

World champion sprinter has muscle profile built for speed

July 27 2015, by Marc Ransford

A former world champion sprinter is the first human tested to have nearly a quarter of his leg muscle fibers categorized as "super fast," says a report from Ball State University.

Muscle biopsies taken by researchers at Ball State's Human Performance Laboratory (HPL) from Colin Jackson, who holds the current indoor world record in the 60-meter hurdles, found his legs had an abundance of pure MHC IIx muscle fibers—also known as "super fast." His total fast-twitch population, including the super fast fibers, was 71 percent.

Previous [skeletal muscle](#) reports from sprinters have shown a high proportion of fast-twitch MHC IIa fibers but with less than 6 percent of the pure MHC IIx muscle fibers. A typical person's muscle is roughly 50 percent slow-twitch and 50 percent fast-twitch with less than 2 percent of the super-fast muscle fibers.

"To put this in perspective, most top sprinters have muscle consisting of 70 percent fast-twitch and 30 percent slow-twitch," said Scott Trappe, HPL director and the university's John and Janice Fisher Professor of Exercise Science. "With Colin, this amount of super-fast muscle is more than we've ever seen. So, this provides some scientific support as to why he achieved a high level of success."

Jackson won multiple world championships

During a career in which he represented Great Britain and Wales, Jackson won an Olympic silver medal, became world champion three times, went undefeated at the European Championships for 12 years and was a two-time Commonwealth champion. He retired in 2003 and later visited HPL for the testing.

Trappe is the lead author of the study, which was recently published in the *Journal of Applied Physiology*. He noted that the lab tested its findings three times to ensure the results were conclusive.

Genes highly responsive to intense exercise

The study also found that the power output of the MHC IIx and MHC IIa muscle fibers was higher than in any other human, and genes involved with muscle growth were highly responsive to intense exercise and were most pronounced in the MHC IIx fibers.

The power output of the muscle fibers follows a hierarchal pattern (MHC IIx>MHC IIa>MHC I), with the super fast-twitch MHC IIx fibers 2x more powerful than the fast-twitch MHC IIa fibers and 14x more powerful than the slow-twitch MHC I muscle fibers.

"His [muscle](#) makeup allowed him to burst to an incredible speed, but the race was over in just a matter of 10 to 12 seconds," Trappe said. "His training was very similar with short workouts that were conducive to building his speed."

He noted that the only other athlete model comparable to the sprint champion comes from the animal kingdom. Studies have found that cheetahs have about 70 percent MHC IIx content and can reach speeds up to 70 to 75 miles per hour.

Trappe noted that biomechanics play an important role when comparing

animal and human running speeds along with other structural, metabolic and genetic traits, but the data strongly supports the idea that sprinting ability is related to MHC IIx content.

"Jackson is a very special athlete, but we believe that there could be others out there like him," he said. "This was the first time we were able to put [muscle fibers](#) through a genetic test with such an incredible athlete. We haven't seen others yet, but more testing to could find them."

Provided by Ball State University

Citation: World champion sprinter has muscle profile built for speed (2015, July 27) retrieved 25 April 2024 from

<https://medicalxpress.com/news/2015-07-world-champion-sprinter-muscle-profile.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.