UW study will explore anemia

November 8 2011

To say a pregnant woman is eating for two leaves out a few guests at the table — trillions of them, according to Christopher Coe, a University of Wisconsin-Madison psychology professor.

Coe will soon begin studying a unique consequence of anemia — the lack of healthy, oxygen-carrying red blood cells — by looking at abundance of microbes living in the guts of humans and other animals.

Anemia's primary cause is an insufficient amount of iron, and Coe will investigate the relationship between the iron in our diets and the different kinds of microbes in our intestines with a Grand Challenges Explorations grant from the Bill & Melinda Gates Foundation.

"There are more bacteria in and on us than there are our own cells in our bodies," Coe says. "Bacteria need iron, too. Once your bacteria are in you, you and the iron you consume are their only source."

More than 1 billion people around the world are anemic, according to Coe, including some 90 percent of the children in rural India.

"It's a major concern for people in poorer parts of the world, but the richer parts are not off the hook," he says. "Pregnant women — especially pregnant teenagers — and fast-growing and large babies everywhere are at real risk of falling short on iron and becoming anemic."

The resulting fatigue and increased chance of infections can get severe

enough to put a life at risk, but the microbial connection also opens sufferers up to other concerns.

"We know from recent studies that anemic individuals have different gut bacteria than people who consume sufficient iron," Coe says.

Anemia is associated with more harmful bacteria — bacteria that can cause potentially dangerous illnesses not necessarily related to anemia. Upsetting the microbial balance in the intestines and bowel "can cause diarrhea and other illnesses," Coe says. "That's a big deal if you live in Africa, where clean water is hard to come by and uncontrolled bouts of diarrhea can be fatal."

Coe's lab will track the progression of iron as it passes through the bodies of rhesus macaques — one labeled iron isotope delivered to the monkeys' bloodstream directly, a different isotope through their stomachs (meaning it will have to pass through the microbes in their intestines).

At the same time, researchers will be applying new techniques from molecular biology to measure the presence of 230 different microbes that live within the route food takes through our bodies.

A lingering chicken-and-egg question may contribute to new treatments for anemia — including simple nutritional supplements or drugs that change the bacterial community in the gut to promote greater uptake of iron.

"It could be that nutrition is affecting the bacterial community, or conversely, that an abnormal bacterial community is one contributing cause of anemia," Coe says. "Part of our investigation involves basic science: We want to improve our understanding of iron biology to prevent illness, knowledge that can then provide new insights for clinical

practice. We are also applying cutting-edge and innovative techniques to identify both the beneficial and pathogenic microbes in the gut."

Both aspects are of interest to the Gates Foundation, which selected Coe's research from among 2,000 other applications in its most recent — and seventh — round of Grand Challenges Explorations grants. Each of the 110 awardees from around the world will receive $100,000 to support one year of research, with the option of then submitting initial results that could win $1 million in additional funding to continue the work. Round 7 focused on new approaches to promote maternal and child health.

"We believe in the power of innovation — that a single bold idea can pioneer solutions to our greatest health and development challenges," says Chris Wilson, director of global health discovery for the Gates Foundation. "Grand Challenges Explorations seeks to identify and fund these new ideas wherever they come from, allowing scientists, innovators and entrepreneurs to pursue the kinds of creative ideas and novel approaches that could help to accelerate the end of polio, cure HIV infection or improve sanitation."

To apply for the Gates award, Coe had to submit answers to two questions in a maximum length of two pages: "What is your idea?" and "How will you test it?"

"It was an interesting intellectual challenge as a researcher," Coe says. "You had to ask yourself some very basic and critical questions: What do I know? What can I do? How can we be of help with respect to promoting maternal and child health?"

For Coe and his collaborators — Gabriele Lubach of UW-Madison, Michael Bailey and Scott Dowd of Ohio State University, and Jonathan Swann of the University of Reading — the answers motivated taking a

unique perspective on iron deficiency, which was enabled by a huge leap in molecular biology and microbiology testing.

"It's a revolutionary new perspective, realizing that we have so many other organisms in and on us," Coe says. "Similarly, the new techniques enable us to determine their presence so fast and comprehensively."

Just 10 years ago, Coe's lab would have grown one type bacteria at a time (each in its own dish) to test for their presence in a sample. "Now we use a single swab," he says, "and in one determination, you know whether there are any of 230 species of bacteria and in what abundance."

That adds a new level of complexity — accounting for trillions of bacteria — to research. "But the main aim is still quite simple: Iron deficiency is a major problem for pregnant women and growing infants around the world," Coe says. "And we and the Gates Foundation believe that we can help improve prevention and treatment of anemia."

Provided by University of Wisconsin-Madison

Citation: UW study will explore anemia (2011, November 8) retrieved 4 May 2024 from https://medicalxpress.com/news/2011-11-uw-explore-anemia.html