

Oxygen uptake in respiratory muscles differs between men and women during exercise

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Muscles necessary for breathing need a greater amount of oxygen in women than in men, according to a study published today in *The Journal of Physiology*.

Researchers found that at submaximal and maximal exercise intensities, respiratory muscles (muscles necessary for breathing, such as the diaphragm and muscles surrounding the ribcage) consume a greater amount of [oxygen](#) in women compared with men. This means that women use more energy when breathing because a significantly greater part of total oxygen is directed to the respiratory muscles.

In their experiments, the researchers determined the oxygen cost of breathing in healthy men and women over a range of exercise ventilations. Men and women first completed a maximal cycle test to determine the ventilation and whole-body [oxygen consumption](#) associated with exercise. During subsequent experimental days, subjects sat on a cycle ergometer but did not perform exercise. Rather, they mimicked the breathing patterns associated with ventilation during different exercise stages and the oxygen consumed by the breathing muscles was measured. The amount of oxygen consumed by the [breathing muscles](#) during mimicking trials was related to the amount consumed during exercise.

Professor William Sheel from the University of British Columbia and lead investigator of the study, explained, 'During exercise we need to breathe more often, and as a consequence, the respiratory muscles need

to work harder and use a lot of energy. Our findings are important because they show that the metabolic cost of breathing during exercise is higher in healthy young women. We know that like other skeletal muscles, the contracting respiratory muscles require enough blood flow to meet oxygen demand.

'Our findings suggest that if women have a greater oxygen cost of breathing, they likely dedicate a greater amount of blood flow towards their respiratory muscles during maximal exercise. Hence, their physical performance may be less because of a reduced blood flow to the [leg muscles](#), but this still needs to be tested.

'Future studies could investigate whether the higher oxygen cost indeed has an influence on leg [blood flow](#), cardiac output and [skeletal muscle](#) fatigue. This may also play a role in lung diseases. A reduced lung capacity together with harder working muscles may lead to a higher energy demand, which could be greater in women. Sex-differences in [exercise](#) responses could therefore be important for clinical management of people with lung disorders.'

More information: Dominelli PB, Render JN, Molgat-Seon Y, Foster GE, Romer LM and Sheel AW (2015) Oxygen cost of exercise hyperpnoea is greater in women compared with men. 10.1113/jphysiol.2014.285965

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