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Press release
For immediate release

New cause of chronic inflammation in ulcerative colitis discovered
Gut bacteria send dangerous mediators

Graz, 19 May 2025: It is estimated that over five million people worldwide suffer from ulcerative colitis, a chronic inflammation of the colon that often progresses in stages whose causes have not yet been fully investigated. A new international study with the participation of researchers from the Medical University of Graz and the University of Graz has now yielded groundbreaking findings regarding the development of this disease. The paper published in the journal Nature Communications shows that not only living gut bacteria but also their tiny vesicles (small extracellular sacs), which are coated with antibodies, significantly contribute to chronic inflammation in the colon.

Trojan horse in the gut: how bacteria trigger inflammation

The focus of the current study is on bacterial extracellular vesicles (BEVs). Just a few nanometers in size, they are tiny sacs produced by gut bacteria. These vesicles contain different bacterial elements including pro-inflammatory substances such as lipopolysaccharide (LPS), proteins or pieces of DNA.

"BEVs can be thought of as a molecular communication system: With their help, bacteria influence their environment—and also the human immune system," explains Christoph Högenauer, a Med Uni Graz gastroenterologist.

The researchers from Med Uni Graz, the University of Graz and their international partners have now found out that in patients with ulcerative colitis, many of these vesicles in the gut are coated by a specific antibody, immunoglobulin A (IgA). IgA normally helps to protect the gut mucosa against pathogens. In this case, IgA seems to unintentionally intensify inflammatory processes.

The IgA-coated vesicle binds selectively to receptor CD89, which is present in certain immune cells in the gut. "This contact can trigger especially strong inflammatory reactions—and might play a key role in chronic inflammation," says Högenauer.

"These vesicles act like small Trojan horses: They transport inflammatory signals and are easily recognized and activated by immune cells due to the IgA coating," adds molecular biologist Stefan Schild of the University of Graz.

The immune system versus the microbiome—key findings

In the study, the researchers analyzed colonic fluids and tissues samples from ulcerative colitis patients as well as healthy control subjects. They found:

- High concentrations of IgA-coated BEVs in the samples from subjects suffering from ulcerative colitis
- Strong inflammatory reactions in immune cells with a CD89 receptor when they were confronted with IgA BEVs
- Clearly more CD89-positive immune cells in the inflamed gut mucosa of ulcerative colitis patients
- In a mouse model with a human CD89 receptor, these IgA BEVs significantly aggravated gut inflammation—while unmodified mice or those with soluble IgA did not exhibit such a reaction.

These findings provide a clear indication that it is not the antibodies alone or the bacteria itself but the combination of bacterial vesicles and IgA coating that provide the trigger for chronic inflammation.

Closing the treatment gap: Research brings antibodies into play

Ulcerative colitis is one of the most common chronic inflammatory bowel diseases. Its incidence is increasing worldwide—especially in industrialized countries. Although modern therapies target the immune system, many patients are resistant to treatment or suffer relapses. Högenauer and Schild are in agreement that the newly identified IgA BEVs might be key to closing this gap: "Our findings shows that these bacterial vesicles play a key role as previously overlooked drivers of inflammation—and also provide a new therapeutic target." In the future, therapies might be developed that stop the formation, IgA coating or effect of these vesicles—for example through neutralizing antibodies or blockage of CD89. In addition, the data suggest that earlier strategies targeting B cells or IgA that have been abandoned should be reconsidered.

A new look at the gut microbiome

The study emphasizes once more the importance of the gut microbiome in chronic inflammatory disease—but from another perspective: "It's not just which bacteria are present but also what they release and how these signals are interpreted by the immune system," stresses Högenauer. "Bacterial vesicles—products of the microbiome that have hardly received any attention—are thus becoming the focus of research. They might play an important role in the future not just in ulcerative colitis but also in other immune-mediated diseases," adds Schild.

Original publication

[Enrichment of human IgA-coated bacterial vesicles in ulcerative colitis as a driver of inflammation](#)

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Further information

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