Mouth and gut bacteria linked to brain changes in Parkinson's disease

Scientists have discovered a link between bacteria in the mouth and gut and the progression cognitive decline in Parkinson's disease.

Specific changes in these bacteria, known as the microbiome, has associated with cognitive decline in Parkinson's. This includes the shift from mild memory issues to dementia, a common and distressing symptom of the disease.

These changes in the microbiome could potentially act as early warning signs of Parkinson's, helping doctors detect and treat the disease before symptoms become severe. Currently, Parkinson's is very difficult to diagnose in its early stages because symptoms develop slowly over time.

The research, led by King's College London, adds to the increasing evidence showing how gut and brain health are closely aligned. While the link between this 'gut-brain' relationship has been extensively studied, few studies have explored the role of the gut in cognitive decline of neurodegenerative degenerative disease such as Parkinson's.

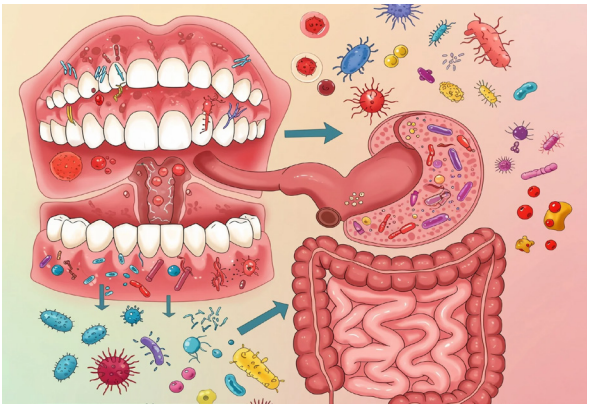
Dr Saeed Shoaie, group leader of the Quantitative Systems Biology (QTS) Lab at King's College London, said: "The human gut and oral bacterial communities are increasingly linked to neurodegenerative diseases. Disruptions in the gut-brain axis could trigger inflammation and immune responses that contribute to neuronal damage. A common gum disease bacterium like Porphyromonas gingivalis, has been discovered as a potential driver of Alzheimer's."

In the study, published in Gut Microbes, gut and mouth bacteria were analysed, collected in 228 samples of stool and saliva. This included two groups of patients with Parkinson's – those with mild cognitive decline and those with dementia – showing different stages of the disease. There was also a healthy control group with no Parkinson's diagnosis.

They discovered clear differences in the types and functions of bacteria between the groups. In people with cognitive impairment, the gut contained more harmful bacteria, many of which had likely come from the mouth.

This process, known as 'oral-gut translocation', involves oral bacteria moving into the gut, where they don't normally belong. These bacteria were found to release specific molecules known as virulence factors, toxins that can damage gut tissue, promote inflammation, and possibly affect the brain.

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The mouth and gut are linked

First author Dr Frederick Clasen, research associate at the QTS lab, King's College London, said: "We don't yet know if the bacteria are causing the cognitive decline or if changes in the body due to Parkinson's allow these bacteria to grow. But our findings suggest they may play an active role in worsening symptoms."

Using artificial intelligence, the team linked these toxins specifically to cognitive decline in Parkinson's. These tools helped pinpoint bacterial species and functions that weren't obvious by traditional analysis alone.

Dr Clasen explained: "These toxins could be used as biological markers to identify patients at higher risk of dementia in Parkinson's. In the future, they might also be targets for new treatments that protect the brain by changing the gut environment."

The findings also highlight the importance of oral hygiene and nutrition in people with Parkinson's, especially as the disease progresses.

Dr Shoaie, who co-authored the study, added: "The emerging evidence underscores the potential importance of maintaining oral and gut health in mitigating or slowing neurodegenerative processes. As people with Parkinson's become increasingly reliant on carers, routine practices such as oral hygiene and nutritional intake may be neglected.

"Our findings suggest that promoting a healthy microbiome through consistent oral care, a balanced diet, and potentially targeted probiotic interventions could support improved disease management in Parkinson's."

Future research will aim to understand whether these bacteria and toxins directly influence brain function, and if changing the microbiome through diet, oral hygiene, or medication can slow or prevent dementia in Parkinson's patients.