Is gut health the key to preventing osteoporosis? New study aims to find out

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Microbiota in the gut can affect how minerals are absorbed or impact the bone remodeling process. This study by Tulane University will be one of the most comprehensive to examine the relationship between microbiota in the gut and a person's risk for osteoporosis. (Photo by Shutterstock)

There's a reason osteoporosis is dubbed a "silent disease." Despite its prevalence — affecting more than a third of all women ages 50 and older and more than 200 million people worldwide — the disease often makes bones brittle before a person

knows they're at risk. Once diagnosed, current medications can often fall short due to the highly individual causes of the disease and the wide array of severe side effects.

Fractures can lead to disability or even death. In addition, osteoporosis is expected to cost patients and the U.S. healthcare system more than $25 billion annually by 2025.

Now, the National Institutes of Health has given Tulane University more than $11 million for an innovative study that aims to sound the alarm earlier on osteoporosis and develop more effective, personalized drugs in response. And the key to combating the disease may reside in the gut.

"The hypothesis is that the different compositions of bacteria species in the gut influence people's health and risk of osteoporosis," said study director Dr. Hong-Wen Deng, who leads the Center for Biomedical Informatics and Genomics at Tulane University School of Medicine.

Past studies have found that microbiota in the gut can affect how minerals such as calcium are absorbed. Other gut bacteria can regulate cell signaling and impact the bone remodeling process. Some research has previously shown a relationship between gut bacteria and bone mass in animals, but this study will be one of the most comprehensive to examine the relationship in people.

"Once we know people's genetic makeup and gut microbiome bacteria species, we can predict people's risk," Deng said. "And once we know the mechanisms and molecules that confer higher risk, we can target those using drugs."

The five-year study will operate in two phases. One phase will examine gut bacteria from up to 10,000 people to identify which may be markers for osteoporosis risk. The other will attempt to identify specific genes associated with osteoporosis and study how genetic variations passed from parents may affect a person's risk.

"No more than 15% of the inheritability or the genes involved, is known," Deng said. "We hope that down the road, we will be able to use that data for artificial intelligence applications for better prediction models that can be applied clinically and for the invention of new, more effective drugs without too many side effects."

The study is the first comprehensive osteoporosis study to include both men and women while examining both the human genome and the gut microbiome. Though women are at higher risk for osteoporosis, men have a higher mortality rate after suffering fractures, making it crucial to study both groups.

The study is also one of the most inclusive osteoporosis investigations and will examine osteoporosis risks among different ages and ethnicities.

"With Tulane's support and these grants, we've built one of the largest cohorts in the world from a single population for osteoporosis studies, more than 17,000 people locally," Deng said. "And we want to continue to study ethnic differences and the health of underrepresented populations."

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Study director Dr. Hong-Wen Deng, who leads the Center for Biomedical Informatics and Genomics at Tulane University School of Medicine, believes that identifying the gut bacteria linked to osteoporosis risk can lead to more effective treatment. (Photo by Cheryl Gerber)