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Emergency Responses Greatly Increase Risk to Firefighters of Dying on Duty From Heart Disease

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Boston, MA -- Firefighters engage in a dangerous occupation, risking life-threatening burns and smoke inhalation, among other hazards. So it may surprise some that the leading cause of death on duty among U.S. firefighters is coronary heart disease (CHD). In a new, large-scale study, researchers from the Harvard School of Public Health (HSPH) examined the link between CHD deaths and firefighting and looked at specific job duties to see which might increase the risk of dying from a coronary event. The landmark study provides the strongest link to date between CHD and emergency firefighting duties. It found that putting out fires was associated with a risk up to 100 times greater than the risk of dying from non-emergency duties. The study appears in the March 22, 2007 issue of *The New England Journal of Medicine*. An accompanying editorial also appears in this issue of the journal.

"We found conclusive evidence that the risk of CHD death is significantly higher during fire suppression, responding to alarms, returning from alarms and during certain physical training activities," said Stefanos Kales, lead author and assistant professor in the Department of Environmental Health at HSPH. Kales is also the medical director of Employee Health & Industrial Medicine at Cambridge Health Alliance.

Cardiovascular events, mainly due to CHD, account for 45% of deaths among firefighters on duty. Numerous earlier studies examined CHD death rates to see whether firefighters have a greater lifetime risk of heart death than the general population or compared to other occupations. Because roughly one third of firefighters and one third of the general population in developed countries die of cardiovascular disease, those studies were inconclusive. The researchers, therefore, took a different approach to assess whether specific duties could acutely trigger CHD events.

The team, led by Kales and David Christiani, senior author and professor of occupational medicine and epidemiology in the Departments of Environmental Health and Epidemiology at HSPH, examined data on all U.S. on-duty firefighter deaths between 1994 and 2004, except for those deaths associated with the September 11, 2001 terrorist attacks. They also made estimates of the average annual proportion of time firefighters spent on specific job duties using data from several sources, including 17 large metropolitan fire departments.

The results showed that, of the 1,144 firefighter on-duty deaths during that period, 449 (39%) were attributed to CHD. Of those, 144 took place during fire suppression. Estimates showed that firefighters spent just 1% to 5% of their time on fire suppression, yet that job responsibility accounted for 32% of deaths from coronary events. Therefore, the relative risk of death from CHD while putting out fires was up to 100 times as high as the risk associated with non-emergency duties. An increased risk was also observed for other emergency duties, such as alarm response, as compared to non-emergency duties. "The present study confirms our previous results from a smaller study of deaths and an investigation of non-fatal events leading to retirement from firefighting. It provides the strongest evidence to date that firefighters' work activities can trigger CHD events," said Kales.

The authors hypothesize that the risk of dying from heart disease may increase during fire suppression because of the effects of strenuous exertion on firefighters who have underlying CHD. Also, many firefighters are overweight and lack adequate physical fitness, which may be contributing risk factors. A 2005 study by the National Fire Protection Association showed that more than 70% of fire departments lacked fitness and health programs. Kales' team has published a body of previous work documenting a high prevalence of obesity among

firefighters and associating cardiovascular risk factors and previously diagnosed heart disease with on-duty CHD events and other adverse outcomes.

"We hope that our study will reinforce efforts in the firefighting community to improve their health and wellness programs. We also hope that these striking results will make physicians who care for firefighters, such as internists and cardiologists, more cognizant of the demanding nature of this occupation and get them to be more aggressive with regard to cardiovascular risk reduction," said Kales.

The study was supported by grants from the National Institute for Occupational Safety and Health and the Massachusetts Public Employees Retirement Administration Commission.

"Emergency Duties and Deaths From Heart Disease Among Firefighters In the United States," Stefanos N. Kales, Elpidoforos S. Soteriades, Costas A. Christophi, David C. Christiani, The New England Journal of Medicine, 356;12, March 22, 2007

For further information contact:

Todd Datz

tdatz@hsph.harvard.edu

617-432-3952

Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115
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