# Prebiotics could help space travelers stay healthy

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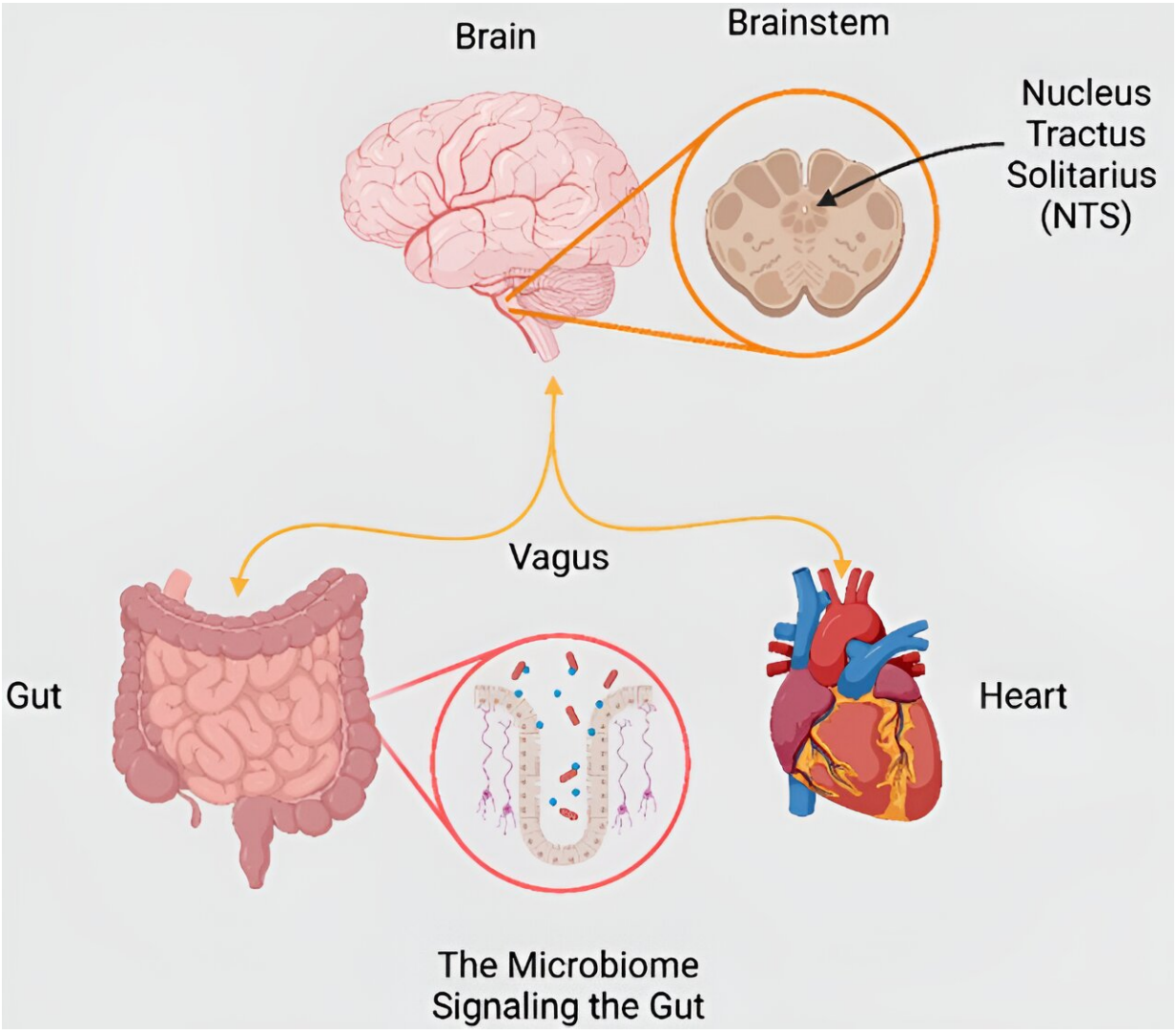

Credit: American Physiological Society

Space travel can be hard on the human body, but new research suggests that cultivating a healthy gut microbiome could help astronauts weather the stresses of altered gravity. Researchers presented their work at the American Physiology Summit in Long Beach, California, held April 4–7.

"Our work suggests that space travelers—or anyone suffering stress in response to extreme environments—can benefit from a prebiotic diet to reduce stress and its impact on the heart and gut," said Nicholas Iwakoshi, the study's first author and a doctoral student in the Neuroscience, Systems Biology and Bioengineering Program at Loma Linda University School of Medicine.

The study sheds new light on how gut microbes influence cardiovascular health. This is important in the context of space travel because altered gravity can disrupt the body's ability to regulate cardiovascular function, but it also could offer lessons for supporting heart health here on Earth.

"What you eat and the state of your microbiome affects your nervous system, your heart and your overall health," Iwakoshi said. "A healthy gut microbiome contributes to our adaptability to stress."

Prebiotics can be thought of as microbe food—substances that fuel the growth of healthy gut bacteria. They are different from probiotics, which contain live microorganisms, and can be taken as dietary supplements or consumed within foods that are naturally rich in

prebiotic compounds.

For the study, researchers used a device at the NASA Ames Research Center that mimics the 3G-force gravitational load that astronauts experience during launch and landing. Mice were divided into groups and fed either a normal diet or a prebiotic-enriched diet and exposed to normal gravity or 3Gs. According to the results, mice given a prebiotic diet were better able to adjust to the stresses of 3Gs, as measured by changes in heart rate variability, compared with the 3G-exposed mice that were fed a normal diet.

The findings suggest that by encouraging the growth of certain gut bacteria, the prebiotic diet influences the signals sent from the gut to the central nervous system in ways that help manage the balance between sympathetic (fight-or-flight) and parasympathetic (rest-and-digest) drive, reducing cardiovascular stress.

"Our most interesting result was that the prebiotic diet mitigates some of the gravity-dependent stress responses that alter cardiovascular control," Iwakoshi said. "This suggests that brainstem centers that communicate with both the gut and heart coordinate adaptation to stress."

The researchers noted that further studies would be needed to confirm the findings and assess the impact of prebiotics in humans.

Provided by American Physiological Society

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