Gut bacteria flora linked to chronic heart failure

A new Norwegian study has found that chronic heart failure patients lack important microbiota in their intestinal tracts.

Heart failure is just that – a condition when the heart is no longer doing its job properly.

It is incapable of pumping the quantities of blood a healthy heart can. This means internal organs might not be getting the blood supply they require. Many chronic heart failure patients end up needing heart transplants and the condition can be fatal.

But Norwegian medical researchers have discovered something that might give better odds to future heart failure patients.

A new study shows that people with chronic heart failure have a different gut microbiota – the community of microorganisms in the intestinal tract – than healthy persons.

Maybe they could be helped by treatment of their intestines?

Found characteristic differences

Marius Trøseid at the Oslo University Hospital and colleagues are behind this research.

They studied the gut microbiota of two independent groups of heart failure patients. The microbial flora of both were compared with analyses of the intestinal flora with comparable groups of healthy persons.

This enabled them to find characteristic differences in the gut microbiota of healthy people and patients with chronic heart failure.

“There is one special signal that is seen in both groups of heart patients,” says Trøseid.

“They have a narrower variety of microbes in their intestines. We identified 15 groups of bacteria that are different between healthy and afflicted persons, and most of these groups are lacking in the heart failure patients.”

Moreover, most of the 15 bacteria groups have something else in common: They produce the compound butyrate – a so-called conjugate base of butyric acid.

Inflammation

Butyrate is a short chain fatty acid that the body really needs.

“It is a major source of nutrients for the cells lining the colon,” says Trøseid.
Butyrate also has a direct effect on the intestines as a suppressor of colonic inflammations. So what happens when there is less of this substance?

Trøseid and colleagues found a link between levels of butyrate producing bacteria in the gut and levels of inflammation substances in the bloodstream.

It’s conceivable that a lack of butyrate leads to inflammations in the intestines of chronic heart failure patients because its healthy effect is absent.

It is also possible that colonic cells begin to work less effectively, thus weakening the barrier between gut contents and the rest of the body. This enables substances from the gut to leak into the bloodstream and trigger an immune response in the entire body.

Earlier studies have found that such inflammations can play a role in heart failure.

Trøseid and colleagues also followed the condition of one of the groups for 14 months. Some of the patients died in this period or received heart transplants. These patients also had larger reductions in butyrate producing bacteria groups and higher levels of inflammation substances than the other patients.

Start of something bigger

Cardiological researcher Helge Røsjø at the University of Oslo is intrigued by the results.

“Gut flora can be significant for the development of heart diseases,” he writes in an email to ScienceNordic’s Norwegian partner forskning.no.

The professor emphasises the need for more and larger studies before this can prospectively be put to clinical use for patients.

“This work can certainly be the start of more comprehensive studies,” writes Røsjø.

He has not been involved in the study but has worked with some the same researchers in connection with other initiatives.

What is the relationship?

There is much to be learned about the link between the types of microbes in the gut and chronic heart failure.

There is also the issue of cause and effect. A link between gut microbes and the disease does not determine which is causing what.

It could be that gut microbiota are part of the cause of or an exacerbating factor for heart failure. But it might also be that the disease is changing the flora of gut microbes.

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“It is likely that heart failure also impacts the gut,” says Trøseid.

“The heart pumps less blood to the intestines and patients often suffer oedema in the intestinal lining.”

Maybe it is a vicious circle, where heart failure impacts the gut and the gut is maintaining or aggravating the heart disease.

Possible treatment
More research is needed.

There are thought to be many related studies underway elsewhere. As Trøseid and colleagues published their results, a similar study from China was published in Scientific Reports. Their results were also congruous to those in the Norwegian project.

Trøseid and colleagues want to continue along two paths.

They hope to get funding for more thorough analyses of the genes of the gut bacteria and analyse the bacteria produced substances that find their way into the bodies of patients with heart failure.

The researchers are already at work on a study in which they knock out or alter some of the gut microbiota to see whether this can help the heart failure patients.

Trøseid hopes that this will someday lead to better ways of treating those with serious heart condition.

“I don’t think we can cure heart failure by improving the gut microbiota but it is conceivable this can be used as a supplementary treatment which can help make other medications more effective,” he says.

Read the Norwegian version of this article at forskning.no.

Chronic heart failure patients lack several of the bacteria groups which produce the anti-inflammatory substance butyrate. (Photo: Liya Graphics / Shutterstock / NTB scanpix)

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