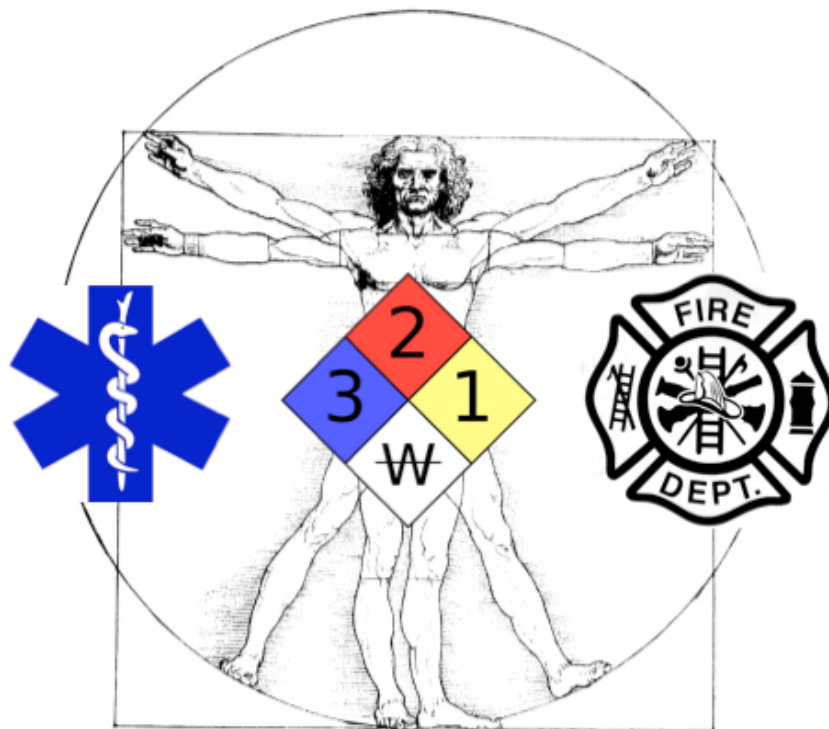

Gasping for air...

A review of Greater physical fitness is associated with better air ventilation efficiency in firefighters. Original article written by: P Gendron et al. Applied Ergonomics (2015) 47:229-235.

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www.firefighterresearch.org

Introduction

Use of self-contained breathing apparatus has saved countless firefighters lives especially considering how residential fuel loads and smoke composition have evolved in the past 20 years. However, this life saving device makes it more difficult to perform at peak capacity. Fire suppression activities require considerable exertion, which must be supported by the heart and lungs delivering oxygen rich blood to, and removing carbon dioxide from, the tissues. This means that a firefighter must have both the strength to complete the job and enough air in the cylinder to supply the working muscles. When the cylinder runs low, the firefighter is done working so extending cylinder time extends the work duration

What the study did

A group of researchers from the University of Quebec examined the relationship between aerobic capacity (the ability for the heart to work at higher capacity for longer intervals) and air consumption when working in turnout gear and SCBA. Thirteen fit, male firefighters took part in the study and performed three different tests while wearing full turnout gear and SCBA. In the first test, they walked on a treadmill at a constant speed while the incline increased every two minutes until exhaustion to determine their maximal aerobic capacity (VO₂max). In the second test, they walked on a treadmill at 10 METs capacity (a brisk pace) to see how quickly they used air from their SCBA cylinder and in the third test, they performed a series of firefighting skills that included manipulating hose line, raising and lowering ladders, and dragging a rescue manikin.

What the study reported

Firefighters who performed the skills test most quickly were fitter as demonstrated by their ability to walk longer on the treadmill (higher VO₂max). They also used less air from the SCBA cylinder during the constant 10 MET test than their less fit counterparts. It was also reported that larger firefighters used more air on the 10 Met and skills tests.

What it means for the fire service

It is not surprising that fitter firefighters used less air from the SCBA cylinder during moderate and high intensity work. A fitter heart and lungs can deliver oxygen more efficiently at any given workload and extend the duration of the air supply. It is also not surprising that larger firefighters require more oxygen to sustain greater body mass during exertion. To some degree this is due to larger muscle mass performing each task but it is also true that these firefighters simply had more mass to carry around which required additional energy. Interestingly, the association between air consumption and fitness was stronger than the association with body size so larger firefighters with greater physical fitness are more efficient at ventilation than small, less fit firefighters. Next time you hit the gym, remember to exercise your heart. You will stay on the fireground longer and be healthier.

