The impact of firefighter personal protective equipment and treadmill protocol on maximal oxygen uptake

This study investigated the effects of firefighter personal protective equipment (PPE) on the determination of maximal oxygen uptake (VO\textsubscript{2max}) while using two different treadmill protocols: a progressive incline protocol (PIP) and a progressive speed protocol (PSP), with three clothing conditions (Light-light clothing; Boots-PPE with rubber boots; Shoes-PPE with running shoes). Bruce protocol with Light was performed for a reference test. Results showed there was no difference in VO\textsubscript{2max} between Bruce Light, PIP Light, and PSP Light. However, VO\textsubscript{2max} was reduced in Boots and Shoes with shortened maximal performance time (7 and 6 min reduced for PIP Boots and Shoes, respectively; 11 and 9 min reduced for PSP Boots and Shoes, respectively), whereas the increasing rate of VO\textsubscript{2} in Boots and Shoes during submaximal exercise was greater compared with Light. Wearing firefighter boots compared with wearing running shoes also significantly affected submaximal VO\textsubscript{2} but not VO\textsubscript{2max}. These results suggest that firefighters’ maximal performance determined from a typical VO\textsubscript{2max} test without wearing PPE may overestimate the actual performance capability of firefighters wearing PPE.