

Predicting risk for high blood pressure

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High blood pressure also called hypertension is a major health problem that when left untreated can lead to heart disease, stroke and kidney failure. African Americans are more likely to develop high blood pressure and develop it earlier in life than Caucasians. But the reasons for the heightened risk in African Americans still remained largely unknown, although new evidence may provide some insight.

Dr. TanYa Gwathmey from the Hypertension and Vascular Research Center of Wake Forest University Baptist Medical Center studies the factors that contribute to having [high blood pressure](#), particularly in African Americans. Her group found that there are racial differences in the activity of enzymes that make or breakdown a major regulator of [blood pressure](#). And her results correlate with the bias of African Americans being more at risk.

At the annual 2010 Experimental Biology conference in Anaheim, CA held April 24-28, Gwathmey will be discussing these findings in her presentation titled "Sex and Racial Background Influence Angiotensin Peptide Metabolism in Young Adults." The team of researchers that also contributed to this study includes Hossam Shaltout and Mark Chappell of the Hypertension and Vascular Research Center; James Rose of the Center for Perinatal Research; Lisa Washburn of the Department of Pediatrics from the Wake Forest University Baptist Medical Center; and Patricia Nixon of the Department of Health and Exercise Science of Wake Forest University, Winston-Salem, NC.

Two Peptides With Opposing Function

Blood pressure is regulated by peptides (short strings of [amino acids](#)) called angiotensins. Specific forms of angiotensin affect blood pressure differently. Angiotensin II causes the body to retain salt and water and causes blood vessels to constrict; all characteristics that promote high blood pressure. On the other hand, angiotensin (1-7) has protective effects against high blood pressure by causing blood vessels to open up and allowing the body to release salt and water.

The enzyme ACE (angiotensin converting enzyme) makes the riskier angiotensin II. But angiotensin II can be converted to the protective angiotensin (1-7) by the enzyme ACE2. So someone with high ACE activity would make more angiotensin II and would be more at risk for high blood pressure. Alternatively, someone with higher ACE2 activity would make more angiotensin (1-7) and would not be as likely to develop high blood pressure.

High Risk Individuals Have Differences In Angiotensin Hormone Metabolism

During adolescence, most individuals haven't developed high blood pressure yet. Gwathmey chose to study participants at age 15 to identify predicting factors of high blood pressure that may be present before the disease has set in. Gwathmey's study specifically examined African American boys and girls and Caucasian girls. All participants tested had normal blood pressure. Urine samples were collected from the participants and analyzed for levels of ACE and ACE2 enzymes as a read-out for the predominant form of angiotensin.

African American boys had higher ACE levels than both African American and Caucasian girls, meaning the African American boys may have higher levels of angiotensin II. Researchers also observed that African American girls had less ACE2 than Caucasian girls, meaning

they may make less of the protective angiotensin (1-7) hormone. To put it more simply, African American boys have more of the enzyme that makes the hormone that contributes to high blood pressure and African American girls have less of the enzyme that makes the hormone that protects against high blood pressure or hypertension.

"What is really interesting to me is that we are seeing changes in angiotensin metabolism before blood pressure changes," Gwathmey said. "This could become a useful tool for predicting high pressure and potential therapeutic treatment before hypertension actually sets in."

Researchers are recruiting more participants to make this study more comprehensive. In the future studies, Gwathmey hopes to look at other contributors like obesity and certain dietary factors that may put African Americans at greater risk for high blood pressure than Caucasians.

"We can't group all people into one category to assess the blood pressure system," said Gwathmey. "If we look at a study without consideration of racial and/or gender influences, then we may be missing out on key information that may better help us to address this epidemic."

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