PRESS RELEASE

The Gut as a Key Player in Immunotherapy for MS

According to an international study, multiple sclerosis therapy harnesses protective gut immune cells

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Bonn, July 23 – B-cell depletion therapies, in which B cells of the immune system, which may drive disease activity in multiple sclerosis (MS), are temporarily removed, have contributed significantly to improved treatment for patients in recent years. Researchers from the University Hospital of Bonn (UKB), the Universities of Bonn, Basel, Toronto, and Yale, along with their collaborators, have uncovered a previously unknown mechanism through which B-cell depletion therapies contribute to a better disease course in patients with MS. Surprisingly, the treatment appears to exert part of its beneficial effect by mobilizing regulatory immune cells that naturally reside in the gut. This study has now been published in the journal *Science Translational Medicine*.

In multiple sclerosis (MS), the most common chronic inflammatory disease of the central nervous system, B cells, which are part of our immune system, mistakenly attack the protective sheath surrounding nerves, known as the myelin sheath. This role in the development and progression of MS has brought this type of white blood cell into focus as a therapeutic target. It is important to note that researchers now know that not all B cells are harmful in MS. In addition to disease-causing B cells, there are also beneficial B cells that, in accordance with their actual function, help regulate immune responses and may have a positive effect on the course of the disease. An international research team led by Prof. Anne-Katrin Pröbstel from the UKB, as well as from the Universities of Basel and Bonn and the German Center for Neurodegenerative Diseases (DZNE), investigated in the study how B-cell depletion therapies affect these protective B-cell populations.

To this end, the first authors, Dr. Tradite Neziraj and Dr. Elisabeth Pössnecker, analyzed immune cells from various tissues. To do so, they collected cells from the blood, cerebrospinal fluid, and intestinal mucosal tissue of in the study participating control subjects and B-cell-depleted MS patients and examined the collected cells for type and function. They observed that B-cell depletion therapy promoted the trafficking of beneficial B cells from the gut into the bloodstream and the central nervous system of people with MS.

Immunotherapy promotes cell migration from the gut

“Our research shows that B cell depletion changes the levels of factors that regulate B cells and is associated with an increased migration of protective gut-derived B cells,” explains Prof. Dr. Pröbstel, Managing Director of the Center for Neurology at the University Hospital Bonn (UKB), a member of the Cluster of Excellence ImmunoSensation[3] at the University of Bonn, and research group leader at the DZNE. “Interestingly, higher levels of these B cell-regulating factors were linked to better outcomes in patients with MS.”

The findings provide new insights into why B-cell depletion therapies are so effective. Rather than simply removing harmful immune cells, the treatment may also help recruit beneficial immune cells from the gut. This discovery opens up new possibilities for developing future therapies that harness beneficial gut immune cells in MS and other inflammatory diseases.

Collaborations and Funding:
The study was conducted in collaboration with Université de Lausanne and UMC Amsterdam. The research team of Prof. Pröbstel received funding for the study from the Swiss Multiple Sclerosis Society (SMSG), the Propatient Stiftung of the University Hospital of Basel, the Fondation Pierre Mercier pour la Science, the National Multiple Sclerosis Society, the Swiss National Science Foundation, the State Secretariat for Education, Research an Innovation (SERI) under the European Union's Horizon 2020 research and innovation program grant and the German Research Foundation (DFG) as part of Germany's Excellence Strategy. Dr. Neziraj received funding through an "Early Investigator Research Award" from the U.S. Department of Defense's Multiple Sclerosis Research Program and a postdoctoral fellowship from the SNF.

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Image material:

Caption for collage:
B-cell depletion therapies: (from left) Prof. Dr. Anne-Katrin Pröbstel, Dr. Tradite Neziraj and Dr. Elisabeth Pössnecker have discovered that this multiple sclerosis therapy utilizes protective immune cells in the gut, thereby contributing to a more favorable disease course.

Picture credits: (left) University Hospital Bonn (UKB) / Rolf Müller; (center, right) University Hospital Basel / Rita Carubia

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About the University Hospital Bonn: As one of Germany's leading university hospitals, Bonn University Hospital (UKB) combines excellence in medical care and research with high-quality teaching. Every year, UKB treats more than half a million outpatients and inpatients. Around 3,500 students are enrolled in medicine and dentistry, and over 600 individuals receive training in healthcare professions annually. With around 9,900 employees, UKB is the third-largest employer in the Bonn/Rhein-Sieg region. In the „*Focus* hospital rankings", UKB is rated the top university hospital in North Rhine-Westphalia and has the second-highest case mix index (an indicator of treatment complexity) of all university hospitals nationwide. In 2025, UKB secured nearly €100 million in third-party funding for research, transfer, and teaching. For the fourth consecutive year, the F.A.Z. Institute recognized UKB as both "Germany's Training Champion" and "Germany's Most Desirable Employer." For current figures and further information, please refer to the annual report at: geschaeftsbericht.ukbonn.de