

Higher blood pressure over life span increases congestive heart failure risk in Black people

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(From left) Graduate Student Melissa Howie, Cardiovascular Researcher Dr. Gaston Kapuku and Vascular Biologist Dr. Zsolt Bagi. Credit: Kim Ratliff, Augusta University

Starting with early childhood, otherwise healthy Black people show signs of slightly diminished heart muscle strength and a slightly higher blood pressure than their white counterparts, factors which may put them on a course for early development of congestive heart failure, researchers report.

The take-home message for parents and physicians is that, particularly for populations at high cardiovascular risk such as Black people, a close check should be kept on [blood pressure](#) starting in early adolescence, says the corresponding author of the study in *Journal of the American Heart Association*.

Children with chronically higher normal blood pressures also may need early assessment of their [heart](#) function and/or medication to further lower their blood pressure to protect their future heart

health, says Dr. Gaston Kapuku, cardiovascular researcher at the Georgia Prevention Institute at the Medical College of Georgia at Augusta University.

The researchers also found that ejection fraction, a widely used method to assess the strength of the heart [muscle](#) by looking at the amount of blood the [left ventricle](#), the main pumping chamber of the heart, pumps out with each contraction is not a good way to identify these at-risk young people as they move through life.

Rather a long-available, but less-utilized analysis called midwall fractional shortening, or MFS, which looks more directly at the contractility of the cardiac muscle, appears to provide earlier insight that the heart wall is beginning to thicken and weaken in response to pushing against higher pressure inside the aorta, the body's largest blood vessel, which delivers oxygen-rich blood to the body.

Kapuku and his colleagues looked at 673 individuals—about half male and female, half Black and half white—who have been followed at the Georgia Prevention Institute for more than 30 years as part of the Augusta Heart Study, looking at development of cardiovascular risk factors in children with a family history of risk factors like hypertension and heart attack.

This appears to be the first prospective study to examine changes in cardiac muscle, or myocardium, function in a healthy group of individuals across their life span.

They found that while ejection fraction held steady in Black study participants over the 30-year course of the study, MFS was able to document a fraction of a percentage point of change in heart function: A .54% decrease in MFS in Black participants

compared to white participants, as both grew from childhood into young adulthood. They also saw that as the size of the left ventricle grew by 1 gram, or about 0.035 ounces, MFS decreased in Black participants by 0.01%. The entire heart weighs 7-15 ounces, and a heart that gets bigger is an indicator of disease.

Also as pressure inside the aorta, against which the ventricle pumps, slowly crept up over the years, MFS, which indicates muscle strength, crept downward.

Subtle decreases in MFS are associated with increased risk of congestive heart failure, the researchers write. Kapuku notes that while the small decreases in contractility they found are not yet clinically significant in these [young people](#), if the trend continues they likely will become a factor in their heart health.

"When you look at MFS you can actually assess the power of your muscle, you know that it is weakening even though the ejection fraction is normal," Kapuku says.

MFS is a formula that also accounts for the heart wall thickness when it's contracting and relaxed. Kapuku contracts his biceps to show the clear difference contracting and relaxing makes in muscle size. The heart cavity that fills with blood is much bigger when its relaxed, called diastole, and the muscle gets much bigger when it's contracting, called systole.

Kapuku and his colleagues say MFS is an easy, sensitive and inexpensive way to detect slight changes in cardiac muscle strength that are setting the stage for major heart dysfunction down the road, perhaps particularly in young Black individuals.

Heart disease is the leading cause of death for all Americans, but death rates are higher in Black people than white people and other ethnic groups, and disease develops at a younger age, according to The Heart Foundation. Despite cardiovascular disease remaining the number one killer, congestive heart failure is the only adult cardiovascular disease that actually continues to

increase in incidence, Kapuku says, primarily because people are living longer. Black people also have the highest rate of congestive heart failure resulting from aging, rather than from direct damage to heart muscle from a heart attack, Kapuku says.

The study helped show the racial disparities, including a slightly higher blood pressure and decreasing heart function, already are evident at a young age, he says. Researchers suspect that stress-induced sodium retention, in which a higher percentage of Black people hold onto more sodium, rather than secreting it in their urine, is a significant factor. Higher sodium levels increase fluid volume inside blood vessels and blood pressure, including pressure inside the aorta, which the left ventricle must continually pump against, called afterload.

That means that despite physical fitness, a young Black person's blood pressure would tend to run higher than his white counterpart's, setting the stage for congestive heart failure earlier in life, Kapuku says.

Like Kapuku's biceps trying to lift increasingly heavier hand weights, the heart will increase muscle mass against this increased pressure but, unlike the biceps, the heart does not function better when it's bigger.

"If I didn't have increased resistance, I would not have increased cardiac load," Kapuku says. "We have to lower the blood pressure as soon as possible. Myocardial dysfunction might occur before the currently defined clinical criteria for hypertension."

That means lowering blood pressure in young Black individuals, likely shortly after they enter adolescence, might help preserve heart function.

A better diet including foods low in salt and high in potassium, like cooked broccoli and spinach, plantains and sweet potatoes, along with regular physical activity likely will help, Kapuku says, "but medical treatment may be the ticket to longevity."

Groups like the American Heart Association say you can appear to have a "normal" ejection fraction

and still have heart failure with what is called preserved ejection fraction, where the heart muscle is so thick and stiff it may hold less blood so seems to be pumping out the usual percentage—50-70% of the ventricle's contents—until the total volume is not sufficient to sustain the body.

Early on, like in these study participants, the heart likely tries to compensate, to keep the [ejection fraction](#) up, by working harder, which works for a while until it doesn't, Kapuku says.

Congestive heart failure can occur with normal aging as the cardiac muscle cells, or cardiomyocytes, we are born with slowly begin to die off and their former space fills with fibrous tissue, which also starts to encircle remaining cardiomyocytes and eventually weaken the heart's ability to contract. Exercise can slow but not stop the process that makes proper filling and pumping increasingly difficult.

The American Academy of Pediatrics and the National Heart, Lung and Blood Institute both recommend that children have yearly screenings for high [blood pressure](#), starting at age 3, at their annual well-child visits.

More information: Gaston Kapuku et al. Effects of Race, Cardiac Mass, and Cardiac Load on Myocardial Function Trajectories from Childhood to Young Adulthood: The Augusta Heart Study, *Journal of the American Heart Association* (2021). [DOI: 10.1161/JAHA.119.015612](https://doi.org/10.1161/JAHA.119.015612)

Provided by Medical College of Georgia at Augusta University

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