write in the publication.

The anxiety of the recipient mice they tested with a light-dark box. This box consists of a transparent, brightly lit compartment and a dark, opaque. Mice that are less afraid to spend more time in the light than in the dark compartment of the box.

Bachmann and her colleagues interpret these results as: stressful situations affect the immune system so that it reduces the effects of stress in the recipient animal - such as an anti-depression vaccination. This observation is actually counter-intuitive, the authors write. "Instead of transferring the immune cells of the stressed animals anxiety and depressive behavior in the recipient animals, these immune cells appear to protect against the negative effects of stress."

"This is a completely unexpected result was for us," says Professor Mike Herkenham, the laboratory director and senior author of the study. "We have no idea how the lymphocytes have transferred their antidepressant effect on the recipient mice, especially in the brain, because the signal molecules of lymphocytes are actually too large to cross the blood-brain barrier."

The data suggested that immune cells even try to counteract the negative effects of stress. The immune system is thus likely to be involved in the mechanisms that make animals and people resistant to stress, and offer a potential starting point to make new fast-acting antidepressants.

The results were published on 28 January in the Journal of Neuroscience.