

Fasting acts as diet catalyst in those with metabolic syndrome

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One in four Germans suffers from metabolic syndrome. Several of four diseases of affluence occur at the same time in this 'deadly quartet': obesity, high blood pressure, lipid metabolism disorder and diabetes mellitus. Each of these is a risk factor for severe cardiovascular conditions, such as heart attack and stroke. Treatment aims to help patients lose weight and normalize their lipid and carbohydrate metabolism and blood pressure. In addition to exercise, doctors prescribe a healthy, low-calorie diet. Medication is often also required. However, it is not fully clear what effects nutrition has on the microbiome, immune system and health.

A research group led by Dr. Sofia Forslund and Professor Dominik N. Müller from the Max Delbrück Center for Molecular Medicine in the Helmholtz Association (MDC) and the Experimental and Clinical Research Center (ECRC) has now examined the effect a change of diet has on people with metabolic syndrome. The ECRC is jointly run by the MDC and Charité Universitätsmedizin Berlin. "Switching to a healthy diet has a positive effect on [blood pressure](#)," says

Andras Maifeld, summarizing the results. "If the diet is preceded by a fast, this effect is intensified." Maifeld is the first author of the paper, which was recently published in the journal *Nature Communications*.

Broccoli over roast beef

Dr. Andreas Michalsen, senior consultant of the Naturopathy Department at Immanuel Hospital Berlin, and Professor Gustav J. Dobos, chair of naturopathy and integrative medicine at the University of Duisburg-Essen, recruited 71 volunteers with metabolic syndrome and raised systolic blood pressure. The researchers divided them into two groups at random.

Both groups followed the DASH (Dietary Approach to Stop Hypertension) diet for three months, which is designed to combat [high blood pressure](#). This Mediterranean-style diet includes lots of fruit and vegetables, wholemeal products, nuts and pulses, fish and lean white meat. One of the two groups did not consume any solid food at all for five days before starting the DASH diet.

On the basis of immunophenotyping, the scientists observed how the immune cells of the volunteers changed when they altered their diet. "The innate immune system remains stable during the fast, whereas the adaptive immune system shuts down," explains Maifeld. During this process, the number of proinflammatory T cells drops, while regulatory T cells multiply.

A Mediterranean diet is good, but fasting improves it

The researchers used stool samples to examine the effects of the fast on the [gut microbiome](#). Gut bacteria work in close contact with the immune system. Some strains of bacteria metabolise dietary fibre into anti-inflammatory short-chain fatty acids that benefit the [immune system](#). The composition of

the gut bacteria ecosystem changes drastically during fasting. Health-promoting bacteria that reduce blood pressure multiply. Some of these changes remain even after resumption of food intake. The following is particularly noteworthy: "Body mass index, blood pressure and the need for antihypertensive medication remained lower in the long term among volunteers who started the [healthy diet](#) with a five-day fast," explains Dominik Müller. Blood pressure normally shoots back up again when even one antihypertensive tablet is forgotten.

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Provided by Max Delbrück Center for Molecular Medicine

Blood pressure remains lower in the long term—even three months after fasting

Together with scientists from the Helmholtz Centre for Infection Research and McGill University, Montreal, Canada, Forslund's working group conducted a statistical evaluation of these results using artificial intelligence to ensure that this positive effect was actually attributable to the fast and not to the medication that the volunteers were taking. They used methods from a previous study in which they had examined the influence of antihypertensive medication on the microbiome. "We were able to isolate the influence of the medication and observe that whether someone responds well to a change of diet or not depends on the individual immune response and the gut microbiome," says Forslund.

If a high-fibre, low-fat diet fails to deliver results, it is possible that there are insufficient gut bacteria in the gut microbiome that metabolise fibre into protective fatty acids. "Those who have this problem often feel that it is not worth the effort and go back to their old habits," explains the scientist. It is therefore a good idea to combine a [diet](#) with a fast. "Fasting acts as a catalyst for protective microorganisms in the gut. Health clearly improves very quickly and patients can cut back on their medication or even often stop taking tablets altogether." This could motivate them to stick to a healthy lifestyle in the long term.

More information: András Maifeld et al. Fasting alters the gut microbiome reducing blood pressure and body weight in metabolic syndrome patients, *Nature Communications* (2021). [DOI:](#)

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