Fitness lowers young blacks' blood pressure

Physically fit black adolescents have lower nighttime blood pressure readings than their less-fit black peers, according to new research. The study hints that U.S. blacks can take steps early in life to reduce the threat of cardiovascular damage caused by longstanding elevations in blood pressure.

Gregory A. Harshfield of the University of Tennessee in Memphis discovered racial differences in 24-hour blood pressure patterns several years ago. He observed that blood pressure drops about 10 percent during sleep for white children, but black children show only about a 5 percent drop per night. The trend seems to worsen with age, and by adulthood, blacks have nocturnal blood pressure that remains at daytime levels. These findings suggest the artery-pounding pressure experienced at night in young blacks is a precursor of the hypertension that places them at a high risk of heart disease and stroke.

Harshfield's new report suggests black children can reduce their future risk of hypertension and heart disease with aerobic workouts. He presented his results in Cleveland this week at the 43rd Annual Conference and Scientific Sessions of the American Heart Association Council on High Blood Pressure Research.

Harshfield and his colleagues studied 175 healthy black and white boys and girls aged 9 to 18. They classified the youths as fit or unfit by measuring their ability to use oxygen while riding a stationary bicycle. The researchers recorded blood pressure for 24 hours, finding that physically fit black boys had average nighttime systolic pressure readings of 107 millimeters of mercury (mm Hg), while unfit black boys had blood pressure values averaging 118. Systolic pressure is exerted on arteries when the heart contracts.

Aerobic fitness seemed to reduce daytime blood pressure as well. Fit black males had systolic daytime readings of 117 mm Hg, whereas unfit black males had readings of 126.

Fit black girls showed similar reductions in both daytime and nighttime blood pressure compared with unfit black girls.

In contrast, fitness did not significantly alter blood pressure patterns among white boys and girls in the study. Fit white males, for instance, had an average systolic pressure of 120 mm Hg while awake, compared with 124 for unfit white males. Both fit and unfit white boys had nocturnal systolic values averaging 105 mm Hg.

The findings suggest that exercise alters a mechanism responsible for much of the hypertension commonly seen among blacks. Scientists have observed that blacks often have elevated levels of catecholamines, hormones that raise blood pressure by constricting blood vessels. Harshfield's research implies that exercise may help reduce blood pressure in blacks by lowering catecholamine levels or by reducing blood vessel sensitivity to these hormones. The different type of hypertension primarily seen in whites may not respond to exercise, Harshfield's work suggests.

He and other scientists believe U.S. blacks are genetically predisposed to high blood pressure because they conserve salt more efficiently than whites. But that inherited tendency needs an environmental trigger, such as a high-salt diet, to cause hypertension, Harshfield says. He suspects blacks experience high nocturnal pressure because the body is working overtime trying to clear the bloodstream of a high salt load.

But the blood pressure differences observed by Harshfield might be due to body weight or variations of pressure with age rather than fitness level, comments Darwin R. Labarthe of the University of Texas Health Science Center at Houston. And more work must be done to unravel the complicated interaction between genetic and environmental factors that seem to cause hypertension in blacks, adds Clarence E. Grim of the Drew/UCLA Hypertension Research Center in Los Angeles. — *K.A. Fackelmann*

Weighing the CHAMPions of the universe

Roughly 90 percent of the universe's mass is invisible, making its presence felt only through the influence of gravity. The effort to identify the nature of this elusive material has spawned a host of dark-matter candidates—ranging from congregations of dim, cold stars to swarms of hypothetical elementary particles — but there is no consensus yet on a leading contender. Now theorists have pushed a new, "seemingly outrageous" competitor into the fray: charged massive particles, or CHAMPs.

"People have been excluding the possibility of charged dark matter for no good reason and limiting themselves to neutral particles," says physicist Sheldon L. Glashow of Harvard University. "If you don't know what dark matter is, it would seem wise to be open-minded."

Glashow and his collaborators propose that dark matter consists of stable, very massive, electrically charged elementary particles left over from the Big Bang. These hypothetical particles would have masses between 20,000 and 1 million times the mass of a hydrogen atom. On Earth, such particles would be disguised as "preposterously heavy isotopes of known chemical elements," the researchers say.

For example, a positively charged CHAMP could attract an electron to become the equivalent of a neutral atom. "Aside from its enormous mass, it would have the chemistry of a hydrogen atom," Glashow says.

"It's the resuscitation of an idea that people had always dismissed out of hand," says R. Sekhar Chivukula of Boston University. "Everyone has always assumed that if dark matter were charged, we would have detected the extra stuff."

If CHAMPs exist, they would be a relatively rare constituent of the Earth, perhaps with a concentration similar to that of gold, Glashow says. It should be possible to design experiments to either detect these heavy particles or prove they can't exist. Previous, unsuccessful searches for heavy or anomalous isotopes don't necessarily exclude CHAMPs.

Eric B. Norman and his colleagues at the Lawrence Berkeley (Calif.) Laboratory have already begun looking for telltale traces of massive, negatively charged elementary particles trapped in iron and lead nuclei. So far, they have found no evidence for such particles, which would behave like extremely heavy electrons.

Glashow argues that Norman's group has looked in the wrong places. He recommends a search for "superheavy" hydrogen isotopes and suggests carbon nuclei as more likely hosts for negatively charged CHAMPs.

Moreover, it may be much easier to detect CHAMPs in lunar samples or chunks of meteorites. Because the moon has no atmosphere and little geological activity, CHAMPs flying through space would crash into its surface and presumably settle there in greater abundance than on Earth.

"We are planning to do some experiments to look for carbon nuclei having attached massive particles and possibly to look for superheavy hydrogen," Norman says. "We've got half a dozen meteorite samples, and we're pleading with NASA people to give us a moon rock."

Most astrophysicists believe that one dark-matter candidate will eventually turn out to be the dominant constituent of the universe. If CHAMPs are discovered and proved the missing matter, knocking rivals such as weakly interacting massive particles (WIMPs) out of the ring, then scientists will have a marvelous new material to play with and investigate.

"They would be a delight to material science," Glashow and his colleagues speculate. "Depending on their chemical identity, they could be used to create ultrahigh-density plastics or alloys." They would also make possible particle accelerators that would render the Superconducting Super Collider "impotent and obsolete." — *I. Peterson*

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