

# Acute effects of firefighting on cardiac performance

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**Abstract** This study examined standard echocardiographic measures of cardiac size and performance in response to a 3-h firefighting training exercise. Forty experienced male personnel completed a standardized 3 h live firefighting exercise. Before and after the firefighting activities, participants were weighed, height, heart rate, blood pressure and blood samples were obtained, and echocardiographic measurements were made. Firefighting produced significant decreases in left ventricular diastolic dimension, stroke volume, fractional shortening, and mitral E velocity, tachycardia, a rise in core temperature, and a reduction in calculated plasma volume. On tissue Doppler imaging, there were no changes in systolic contractile function, but a decreased lateral wall diastolic velocity was observed. These findings show that 3 h of live firefighting produced cardiac changes consistent with cardiac fatigue, coupled with a decrease in systemic arterial compliance. These data show that live firefighting produces significant

cardiovascular changes and future work is needed to evaluate if these changes are related to the increase in cardiovascular risk during live firefighting.

**Keywords** Cardiac fatigue · Ventricular function · Exercise · Heat stress