

Firefighters Face Extreme Duress in Their Occupation

Firefighting is one of these most strenuous and stressful jobs both physically and mentally (Baxter et al., 2010; Cheung, Petersen, & McLellan, 2010). The specific hazards of the working environment are often unknown due to the nature of the job. During the fire suppression stage, firefighters are often working close to maximal heart rates (Cheung et al., 2010). The personal protective equipment (PPE) and firefighting equipment factors in additional strain, especially on the heart (Cheung et al., 2010). Heart attacks are the most frequent reported cause of death of on-scene firefighters.

Although PPEs are supposed to protect the firefighter, PPEs also trap in heat and contribute to the firefighter's heat stress/thermal and cardiopulmonary strain (Cheung et al., 2010). Typical clothing (on top of standard uniform) features a Gore-Tex jacket (plus shell and liner), pants, Kevlar hood, respirator, helmet, rubber boots, and gloves all of which might weigh in around 10-15 kg (about 22 to 33 lbs) (Cheung et al., 2010). The self-contained breathing apparatus (SCBA) typically weights 10-12 kg (about 22-26 lbs) (Cheung et al., 2010). For an average 180 lb firefighter, PPEs may add an extra 30% of the firefighter's body mass (Cheung et al., 2010). Tools/equipment, on top of that, represent additional weight to account for (Cheung et al., 2010).

The clothing is very insulated and greatly reduces heat transfer while at the same time also impairs moisture/vapor evaporation (Cheung et al., 2010). Adequate ventilation is impeded.

The lead firefighters (first to enter building) typically have a heart rate well over 150 beats per minute, and body core temperatures may rise 1.3 degrees Celsius per 24 minutes of intense firefighting (Cheung et al., 2010).

SCBA's are supposed to protect the firefighter from gases and particulate matter, but the SCBA also imposes expiratory resistance which requires the respiratory muscles to generate greater pressure to overcome the resistance--it is hard work to breathe (Cheung et al., 2010). Over time, this may cause altered/adapted lung function (Cheung et al., 2010). SCBA's protect firefighters from many toxins and ultrafine particulate matter that are encountered during suppression (putting out the fire) and knockdown. However, SCBA's should be, but are not always worn during the overhaul stage (opening up the walls, ceilings, building compartments to check for residual flames/hotspots/etc.) (Baxter et al., 2010). Without the SCBA's, firefighters are susceptible to ultrafine particles which may contribute to coronary heart disease, and a plethora of unknown vaporous agents (Baxter et al., 2010). Even if individual chemicals are identified post-fire, the combined effect and long-term exposure cannot be predicted.

References

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