Gut microbes may hold key to vascular healing

NIH GRANT AND SVS AWARD SUPPORT RESEARCH ON GUT MICROBES; EFFECT ON RESTENOSIS
Could microbes in the gut impact human arteries? Surprising early research suggests they might play a role.

Re-narrowing of the arteries is the most common problem for patients who have had open or endovascular surgery. Also called restenosis, it impacts between 20 and 50 percent of patients, depending on the artery treated, even if the surgery is initially successful.

Gut microbes may hold a key to preventing restenosis. In just a few years, they have become the new rock stars of human health, simultaneously blamed for numerous diseases and sought out as possible cures for others, such as diabetes, hardening of the arteries (atherosclerosis) and obesity.

Promising new research on how gut microbes are involved in vascular disease has received a Mentored Clinical Scientist Research Career Development Award (K08) from the National Institutes of Health.

Lead researcher and vascular surgeon Dr. Karen Ho has also recently been awarded a supplemental grant that is jointly sponsored by the Society for Vascular Surgery Foundation and the American College of Surgeons.
The term “gut microbes” refers to the trillions of bacteria that live in the human gastrointestinal tract. Over the evolution of the human species, these bacteria have become essential to human survival, but an imbalance of certain microbes can also lead to disease.

Fiber that is consumed in the diet passes to the gut, where gut microbes process it to produce a short-chain fatty acid called butyrate. Ho’s initial research suggests that butyrate, which has been shown to have an anti-inflammatory effect on different cell types in the body, may also act directly on cells in the blood vessel wall.

She believes that butyrate may help reduce scarring in arteries after vascular surgery, an important benefit because procedures to open a blocked artery often lead to scarring within the artery wall. Over time, this scarring process can lead to re-narrowing or even complete blockage of arteries. In many cases where this scarring process occurs, patients eventually will need to undergo additional procedures.

Ho also hypothesizes that microbes may produce other metabolites in addition to butyrate that also affect blood vessels positively after vascular surgery.

Atherosclerosis-related diseases are the No. 1 cause of death in the U.S. for both men and women, according to the Society for Vascular Surgery website. Roughly five million people in the U.S. are affected.

While Ho’s research is aimed at preventing artery re-narrowing after surgery, it could have other applications as well. Over the long term, such research could impact how patients are managed after procedures, Ho hopes. It may also change the way physicians treat patients with atherosclerosis before a surgical procedure.

“We are trying to identify the good microbes and the bad ones as well as understand their function,” Ho said. “We are very excited because we have made a lot of initial progress.”

Her research team is measuring how changes in the composition and diversity of gut microbes affect arteries. “We hope to identify pathways by which microbes affect vascular surgery outcomes,” said Ho, who is based at Northwestern University Feinberg School of Medicine in Chicago but working in tandem with researchers at the University of Chicago.

The research is preliminary and even though she has identified microbial strains that may affect scarring, further work will need to confirm these findings and translate results to patient care.

In the long term, she hopes that such research will lead to an understanding of how diet and gut microbes contribute to vascular disease and vascular surgery outcomes.

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The Society for Vascular Surgery® (SVS) is a 5,300-member, not-for-profit professional medical society, composed primarily of specialty-trained vascular surgeons, which seeks to advance excellence and innovation in vascular health through education, advocacy, research and public awareness. The Society is based in Chicago, Illinois.

PHOTO CAPTION: Dr. Karen Ho is leading a team of researchers to see if gut microbes can prevent narrowing of arteries after vascular surgery. https://flic.kr/p/FWeeCy

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