Genetically altered mice provide initial evidence that human gut bacteria can trigger multiple sclerosis

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Munich. (LMU) Multiple sclerosis (MS) is the most common inflammatory disease of the central nervous system. There are many indications that MS is an autoimmune disease in which immune cells “accidentally” attack the brain and spinal cord. However, as with other autoimmune diseases, the actual triggers of the autoimmune reaction are still unknown. A new study by scientists from the SFB 128 demonstrated for the first time that gut bacteria of MS patients are able to trigger an MS-like disease in an animal model.

It has been known for some time that the individual intestinal flora, also called “microbiota”, has a decisive influence on the function of the immune system. In order to investigate the role of gut bacteria in the development of MS, the scientists chose a particularly promising approach: they compared the intestinal flora of identical twins. It is rare that a MS patient has a twin brother or sister; however in such cases, usually only one twin is affected by MS while the other is healthy. This is an indication that something other than genetic factors must play a role in the development of MS. Within the scope of the cooperation project of the Institute of Clinical Neuroimmunology at the LMU-Klinikum and the Max Planck Institutes for Neurobiology and Biochemistry, the intestinal flora of identical twin pairs, with only one twin suffering from MS, was compared. Since each pair of twins is genetically identical, the influence of the human genes on the intestinal flora can be neglected in the paired comparisons and thus MS-relevant differences in the intestinal flora can be identified.

Dr. Kerstin Berer and Dr. Lisa Ann Gerdes from the SFB CRC 128, together with their colleagues and with support from the German Multiple Sclerosis Society (DMSG), recruited more than 50 identical twin pairs, each with one twin suffering from MS (German Twin cohort). When comparing the intestinal flora of healthy and MS-diseased twins, some interesting differences were found. Most noteworthy, however, was the observation that genetically modified mice populated with gut bacteria from MS twins more often developed brain inflammation very similar to human MS than mice colonized with intestinal bacteria of healthy twins.

This is the first direct indication that the human intestinal flora actually contains components that start or promote the onset of multiple sclerosis. For Prof. Dr. Reinhard Hohlfeld, head of the Institute of Clinical Neuroimmunology at the LMU-Klinikum, now the puzzle work begins: “In the next step, we must try to find out how it is possible that gut bacteria trigger an autoimmune reaction that ultimately which ultimately leads to the destruction of the brain and spinal cord. Because it is only when we understand the mechanisms better that we can influence them therapeutically. ”

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