

UNC's Nutrition Research Institute

Discovering what every body is craving

PHOTO BY CHAD MITCHELL

Imagine visiting your doctor for a prescription – not for medication, but for a diet perfectly tailored to your body's needs. You would get a precise menu for feeling and looking your best – foods to ward off chronic diseases such as cancer and diabetes, to preserve memory and other brain function, even to increase fertility.

Thanks to research by scientists at the UNC Nutrition Research Institute (NRI), in Kannapolis, N.C., nutrition wellness prescriptions are becoming a reality. Drs. Brian Bennett, Carol Cheatham, Karen Corbin, Amy Johnson and Steven Zeisel study the relationship

of our unique genetic composition with the nutrients that make us function most efficiently. Research into genetics, metabolism, cognitive function – even bacterial content of our gut—provides insight into what each of us needs to be at his or her best.

Assistant genetics professor Dr. Brian Bennett, for example, explores factors that may increase some people's heart disease risk. His theory? In some people, too much of the nutrient choline might react with common gut bacteria, forming a harmful byproduct of metabolism, or metabolite. Those individuals may want to avoid choline supplements.

In contrast, pregnant women – require abundant choline to support development of the fetal brain and nervous system. Dr. Steven Zeisel, Institute director, and Dr. Carol Cheatham are examining possible benefits of adding choline supplements to the diets of pregnant women in The Gambia to stimulate cognitive development in fetuses (See box on page 13 for details.)

Blueberries may stimulate cognitive function, too—especially in the elderly. They might help people stay sharper and more alert as they age. Through a grant from the U.S. Department of Agriculture, Cheatham is exploring possible benefits of an extract of blueberries to thinking and reasoning in the elderly.



Brian Bennett, PhD



Carol Cheatham, PhD



Karen Corbin, PhD



Amy Johnson, PhD

Another NRI researcher, Dr. Karen Corbin, leads a team that discovered a pattern of genes that may cause some people to develop a fatty liver, which could progress to fibrosis and cancer. A genetic test to measure predisposition has been developed but is not ready for public use. When that tool is available, it may be an important way to help genetically predisposed people to avoid obesity so as to avoid more extensive problems.

Diet even could affect fertility – specifically, how well sperm swim. A common gene polymorphism (a “misspelled” gene) may prevent sperm from developing adenosine triphosphate (ATP), a molecule that stores energy. Without energy, sperm are unable to swim, possibly causing infertility. Dr. Amy Johnson, then a postdoctoral research associate at NRI, and her team found that adding the nutrient betaine to the diet solves the problem in mice; they are hoping to show how similar supplements could help men. First recognized

in beets, betaine helps the body metabolize homocysteine, an amino acid.

Projects such as these thrive at NRI, where experts in nutrition, memory, metabolism, genetics and other scientific specialties collaborate. On the N.C. Research Campus in Kannapolis, they connect with researchers from many other disciplines, as well. N.C. State University’s Plants for Human Health Institute is next door and is partnering with Cheatham on her blueberry research.

“You don’t often have collaborative opportunities like that,” Zeisel says.

Researchers on the Kannapolis campus have access to some of the most sophisticated equipment anywhere. NRI has one of 11 metabolic chambers in the U.S., allowing researchers to measure metabolism and energy expenditure over an extended period of time, usually 24 hours. Just down the sidewalk is the David H. Murdock Research Institute, housing advanced biotechnology

equipment, including a molecular genomics laboratory, metabolomics laboratory, a 950 MHz nuclear magnetic resonance superconducting magnet, and a broad array of microscopy technologies and other capabilities.

“Amazing things are happening here,” Zeisel says. “Our approach is different from being on a large, established campus. It’s more of a start-up environment, where researchers, often early in their careers, are taking new approaches to emerging issues. The results are exciting – and the promise of the future unlimited.”

Steve Zeisel, PhD

—Ramona DuBose



Steve Zeisel’s Gates Foundation Grant Enables pregnant women in The Gambia to deliver healthier babies

Would giving choline supplements to pregnant women in The Gambia improve fetal brain development and future cognitive functioning? Dr. Steve Zeisel’s proposal to discover the potential has made him and the UNC Nutrition Research Institute a Grant Challenges Exploration winner. The initiative is funded by The Bill & Melinda Gates Foundation to explore ideas that “break the

mold” in solving global health and development challenges.

Choline is critical to fetal brain development. Women in developing countries like The Gambia eat one-half to one-third of the recommended amount of choline, and these areas also report suboptimal fetal and child growth. Could providing choline supplements to pregnant women improve their babies’ lives?

“If we show positive results, the program could be expanded throughout sub-Saharan Africa, Jamaica and other low-income countries where diets do not deliver adequate choline. We’re hoping to improve how children perform in school and enhance their lives,” Zeisel says.

In The Gambia, a 4,007-square-mile West African country that knifes through Senegal, 106 of every 1,000 children die before the age of 5 (U.N., 2010).



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