

Mouth bacteria invade the gut in liver cirrhosis patients

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An invasion of the gut by mouth bacteria could be responsible for the development of liver cirrhosis, according to new research led by Professor Stanislav Dusko Ehrlich, who was recently appointed as Director of the new Host-Microbiome Centre at King's College London's Dental Institute.

Scientists from INRA in France, in collaboration with a research team from China, found that the gut microbiota of individuals with liver cirrhosis differed notably from those found in healthy individuals, showing a high proportion of oral [bacteria](#).

The findings, published in *Nature* today, allowed researchers to build a non-invasive test for liver cirrhosis that showed a diagnostic accuracy of over 90 per cent. The breakthrough could have applications for other

chronic diseases and represents an important step in the search for novel treatments.

Bacteria and viruses in the body make up a diverse collection of microbes known as the human microbiome. These are essential for various human processes, such as digestion, but the unique collection of microbes in an individual may influence susceptibility to certain diseases. The mouth itself harbours one of the most diverse microbiomes in the human body and the bacteria present can lead to tooth decay and gum disease but can also be protective.

Cirrhosis is scarring of the liver as a result of continuous, long-term liver damage, often caused by obesity, viral infections and alcohol. Around 4,000 people in the UK die from liver cirrhosis each year. It is diagnosed mainly by [liver biopsy](#), an invasive method which requires the patient to be hospitalised.

Researchers analysed the microbiome of some 250 individuals, half of whom had liver cirrhosis. By comparing the 2.7 million genes they found in these individuals with previously established gene catalogues, researchers identified 800,000 previously unknown genes. Refining their analyses, they determined that 75,000 genes were very differently spread between cirrhotic patients and healthy ones. In terms of bacterial populations, 28 species were more abundant in cirrhotic patients, compared to 38 species in healthy individuals.

In [cirrhotic patients](#), researchers found that up to 40 per cent of the intestinal microbiota can be comprised of bacteria that are rare in healthy people. The majority of these usually reside in the mouth.

Professor Stanislav Dusko Ehrlich, Director of the Host-Microbiome Centre at King's College London's Dental Institute, said: 'A possible explanation is that a deficiency of bile synthesis in liver cirrhosis allows

an invasion of the gut by the mouth bacteria.'

The researchers also created a simple test, based on stool analysis, to identify liver cirrhosis patients by the abundance of only seven bacterial species. This diagnostic tool is promising since it is non-invasive and has an accuracy level of over 90 per cent. Moreover, results show a correlation between the proportion of the gut invaders and the severity of the disease.

Professor Ehrlich added: 'It could be possible to not only diagnose liver cirrhosis but also determine the stage of its advancement.'

Future studies will be needed to understand the role of this bacteria invasion in the development of liver cirrhosis. Early findings suggest that certain bacteria overproduce molecules that are implicated in hepatic encephalopathy, a common complication of liver cirrhosis. A therapeutic strategy would be to inhibit these bacteria; another could target the malfunction of bile in order to prevent the migration from the mouth to the gut.

The novel findings on gut bacteria changes in [liver cirrhosis](#) could provide useful leads for other chronic diseases. Oral bacteria have already been observed to be more abundant in patients with colorectal cancer or with Crohn's disease than in healthy individuals. Controlling and fighting this invasion of the gut from the mouth could prove helpful in treating these serious diseases.

The new Host-Microbiome Interactions Centre at King's College London is a collaborative effort between the Dental Institute and experts from across the College to investigate the bacteria which inhabit our body, help maintain our health and impact our diseases. This bacteria is acquired during our lifetime through exposure to the environment.

The new Centre will examine the role of the microbiome not only on oral and dental health, but also other major disease processes and the overall understanding of human biology.

Provided by King's College London

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