

Longer toes eyed as sprinters' edge

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Credit: Simon Fraser University

(PhysOrg.com) -- Longer toes may give sprinters a leg up on other runners, according to a new study.

Sabrina Lee, a post doctoral fellow at Simon Fraser University and former researcher at Penn State University, and colleague Stephen Piazza found that longer toes and a unique ankle structure give sprinters a “burst of acceleration” over others.

The study, 'Built for Speed: Musculoskeletal Structure and Sprinting Ability', appears in the current [Journal of Experimental Biology](#).

The pair studied the [muscle](#) architecture of the feet and ankles of 12 collegiate sprinters and 12 non-athletes.

Using toe measurements and [ultrasound imaging](#) to measure the sliding of the [Achilles tendon](#) during ankle motion, they first calculated the leverage of the tendon.

The researchers found that the distance between the tendon and the centre of rotation of the ankle were much shorter in sprinters, a difference they say might be explained by “a tradeoff between leverage and muscle force-generating capacity.”

They developed a simple [computer model](#) to see how much acceleration they could generate when the tendon lever arm and toe lengths were changed.

“We found the greatest acceleration occurred when the Achilles tendon lever arm is the shortest and the toes are longest,” says Lee, who recently began working in SFU’s neuromechanics lab.

Lee says the findings are only one explanation for determining who might potentially be a good sprinter. It’s still unclear what effect training can have on influencing the shape of foot bones.

Lee's doctoral work also involved examining the relationship between musculoskeletal architecture and walking in elderly adults.

She is currently collaborating with researchers at Harvard University on studies aimed at improving existing muscle models used to investigate muscle and movement disorders.

Provided by Simon Fraser University

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