

Intense exercise during long space flights can help astronauts protect aerobic capacity

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Most people don't think much about their aerobic capacity while at work. But for astronauts carrying out missions on the International Space Station (ISS), maintaining their cardiovascular stamina during long space flights is part of the job. They must be prepared to perform physically demanding tasks or emergency maneuvers at any time during flights that can last between three and six months in a weightless environment.

In an effort to protect their aerobic capacity and prepare their bodies, [astronauts](#) routinely perform in-flight cardiovascular and strength exercises. But the effect of exercise on astronauts traveling to the ISS was not known because aerobic capacity (VO₂peak) had only been studied in shorter trips, not during and after longer space flights.

To understand whether the routinely prescribed exercise was effectively maintaining VO₂peak, researchers Alan D. Moore Jr., et al., with the National Aeronautics and Space Administration (NASA) Human Research Program followed 14 astronauts (nine men and five women) who traveled on space flights between 91 and 192 days. On average, the subjects exercised 30 minutes a day on five to six days each week at an average intensity of 73% of peak heart rate. The research team measured VO₂peak at approximately nine months and three months before launch; on day 15 of the flight; every subsequent 30 flight days; and day one, 10 and 30 following re-entry to Earth.

The research team observed a ~17% overall reduction in VO₂peak by flight day 15 across the study sample. While some astronauts

experienced a significant decline in VO₂peak (a dip that rebounded later in the [space flight](#)), other astronauts did not experience any substantial change in VO₂peak. Interestingly, the astronauts with the highest VO₂peak experienced the greatest reduction in capacity, but according to the authors, "this finding should not be interpreted that a high preflight aerobic capacity is undesirable. Although the astronauts with high capacities tended to lose more, they typically remained at higher levels than crew who started at lower levels.

"These results provide evidence that, although many astronauts experience a decline in VO₂peak during ISS missions, use of the [aerobic exercise](#) hardware aboard the ISS combined with exercise prescriptions of sufficient exercise intensity can be used to effectively prevent decline in [aerobic capacity](#)," the researchers wrote.

More information: "Peak exercise oxygen uptake during and following long-duration spaceflight." Moore AD Jr, *J Appl Physiol* (1985). 2014 Aug 1;117(3):231-8. [DOI: 10.1152/jappphysiol.01251.2013](#). Epub 2014 Jun 26.

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