Medical Xpress

Symmetrical knees linked to Jamaican sprinting prowess

November 17 2014

Jamaica's share of the world's best sprinters is out of all proportion to its size. The country's secret may be in the symmetry of the sprinters' knees.

Why is Jamaica, with a population smaller than that of Los Angeles, home to so many of the world's elite sprinters - runners who compete in the 100, 200, 400 and 800-meter races?

Robert Trivers, an evolutionary biologist and professor of anthropology

and biology in the School of Arts and Sciences, set out with his colleagues to find out if there was something about the symmetry of their knees that might partly explain this phenomenon. They already knew from their earlier research that the symmetry of children's knees at age 8 predicts how fast a person runs 14 years later in life.

"We then asked, "Is the degree of symmetry positively associated with sprinting ability among the very best sprinters?'" Trivers says. The answer to that question is yes.

Within all sprinters, those with the most symmetrical knees have the best times and this was particularly true of the 100-meter sprinters.

"You can easily imagine why," Trivers says. "If you watch someone running a 100-meter race, you can see his or her knees continually churning up and down, propelling the sprinter forward. Symmetry is very efficient."

Trivers and his co-authors - Bernhard Fink of the University of Gottingen in Germany; Kristofor McCarty and Mark Russell of Northumbria University in England; Brian Palaestis of Wagner College in Staten Island, New York; and Bruce James of the MVP Track and Field Club in Kingston, Jamaica—have published their work in the journal *PLOS ONE.*

For their study, the researchers measured the knees of 74 elite Jamaican sprinters and a control group of 116 non-sprinting Jamaicans of the same age and sex and similar in size and weight. They discovered that the sprinters' knees were much more symmetrical than the knees of people in the control group.

The 74 sprinters were all members of the MVP Track and Field Club, and included Shelly Ann Fraser-Pryce, who holds two Olympic gold

medals in the 100-meter sprint, and Nesta Carter, the man with the fifth fastest 100-meter runs ever recorded.

The 30 sprinters who specialized in the 100-meter race, which does not require turns, had the most symmetrical knees of all. Trivers attributes this finding to the fact that sprinters in longer races have to make left turns each time they run, and this turning may lead to or favor asymmetry over time, just as unbalanced wheels may lead to uneven tire wear on a car.

"So far as we know, this is the first time anyone has isolated a variable that predicts sprinting speed in the future as well as among the very best adult sprinters now," Trivers says.

Scientists have long understood that bilateral symmetry is associated with advantages in animals that have it, including humans. Symmetrical individuals tend to be stronger, healthier and better-looking. Symmetry also makes movement easier and saves energy.

While this study establishes a relationship between knee symmetry and running speed in elite sprinters, it does not establish a causal relationship.

"We don't know for sure whether the sprinters are great sprinters because their knees are symmetrical, or whether their knees are symmetrical because of all the time they spend practicing," Trivers says.

In the future, he wants to study the differences in the strength of sprinters' right and left legs, to see whether the symmetry between them changes over time, and whether the race times of the sprinters change over time. Farther into the future, Trivers is interested in isolating the particular genes that make for great sprinters. People of West African genetic origins, including many Jamaicans, are known to have more "fast-twitch" muscle fibers, which produce energy from the body's sugar

rather than oxygen, and are good for short, intense bursts of activity.

More information: *PLOS ONE*, www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0113106

Provided by Rutgers University

Citation: Symmetrical knees linked to Jamaican sprinting prowess (2014, November 17) retrieved 24 April 2024 from https://medicalxpress.com/news/2014-11-symmetrical-knees-linked-jamaican-sprinting.html

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