

Blood cancer precursor found in 9/11 firefighters

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Amit K. Verma, M.B.B.S. Credit: Albert Einstein College of Medicine

A study in today's issue of *JAMA Oncology* reports that New York City firefighters exposed to the 9/11 World Trade Center disaster site face an increased risk for developing myeloma precursor disease (MGUS),

which can lead to the blood cancer multiple myeloma. The study was conducted by researchers at Albert Einstein College of Medicine, Montefiore Health System, the Fire Department of the City of New York (FDNY) and Memorial Sloan Kettering Cancer Center.

"With our 2011 [study](#) in *The Lancet*, we were the first to show that first responders were more likely to get many different types of cancer," said senior co-author David J. Prezant, M.D., a professor of medicine at Einstein, a pulmonary disease specialist at Montefiore and chief medical officer of the FDNY. "We carried out this new study to do more than just treat cancer. We wanted to find early, predictive signs of cancer that would allow us to screen people and monitor those found to be at risk. By detecting MGUS, which predicts the development of multiple [myeloma](#), we are able to do that."

In MGUS (monoclonal gammopathy of undetermined significance), the blood's plasma cells produce an abnormal protein called monoclonal (M) protein that can be detected with blood tests. MGUS generally causes no problems but can progress to multiple myeloma, a blood cancer diagnosed in about 30,000 Americans each year. In multiple myeloma, rapidly proliferating plasma cells can crowd out the bone marrow's normal blood-forming cells, leading to problems including anemia (shortage of red cells) and leukopenia (shortage of white cells). Most multiple myeloma cases are diagnosed in people older than 65, and only 5 percent of cases occur among people under 50. Half of those diagnosed with multiple myeloma are still alive five years later.

Previous studies suggest that MGUS and multiple myeloma all tend to develop after exposure to toxic chemicals. The aerosolized dust from the collapsed towers exposed FDNY and other first responders to unprecedented levels of polychlorinated biphenyls, polycyclic aromatic hydrocarbons, dioxins, asbestos and other potential carcinogens, as well as diesel smoke from heavy machinery used in the 10-month rescue and

recovery effort.

For statistical reasons, the study population was limited to 781 white, male WTC-exposed firefighters aged 50 to 79 whose blood samples were evaluated to assess the prevalence of MGUS in the group. When results were compared with MGUS prevalence in a non-exposed comparison group (men living in Olmsted County, MN), the prevalence of MGUS in the firefighters was nearly twice as high (7.63 cases of MGUS per 100 firefighters vs. 4.34 cases per 100 non-exposed persons).

"We saw a significantly higher incidence of MGUS in these first responders, and they're developing it at a young age," said the study's senior co-author Amit Verma, M.B.B.S., a professor of medicine and of developmental & molecular biology at Einstein and director of hematologic malignancies at the Montefiore Einstein Center for Cancer Care. Their early development of MGUS, he says, suggests that these firefighters potentially face an increased risk for early-onset of multiple myeloma as well.

Indeed, in a separate analysis, the researchers examined the 16 cases of multiple myeloma diagnosed between September 12, 2001 and July 1, 2017 among all white, male WTC-exposed FDNY firefighters. Their average age of diagnosis was 57, or 12 years younger than the average age for multiple myeloma diagnosis nationally.

Although not everyone with MGUS will develop multiple myeloma, the researchers recommend that physicians screen first responders exposed to the WTC site for both conditions. "Screening for [multiple myeloma](#) risk by testing for MGUS is something we can offer these first responders, which is why this study is important," said Dr. Prezant.

Another study in this edition of *JAMA Oncology* predicts how many WTC-related cancer cases will be diagnosed among FDNY WTC

exposed rescue/recovery workers between January 1, 2012 and December 31, 2031. The study, by Einstein, Montefiore, and FDNY researchers, predicts that among a subset of white males 2,714 new cancer cases will be diagnosed over the 20-year period. Led by Rachel Zeig-Owens, Dr.P.H., a research assistant professor in epidemiology and population health at Einstein, these studies demonstrate that this is a significantly greater cancer burden than the 2,596 cancer cases that would be predicted in a demographically similar but non-exposed population. The study also calculated that the 20-year cost for the first year of [cancer](#) treatment for the FDNY WTC exposed rescue/recovery workers will total more than \$235 million. The paper is titled "Estimation of Future Cancer Burden in World Trade Center-Exposed Fire Department of the City of New York Rescue/recovery Workers."

The MGUS study is titled "Multiple myeloma and its precursor disease among firefighters exposed to the World Trade Center disaster." The blood samples for this study were collected and purified under the direction of Orsi Giricz, Ph.D., a co-first author of the study at Montefiore/Einstein, and then analyzed for MGUS by Ola Landgren, M.D., Ph.D., at Memorial Sloan Kettering Cancer Center, the corresponding author for the study. Dr. Zeig-Owen was also a co-first author in this study. The other Einstein and Montefiore authors are David Goldfarb, M.P.H., George Nwankwo, B.S., Ulrich Steidl, M.D., Ph.D., Kith Pradhan, Ph.D., Charles B. Hall, Ph.D., Hillel W. Cohen, Dr.P.H., Theresa Schwartz, M.S. and Mayris P. Webber, Dr.P.H. Additional authors include Malin Hulcrantz, M.D., Ph.D., Kaznouri Murata, Ph.D., Katie Thoren, Ph.D., Lakshmi Ramanathan, Ph.D., Ahmet Dogan, M.D., Ph.D., and Shani Irby, N.P., all of Memorial Sloan Kettering Cancer Center; Nadie Jaber, PA-C, of the FDNY; and Laura Crowley, M.D. and Michael Crane, M.D., of Mount Sinai School of Medicine.

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More information: "Estimation of Future Cancer Burden Among Rescue and Recovery Workers Exposed to the World Trade Center Disaster." [jamanetwork.com/journals/jamao ... /jamaoncol.2018.0504](https://jamanetwork.com/journals/jamao.../jamaoncol.2018.0504)

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