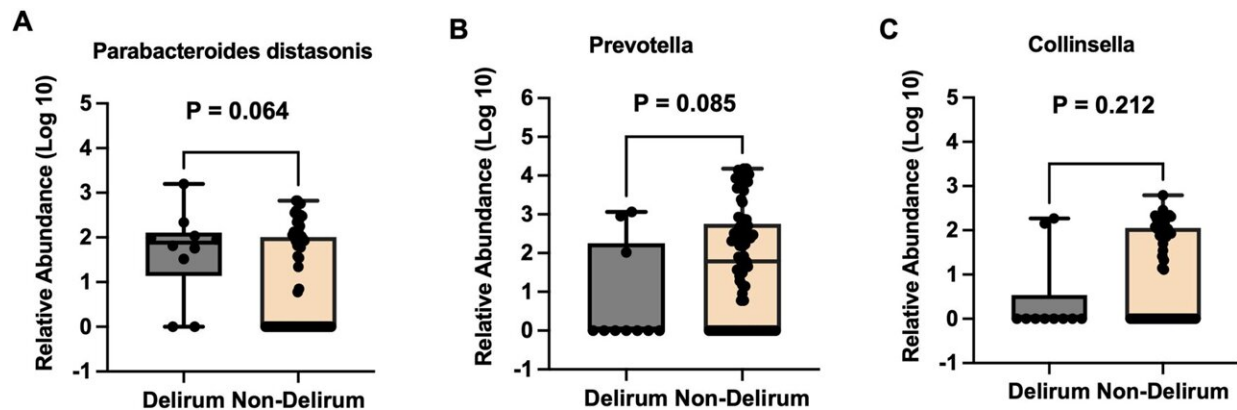# Gut bacteria may contribute to delirium in elderly patients after surgery

May 17 2023, by Brandon Chase

Different postoperative gut bacteria between participants with and without postoperative delirium. Participants who developed postoperative delirium (N = 10) had a higher postoperative relative abundance of gut bacteria of Parabacteroides distasonis (A) a lower abundance of postoperative gut bacteria of Prevotella (B) but not Collinsella (C) than the participants who did not develop postoperative delirium (N = 76). The box indicates the median (50th percentile), the first quartile (25th percentile), and the third quartile (75th percentile) of the abundance of bacteria. Mann–Whitney U test was used to determine the differences in bacteria abundance between the participants with postoperative delirium and those without postoperative delirium. Credit: *Translational Psychiatry* (2023). DOI: 10.1038/s41398-023-02450-1

Postoperative delirium—a sudden, fluctuating and typically reversible disturbance of mental status in patients that occurs after anesthetized

surgery—is a common postoperative complication. The causes, progression and biological signatures are largely unknown, however.

Now researchers at Massachusetts General Hospital, a founding member of Mass General Brigham, and colleagues have conducted a first-of-its-kind study that shows an association between gut microbiota and postoperative delirium. The study's findings were recently published in *Translational Psychiatry*.

Early studies in elderly mice found that anesthesia/surgery induced an age-dependent changes in postoperative gut microbiota and postoperative behavior, including postoperative delirium-like behavior.

In their current work, a clinical observational study conducted between 2016 and 2020 at Mass General, a research team led by Yiying (Laura) Zhang, MD, Ph.D., collected fecal swabs from patients undergoing knee or [hip replacement surgery](link) or laminectomy under general or spinal anesthesia.

The team used 16S rRNA gene sequencing to assess gut microbiota then used a new method called Dimension-reduction Algorithm in Small Human-datasets (DASH) to analyze the relationship between gut microbiota and postoperative delirium.

The method combined statistical algorithms and domain expertise to filter through a large amount of data and accurately extract important signals.

In the 10% of patients who developed postoperative delirium, the researchers found that higher levels Parabacteroides distasonis—a bacterium associated with gut wall health that has a varying role in different diseases—was positively associated with postoperative delirium after adjusting for age and sex.

"DASH was especially helpful in a small dataset where data-driven methodology alone was not enough to find a connection between gut bacteria and postoperative delirium," says Zhang, the lead and corresponding author of the study.

Zhang is an assistant investigator in the Department of Anesthesia, Critical Care and Pain Management at Mass General and assistant professor of Anesthesia at Harvard Medical School.

"Given the small sample size and complex data structure, data-driven methodology alone was insufficient in finding the relationship between gut microbiota and postoperative delirium in patients," says Wenyu Song, Ph.D., from the Department of Medicine at Brigham and Women's Hospital.

"These findings shed light on the possible pathogenesis of postoperative delirium, and may ultimately lead to the development of targeted interventions for better postoperative outcomes in elderly patients," says senior author Zhongcong Xie, MD, Ph.D., a physician-investigator in Department of Anesthesia, Critical Care and Pain Medicine at Mass General and Henry Knowles Beecher Professor of Anesthesia at Harvard Medical School.

More information: Yiying Zhang et al, The association between gut microbiota and postoperative delirium in patients, *Translational Psychiatry* (2023). DOI: 10.1038/s41398-023-02450-1

Provided by Massachusetts General Hospital

Citation: Gut bacteria may contribute to delirium in elderly patients after surgery (2023, May 17) retrieved 4 February 2024 from