

# Ancestry plays vital role in nutrition and disease, study shows

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Over the past decade, much progress has been made regarding the understanding and promise of personalized medicine. Scientists are just beginning to consider the impact of gene-diet interactions in different populations in regards to disease prevention and treatment.

The latest research from Wake Forest Baptist Medical Center and the laboratories of Floyd H. "Ski" Chilton, Ph.D., professor of physiology and pharmacology and director of the Center for Botanical Lipids and Inflammatory Disease Prevention, and Rasika Mathias, Sc.D, assistant professor of medicine and epidemiology at Johns Hopkins University School of Medicine, reveals how humans of different ancestry process a certain type of fat called polyunsaturated (PUFA) fat.

Importantly, this work suggests that the dramatic increase in a particular type of fatty acid, [omega-6](#) PUFAs, in the American diet, together with a genetic propensity, causes individuals of African descent to more efficiently convert these dietary PUFAs to long chain PUFAs in the human body. Long chain PUFA can then, in turn, be converted to inflammatory messengers. Increased inflammatory messengers have been associated with a variety of chronic diseases including cardiovascular disease, arthritis, allergies and asthma, and diabetes.

The research, described in a manuscript that appears online this month in *BMC Genetics*, with upcoming publication in The [British Journal of Nutrition](#), finds that populations of African descent have a much higher frequency of the gene variants associated with the conversion of dietary,

medium chain omega-6 PUFAs to long chain omega-6 PUFAs that then have the potential to increase inflammation. Medium chain omega-6 PUFAs are found in the [American diet](#) in very high concentrations in margarine, [vegetable oils](#), [animal fats](#) and [processed foods](#).

"I believe observations such as this begin to address the critical question of why western diets seem to differentially impact African Americans with cardiovascular disease and diabetes at a higher rate than their Caucasian counterparts," said Chilton.

The Centers for Disease Control and Prevention (CDC) reports that chronic diseases —such as heart disease, cancer, and diabetes — are the leading causes of death and disability in the United States, accounting for 70 percent of all deaths in the U.S. These [chronic diseases](#) also limit daily living for about 25 million people.

Chilton and other groups of scientists have shown that genetic variation in a small region of chromosome 11, known as the FADS cluster, plays a critical role in determining rates of PUFA metabolism in populations of European and Asian ancestry.

The current studies are the first to look at populations of African ancestry. Chilton initially suspected there would be differences when he found that African Americans have much higher circulating levels of a long chain omega-6 PUFA, arachidonic acid (AA), than European Americans. The current research indicates there is a great deal of genetic difference between people of African and European ancestry regarding their ability to make long chain PUFAs. This is concerning, said Chilton, because over the last 75 years, there has been a dramatic increase in the consumption of medium chain omega-6 PUFAs -- from an estimated 2.8 percent to nearly 8 percent of daily calorie intake.

"This is an important example of why it is critical to advance the field of

personalized nutrition," Chilton said. "Understanding which nutrients may be healthy for one population, but not for another will be essential to optimizing public health."

Dietary recommendations made by major health organizations are typically generalized to multiple populations, but are often based on available data from studies that represent one or two human populations. With regard to PUFAs, the American Heart Association currently recommends that Americans increase dietary PUFA levels to 5 to 10 percent of dietary energy. Studies like these suggest that such recommendations may not apply or be healthy for all populations.

"It is critical to study groups such as African Americans because they bear a large proportion of the public health burden of many of the chronic complex diseases of inflammation," Chilton said.

Provided by Wake Forest Baptist Medical Center

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