

# Shivering in the cold? Exercise may protect against muscle fatigue

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New research published in *The Journal of Physiology* highlights how exercise could help people exposed to extreme temperatures protect themselves from the cold. This could be useful for people who live and work in very cold conditions.

Shivering is one of the first defences against cold and it boosts the body's heat production. Shivering can only warm you up for so long and after a few hours your muscles will run out of fuel and will grow too tired to contract. Exercise helps build-up muscle in the limbs and this new research shows that this exercise could help the muscle shiver longer and keep people warmer for longer. Therefore this suggests that people preparing to live in extreme cold conditions should exercise in order to protect against fatigue to their muscles caused by shivering.

The study, conducted by the University of Guelph and the University of Copenhagen, assessed mice that had trained with voluntary wheels and had been exposed to cold temperature conditions. During [cold exposure](#) their changes in body weight, food intake, [blood sugar levels](#) and rectal

temperature were measured, in addition to an examination of their [limb](#) muscle and fat tissue. Mice that did not exercise lost a significant amount of weight when exposed to the cold however exercise-trained mice were better able to maintain their core temperature.

It is important to note that the researchers were unable to directly measure limb [muscle](#) activity during cold exposure, which will be essential for future exploration.

David C. Wright, corresponding author on the study, commented on the future direction of the work 'In this study we show that [exercise](#) training helps build [limb muscle](#) and in turn offers better protection against cold conditions. We would now like to determine if the responses that we saw in males also occurred in females. It would also be interesting to determine if obesity impacts the effects that we saw.'

**More information:** Prior exercise training improves cold tolerance independent of indices associated with non-shivering thermogenesis, *Journal of Physiology* (2018). [DOI: 10.1113/JP276228](#)

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