Ancestral link places Mexican-Americans at greater risk for metabolic disease

August 24 2012

(Phys.org)—Mexican-Americans with an ancestral link to Amerindian tribes were found to have higher insulin resistance levels, which is an indication of several chronic conditions such as type 2 diabetes, according to research by The University of Texas Health Science Center at Houston (UTHealth).

"Now that we have identified the ancestral link, we have an opportunity to develop some new approaches to personalized medicine using genetic markers," said HuiQi Qu, Ph.D., the study's lead author and assistant professor at The University of Texas School of Public Health Brownsville Regional Campus, part of UTHealth. Study results are published in the August issue of *Diabetes Care*, a journal of the American Diabetes Association.

The findings are part of a series of recent articles published in five journals by UTHealth researchers and colleagues that examine the testing, diagnosing and treating of chronic diseases in the Mexican-American population using data and blood samples from the Cameron County Hispanic Cohort (CCHC).

"It is our hope that these findings will help healthcare providers and communities more efficiently identify high-risk persons as well as develop and provide intensified clinical and public health interventions," said Joseph McCormick, M.D., who established the CCHC and is the regional dean of the UT School of Public Health Brownsville Regional Campus. "It is important that we measure the burden of chronic disease,

the risk factors, including behavioral, environmental, genetic and ancestry risk factors, so that we can take this information to our communities and work to address these issues."

According to McCormick, the series of findings increases the importance of ethnicity information in identifying people at high risk of disease. McCormick is a co-author of the series of articles.

In 2003, UTHealth researchers established the CCHC with funding from the National Center on Minority Health and Health Disparities. It is the only cohort in the United States studying health disparities in a purely Mexican-American population, according to McCormick. Almost 2,600 individuals have been enrolled in the cohort and research results help to uncover the high levels of health disparities such as obesity, diabetes, heart disease and mental health conditions that greatly affect the Hispanic population. Researchers have also investigated the lack of access to health services based on low levels of health insurance among this population.

In the Diabetes Care study, CCHC samples were used to measure the genetic and ancestry components of a range of risk factors to chronic diseases including insulin resistance. Males with an ancestral link to the Amerindian tribes were more likely to have an increased risk of insulin resistance.

As part of this study, researchers genotyped 103 ancestry informative markers to determine ancestral links to three major continental populations of European, African and Amerindians in order to determine associations with several potential metabolic conditions linked to chronic disease including insulin resistance. Ancestral informative markers are described as DNA signatures of one's ancestral origin that can be used to explore the relationship between ancestry and specific health conditions. According to researchers, these relatively recently

discovered DNA ancestry signatures are being used to identify clues to disease susceptibility that are passed down and hidden in our genes.

The Mexican-American population is genetically mixed with mainly European and Amerindian ancestries, according to the article. Researchers also identified associations between ancestral components and common metabolic problems including serum lipid levels, blood pressure and liver injury.

In a separate quantitative clinical and epidemiologic study published in the August issue of *Preventing Chronic Disease* (PCD), UTHealth researchers found nearly 70 percent of the cohort had diabetes, hypertension or high cholesterol and a substantial portion of this group was unaware of their condition.

The study was conducted to determine the amount of preventable chronic disease going undiagnosed and untreated in a minority population. "This study also opens the window on a major missed opportunity for preventing common chronic diseases in a minority population and, if corrected, would reduce long-term medical, social and economical burdens," said Susan Fisher-Hoch, M.D., the study's lead author and professor of epidemiology at the UT School of Public Health Brownsville Regional Campus.

While 84 percent of those with hypertension had a previous diagnosis, that was true for only half of those with diabetes or hypercholesterolemia. "By failing to address these diseases in this population, we will continue to see an increase in rates of poorly controlled diabetes and elevated risk for related conditions such as cardiovascular, renal, liver and retinal disease," Fisher-Hoch said. "It's important to note that undiagnosed and missed opportunities for diagnosis are more complex than simple lack of access to care."

In October 2011, the World Economic Forum estimated that by 2030 chronic disease will cost $47 trillion globally. In a previous publication, UTHealth researchers estimated $227million a year in lost wages due to diabetes in the workplace in the Lower Rio Grande valley. This is in addition to the cost of treating diabetes and its complications.

Lack of insurance and education level

contributed to many cases of diabetes and hypertension that were undiagnosed in the Mexican-American population. Participants without insurance had a higher average glycosylated hemoglobin level and were less likely to be treated for many unrelated conditions such as osteoporosis, eye diseases and dyspepsia.

"We have taken more than ten years to develop this cohort, which is now yielding important advances in understanding just how poor the health is in this Hispanic minority," said Fisher-Hoch. "Half of all adults over 18 years of age are obese and one third have diabetes, and insulin resistance underlies most of this pathology." More than three quarters have no health insurance of any kind, so that most people delay care until severely ill and much of the chronic disease is untreated. The cost to the individual, the community and the nation is unsustainable, she added.

Participants on Medicaid or with private insurance were more likely to have received a diagnosis and been on the appropriate medication for all three conditions. However, many participants viewed navigating the U.S. health care system as complex and a deterrent to preventive and prompt treatment.

In further studies examining the Cameron County Hispanic Cohort, UTHealth researchers and colleagues found Mexican-Americans with diabetes, obesity and metabolic syndrome were more likely to have an ischemic electrocardiographic (EKG) abnormality, which suggests

underlying coronary heart disease. Results from this study are published in the 2nd 2012 issue of the *World Journal of Cardiovascular Diseases*.

Furthermore, UTHealth researchers also examined EKG abnormalities that suggest abnormal parasympathetic tone of the heart, which is related to rhythm abnormalities and sudden cardiac death. Researchers found Mexican-Americans with obesity and metabolic syndromes were more likely to show these abnormalities in their EKGs. Based on these findings, researchers recommend using the resting EKG to evaluate obese patients and patients with metabolic syndrome. The resting EKG is a simple, low-cost and widely available cardiovascular diagnostic test that can provide a wealth of information related to coronary risk factors, according to the researchers.

"The presence of these markers of abnormal parasympathetic tone should alert a healthcare professional to further risk assessment or an intensification of appropriate therapies to potentially modulate this and attenuate risk," said Susan Laing, M.D., associate professor of cardiology at the UTHealth Medical School.

In a further study published in the July issue of *Echocardiography* using ultrasound, the same researchers also observed a high prevalence of abnormal carotid ultrasound findings in Mexican-Americans. The study evaluated the thickness of the innermost layers of the carotid arterial wall and plaquing among Mexican-Americans and correlated these markers with coronary risk factors and Framingham Risk Scores. The researchers found that there was misclassification of Mexican-Americans as "low risk" using the Framingham Risk Score, which was developed using Caucasian populations. Furthermore, all Mexican-American women were classified in the low risk group, despite the high prevalence of multiple risk factors including obesity and metabolic syndrome. The researchers found that a substantial proportion of Mexican-Americans who were categorized into the low to intermediate

risk group had evidence of subclinical atherosclerosis, warranting reclassification into the high risk category. These observations further underline the importance of understanding that ethnic groups differ not only in the frequency of common diseases, but also in their clinical presentation, according to the researchers.

Based on their findings, researchers recommend the integration of carotid ultrasound findings when assessing coronary risk and the use of longer term prediction models as a better risk assessment tool in Mexican-Americans. "There are limitations in using the 10-year risk scoring system in this population. We found participants ranked in the low risk category but in fact, they already had atherosclerosis based on ultrasound," said Laing. "Being categorized into the low risk group gives both the patient and the healthcare provider a false sense of security and may exclude someone from being started on life saving preventive therapies."

According to Laing, "In the past, Hispanics were thought to have a lower susceptibility to cardiovascular disease compared to the general population. Our research has refuted this notion and I think we still have yet to see the full impact of the heart disease burden among Mexican-Americans as this relatively young minority group ages in the next few decades. Clearly this is an epidemic that is on its way, and data need to be obtained now. However, in order to develop culturally competent prevention and treatment strategies for Hispanic Americans, engaging this minority group in studies such as these is critical." The findings in these studies are particularly relevant to future public health planning given the changing landscape of the composition of the U.S. population, she said.

"Our research using the Cameron County Cohort has allowed us to pinpoint ways to improve the way healthcare providers address and treat insulin resistant conditions," said McCormick. "While publications are

important to validate our observations, far more important is what we do with the information and how we work with our community to use the information to improve their health."

Provided by University of Texas Health Science Center at Houston