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World Trade Center Rescue and Recovery Workers: Cancer Increases are Beginning to Emerge

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In the weeks after the September 11, 2001 World Trade Center attacks, air and dust sampling in and around “Ground Zero” identified numerous agents classified as established or suspected carcinogens by the International Agency for Research on Cancer or the National Toxicology Program [1]. The estimated 95,000 rescue workers [2] were exposed to dusts and fibers from building materials as well as diesel exhaust and particulates from >100,000 truck trips used in the cleanup. The dust contained metals, asbestos, glass fibers, polycyclic organic hydrocarbons, phthalate esters, furans, polychlorinated biphenyls, organochlorine pesticides, dioxins, chlordanes, and other hydrocarbons [3, 4]. Additionally, fires ignited by jet fuel spread underneath the debris to organic material, heating and diesel oil, and fuel from automobiles left in subterranean parking structures [5], and burned for 99 days after the attacks. Cleanup of the rubble ended nine months later in May 2002.

World Trade Center rescue workers represented a variety of sectors which included not only firefighters and law enforcement, but individuals employed in the public sector, construction, utilities, transportation, cleaning/maintenance, other professions, and volunteers [6]. This variety makes the choice of a comparable referent group challenging. The majority were white men in their 30’s and 40’s at the time of the attacks. Of the rescue workers present at the collapses, half wore no respiratory protection, however the use of protective equipment including respirators increased over time [7].

In this issue of the Journal, Li and colleagues report cancer incidence to 2015 in World Trade Center rescue workers [8]. The authors merged together rescue workers from three cohorts: the Fire Department of the City of New York Cohort, the

World Trade Center Health Registry, and the General Responder Cohort. The combined sample size of 69,102 represents 72.4% of rescue workers. Authors linked cohort members to Cancer Registries from 13 US States, estimated to cover 93% of workers' residences at last contact. Standardized incidence ratios were calculated based on New York State cancer incidence. As 19% of workers were not New York residents, this is likely a conservative approach given the higher cancer incidence in New York compared to other US states [9].

Authors observed slightly lower overall cancer incidence compared to New York State residents (SIR=0.96), which must be considered in light of the healthy worker effect and the 25% lower smoking rate in rescue workers compared to all New York adults. With regards to the individual cancer sites, incidence was elevated for cancers of the tonsil, prostate, thyroid, and melanoma of the skin. There was evidence of greater cancer surveillance of rescue workers, as shown by higher incidence of cancers diagnosed at earlier stages. Although increased cancer risks may be hypothesized to be due to greater medical surveillance among rescue workers, authors stratified by cancer stage and observed increased incidence for both localized and regional/distant thyroid, prostate, and tonsil cancers.

The internal comparisons are particularly of interest. Those who first arrived onsite on September 11, many of whom would have been exposed to the dust cloud, had an overall cancer incidence 47% higher than those arriving later. These workers may differ from the overall sample due to the plausible inclusion of higher proportions of firefighters and law enforcement personnel, although this is not described in the paper. In particular, the notable increases of prostate cancer and

melanoma in the early arrival dust cloud exposed subgroup, including firefighters, are of interest because meta-analyses of this group show coherent increases of these cancers [10-12]. Because some cancer increases should already be expected among firefighters separate from World Trade Center exposures, later analyses might consider comparing firefighters to other rescue workers.

Additional risk factors may also be considered. The individual cohorts were lacking information on lifestyle factors relevant for these cancers such as sun exposure, alcohol use, human papillomavirus (HPV) infection, and detailed information on lifetime smoking. A prior analysis of the General Responder Cohort speculated that HPV may have acted in concert with World Trade Center exposures to promote oropharyngeal carcinogenesis [13].

The plume from the fires blew largely south and east towards Brooklyn, although occasionally winds changed and blew the smoke, soot, and dust in other directions. Rescue workers first arriving in 2001, while the fires were still burning, had a striking 76% increased risk for all cancers and a twofold increased risk of prostate cancer compared to those who started work onsite in 2002, after the fires were extinguished. This finding may be of particular interest to New York City residents and workers in the city exposed to the plume in that 3-month period. The majority of World Trade Center cohort studies focused on rescue workers and individuals residing, working, or studying in lower Manhattan, yet possible carcinogenic impacts from smoke exposure in Brooklyn are also worthy of study. Demonstrating the heavy smoke exposures in Brooklyn, an earlier study observed

equivalent worsened asthma in western Brooklyn residents compared to lower Manhattan residents [14].

Given the maximum of 14-years of follow-up in the present study, increased cancer risks from September 11 exposures have yet to peak. It is of interest to all Americans to continue to monitor and provide health care for rescue workers and exposed New York City residents in the coming years.

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Data availability

Not applicable.

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