



## Update on . . . Environmental Carcinogens

Susan Weiss Behrend, RN, MSN, AOCN® • Associate Editor

### Possible Link Studied Between Cancer and Trade Center Debris

An observational study was conducted in response to public concern regarding the release of both known and suspected environmental carcinogens following the terrorist attacks of September 11, 2001, at the World Trade Center (WTC) in New York, NY, and the potential increase of cancer incidence among exposed individuals. The study subjects were New York state residents enrolled in the WTC Health Registry from 2003–2004 (N = 55,778). The cohort was divided as rescue and recovery workers (n = 21,850) and those not involved in rescue and recovery (n = 33,928). All were followed through December 31, 2008. Standardized incidence ratios (SIRs) made adjustments for age, race and ethnicity, and gender; were computed with 2003–2008 New York state rates as reference; and focused on diagnosed cancers in 2007–2008 as most likely related to exposure during September 11, 2001, and the aftermath. The total and site-specific incidence rate differences per 100,000 person-years between the study population and the New York state population in 2007–2008 also were calculated.

The WTC attacks claimed more than 2,700 lives and exposed hundreds of thousands of individuals to dust, debris, exploded building materials, and toxic emissions that resulted in short- and long-term health-related effects. Environmental surveys have shown that smoke and aerosols emitted from the explosions were mixtures of volatile chemicals and particulate matter that contained known and suspected carcinogens such as asbestos, silica, benzene, hydrocarbons, volatile organic compounds, and metals.

This WTC Health Registry provided pivotal information as a cohort study designed specifically to monitor the health impact of the September 11 attacks among rescue and recovery workers and people who lived, worked, or attended school in lower Manhattan. The focus of this epidemiologic survey was to determine if the environmental pollutants that blanketed lower Man-

hattan following the WTC attacks were causative carcinogenic agents linked to an increase in cancer incidence amongst exposed individuals.

The study was one of the earliest attempts to document a link between environmental exposures to suspected carcinogens (polycyclic hydrocarbons, asbestos, benzene, and dioxins) that emanated from the WTC. No statistically significant increased incidence was noted for all combined cancer sites. Among rescue and recovery workers, it was found that multiple myeloma, prostate, and thyroid cancers were significantly elevated in a later time frame; however, they were not associated with WTC exposures.

Prostate and thyroid cancers are frequently detected during routine screening and are subject to surveillance bias. To address this bias, the researchers compared the proportion of individuals having a routine physical checkup within the preceding 12 months between those with and without subsequent cancer. The proportions were almost identical and, therefore, the respective cases of prostate and thyroid cancer that were stage I at diagnosis (85% and 66%, respectively) were similar to those of the general New York state population. This suggests that cancer cases in this study may not have received more thorough cancer screening than the New York state population in general. Hematologic cancers were of interest because they have a shorter latency period than solid tumors and are associated with certain chemicals, and could be early indicators of cancer risk. Later-period cases of multiple myeloma (n = 7) were observed among rescue and recovery workers, yielding a significantly elevated SIR of 2.85. Thyroid cancer can be caused by ionizing radiation; however, potentially carcinogenic levels of radiation were not documented at the WTC site. Multiple myeloma has been associated with a variety of occupational exposures such as firefighting, painting, and agricultural work. Few specific environmental agents, however, have been linked to myeloma, and the SIR for firefighters at the WTC was based on less than five

cases of multiple myeloma and, therefore, was not statistically significant.

This study has tremendous significance as it represents the first WTC cancer incidence study including both genders, all ages and races, and rescue and recovery workers as well as those not involved in rescue and recovery. The cohort provided measurements of exposure to environmental hazards (some carcinogenic) to dose-response relationships.

The catastrophe of the WTC attacks promulgated despair in the lives of those immediately affected and led to profound national and global changes. This study, therefore, is pivotal as it was the first attempt to document that the etiology of three specific cancers (prostate, thyroid, and multiple myeloma) among rescue and recovery workers were not significantly associated with WTC exposures. The short follow-up and limited data on the medical history and screening of this cohort were among several study limitations. Although the link between WTC exposures and the identified cancers is unclear, longer follow-up is needed for select cancer sites with longer latency.

Cone, J.E., Kahn, A.R., Brackbill, R.M., Farfel, M.R., Greene, C.M., Hadler, J.L., . . . Stellman, S.D. (2012). Association between World Trade Center exposure and excess cancer risk. *JAMA*, 308, 2479–2488. doi:10.1001/jama.2012.110980

### Nurses Must Educate Patients Regarding Diagnostic Radiation

The widespread use of diagnostic medical radiation has proliferated as the most common component of background radiation in Western countries. Diagnostic radiology, particularly the worldwide use of computed tomography scan, will continue this popular trend and the related potential for cancer induction from doses received during these procedures. This article provides an overview of current knowledge related to cancer induction from low doses of ionizing radiation. Estimation of cancer risk from low linear energy transfer (LET) ionizing radiation can enable prediction of cancer risk from low-dose