

# Duty-related risk of sudden cardiac death among young US firefighters

A. Farioli<sup>1,2,3</sup>, J. Yang<sup>1,2</sup>, D. Teehan<sup>1,2</sup>, D. M. Baur<sup>1,4</sup>, D. L. Smith<sup>5</sup> and S. N. Kales<sup>1,2</sup>

<sup>1</sup>Department of Environmental Health (Environmental & Occupational Medicine & Epidemiology), Harvard School of Public Health, Boston, MA 02115, USA, <sup>2</sup>The Cambridge Health Alliance, Harvard Medical School, Cambridge, MA 02139, USA, <sup>3</sup>Department of Medical and Surgical Sciences (DIMEC), University of Bologna, Bologna 40138, Italy, <sup>4</sup>Interdisciplinary for Hormone and Metabolic Disorders, Endokrinologikum ULM, 89073 Ulm, Germany, <sup>5</sup>Department of Health and Exercise Sciences, Skidmore College, Saratoga Springs, New York, NY 12866, USA.

Correspondence to: S. N. Kales, Cambridge Hospital Macht Building 427, 1493 Cambridge Street, Cambridge, MA 02139, USA. Tel: +617 665 1580; fax: +617 665 1672; e-mail: [skales@hsph.harvard.edu](mailto:skales@hsph.harvard.edu)

<b>Background</b>	Little is known regarding duty-related risks for sudden cardiac death (SCD) among young firefighters.
<b>Aims</b>	To investigate duty-related SCD among US firefighters aged 45 or younger.
<b>Methods</b>	We collected data on duty-related SCD from the US Fire Administration (USFA) and the US National Institute for Occupational Safety and Health (NIOSH). Two physicians independently reviewed each record. The proportions of time spent by firefighters performing specific duties were estimated from a municipal department, 17 large metropolitan departments and a national database. We estimated the duty-specific relative risks (RRs) and 95% confidence intervals (95% CI) of SCD relative to non-emergency duties based on the observed deaths and the expected average proportions of time per duty.
<b>Results</b>	The USFA recorded 205 age-eligible on-duty SCDs between 1996 and 2012; 86 (42%) of these deaths and one additional SCD were investigated by NIOSH (total $n = 206$ ). NIOSH was more likely ( $P < 0.001$ ) to report on SCD associated with physical training (69% of cases were investigated) and fire suppression (57%). Compared with non-emergency duties, the risk of SCD was increased for fire suppression (RR 22.1, 95% CI 14.8–32.9), alarm response (RR 2.6, 95% CI 1.5–4.6), alarm return (RR 4.1, 95% CI 2.7–6.2) and physical training (RR 4.8, 95% CI 3.2–7.2). RRs for SCD were higher among firefighters with a pre-existing history of a cardiac condition. All 16 SCDs associated with alarm response occurred among volunteer firefighters.
<b>Conclusions</b>	The performance of strenuous emergency duties is strongly associated with an increased risk of SCD among young firefighters, particularly among those with a history of cardiovascular disease.
<b>Key words</b>	Firefighters; longitudinal study; occupational disease; occupational exposure; sudden cardiac death.