

Step forward in understanding human feet

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Scientists have made a step forward in understanding the evolution of human feet.

Unlike species such as chimpanzees, which have opposable digits on their feet, humans have evolved arched feet to enhance upright walking.

These arches were thought to be supported by plantar intrinsic muscles (PIMs) - but a study by the University of Queensland and the University of Exeter shows PIMs have a "minimal impact" on this.

The findings show that foot muscles are important for helping us push against the ground during walking and running. This suggests that strong foot muscles could be key to our ability to walk and run.

"Recent research suggests that muscles in our feet are key to how the foot functions during walking and running," said lead author Dr. Dominic Farris, of the University of Exeter.

"Our study provides direct evidence showing the significance of these foot muscles in supporting the performance of the human foot.

"Contrary to expectations, PIMs contribute minimally to supporting the arch of the foot during walking and running.

"However, these muscles do influence our ability to produce forward propulsion from one stride into the next."

To test PIMs, the researchers compared foot and lower limb movement with and without a nerve block that prevented contraction of these muscles.

During ground contact in walking and running, the stiffness of the foot arch was not altered by the block, showing that the PIMs' contribution to arch [support](#) is minimal, probably due to their small size.

However, with the PIMs blocked, the distal joints of the foot could not be stiffened sufficiently to provide normal push off against the ground.

"This could have implications for understanding conditions such as flat

[feet](#), the value of training [foot muscles](#) and ideas around potential benefits of running barefoot," said Dr. Farris.

"It turns out these muscles aren't important for supporting the arch of the [foot](#), but they are important for propelling us forwards when we walk or run."

More information: Dominic James Farris et al., "The functional importance of human foot muscles for bipedal locomotion," *PNAS* (2018). www.pnas.org/cgi/doi/10.1073/pnas.1812820116

Provided by University of Exeter

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