



FIRE DEPARTMENT

9 METROTECH CENTER BROOKLYN, N.Y. 11201-3857



Drs. KJ KELLY & DJ PREZANT
Office of the Chief Medical Officer
Bureau of Health Services
Room 2E-4

718-999-1933(4)
Fax 718-999-0174
kellykj@fdny.nyc.gov
prezand@fdny.nyc.gov

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Congress of the United States – House of Representatives
Chairman Christopher Shays, Connecticut
Sub-Committee on National Security, Emerging Threats and International Relations
B372 Rayburn House Office Building
Washington, DC 20515-6143

Re: Findings From the Fire Department of New York's (FDNY)
World Trade Center Medical Monitoring Program:

Dear Chairman and Members:

Good morning Mr. Chairman and members of the Congressional Sub-committee on National Security, Emerging Threats and International Relations. I am Dr. Michael Weiden, a Medical Officer of the Fire Department of New York (FDNY) and Assistant Professor of Medicine and Environmental Medicine in the Pulmonary Division at New York University's School of Medicine. I am reading a statement jointly written with Dr. Kerry Kelly, FDNY's Chief Medical Officer and Dr. David Prezant, FDNY's Deputy Chief Medical Officer who like myself is a lung specialist and a Professor of Medicine at Albert Einstein College of Medicine. Together we have provided over 50 years of service to FDNY's bravest – firefighters and EMS rescue workers.

Today, I have been asked to talk about the health and welfare of FDNY firefighters and EMS rescue workers after 9/11. Let us start by stating that the exposures at the World Trade Center, both during the collapse and in the days, weeks and months thereafter, far exceed in both intensity and duration any previous firefighting experience in the United States. We have learned that people, not buildings, are the victims and that first responders respond whether they're on duty or off duty, and even if they are not wearing the appropriate personal protective equipment and respirators. What lessons have we learned and what changes should we make as we move forward?

On 9/11, two 110 story towers and several other buildings collapsed during rescue and evacuation. With these collapses, FDNY firefighters and EMS rescue workers went from being first responders to victims. Although, first responders accounted for nearly 12% of the dead, our surviving

firefighters and EMS and rescue workers continued to work uninterrupted both at the WTC site and throughout NYC. We must never forget that despite the tragedy of that day, FDNY successfully evacuated over 20,000 civilians and saved countless lives that day. The extraordinary heroism of our firefighters and rescue workers will forever remain a beacon of courage, commitment and dedication.

Over the next 12 months, our rescue workers continued their efforts at Ground Zero despite questions about their exposures and its health effects. Regardless of whether carcinogens are ever proven to be present at the site, remember environmental monitoring was not done on Day 1, we must not neglect the current and future health risk from particulate matter visibly present at high levels. This was the largest single acute exposure to high-volume particulate matter, to dust, in a modern urban environment. Those of us who had the luxury of watching the WTC collapse from our homes on TV, could easily get the impression that the cloud rushed by so fast that the exposure lasted only seconds to minutes. For our firefighters and EMS rescue workers this illusion was not reality. They were suspended in a black cloud, so thick they could not see the sky or even their own hands in front of their faces. They were coughing, gagging, inhaling and swallowing large and small pieces of WTC Dust. And at Ground Zero, the dust turned the sky black for hours and still gray for days.

We now know what WTC dust is. It is pulverized concrete, fibrous glass, silicates, carbon particulate matter and asbestos. This mixture of dust ranged from 1 to 50 microns in size, meaning that it was respirable to the sinuses and large airways and once the upper airways were overwhelmed by this burden, the dust was then respirable even to the small lower airways. It was also swallowed. The dust had a very high pH. In other words, it's like swallowing or inhaling Drano. This high pH, alkaline exposure, caused a deep burn of the lungs, sinuses and esophagus causing persistent inflammation leading to respiratory and gastrointestinal complaints.

Since inhaling this dust can cause considerable harm, it was important to find out if masks or respirators were available and were actually worn by FDNY rescue workers. In a cooperative study with NIOSH, FDNY's Bureau of Health Services asked FDNY firefighters, what masks were available for you to wear on Day 1. Most had a firefighter's respirator, a self-contained breathing apparatus or SCBA. Unfortunately, SCBA typically provides a firefighter with only 8 to 12 minutes of fresh air. In a fire, departments can rotate fresh SCBA bottles or preferably fresh firefighters onto the fire ground. FDNY didn't understand that in this type of disaster, the ability to supply new SCBA bottles would be impossible. Even if FDNY had been able to get fresh SCBA bottles, it would be impractical for firefighter's to use such heavy bottles (weighing nearly 25 lbs) during a prolonged rescue event. After their first SCBA bottle ran out, 70% of FDNY firefighters working on Day 1 stated that they had access to only a dust mask (not NIOSH approved for this type of exposure). And, only 18% stated that they were able to wear a mask during most of their work time. So we're talking about 82% without any respiratory protection, regardless of what type of mask they actually had. By Week 2, 70% of the firefighters had a fit-checked half-face P-100 respirator, the proper respirator for this exposure, but only 30% were able to wear it most of the time. Why? Because these masks are nearly impossible to wear during prolonged work activities as they are uncomfortable and difficult to communicate through to others. They were designed for the laboratory and not heavy physical exertion during a dangerous rescue/recovery operation. To improve respiratory protection at future disasters we need better planning, improved respirator design and supply. P-100 respirators need to have filters that are interchangeable from one manufacturer to the next. Two years after WTC, we still don't have that. Improved design and supply will naturally lead to improved compliance. You don't need to mandate five more hours of training to tell rescue workers what they already know. They know they need to wear a respirator. But they need a better one.

Respirators are not the only aspect of personal protective equipment requiring improvement. Modern firefighting uniforms (so called Bunker gear) is fantastic for fighting fires and preventing burns. But it's designed for fire suppression, not for rescue events. We need to have different uniforms for long-term rescue events. We need to think about uniforms for long-term rescue events that don't provide the same level of thermal exposure, but do take into account comfort, ergonomics, physical fitness levels, and the ability to move around in a collapse scene safely. Current firefighter uniforms provide thermal protection but at the expense of dehydration and heat stress. If the WTC attack had happened during the summer months, there would have been numerous heat related injuries. Improved personal protective equipment is the way to reduce injuries and illness now and in the future.

With few firefighters having adequate respiratory protection, FDNY's Bureau of Health Services understood the need to provide immediate medical monitoring and treatment. From October 2001 to February 2002, we provided every FDNY firefighter and EMS worker with the opportunity for a full medical, not just a listen-to-your-chest-with-a-stethoscope medical, but a full medical; the medical that we helped to design with medical experts, NIOSH, the International Association of Fire Fighters (IAFF) and our local unions. We were able to do this because FDNY had already built a healthcare infrastructure in its Bureau of Health Services to provide medicals to nearly 11,000 FDNY firefighters and 2,500 EMS workers annually for the last decade. Immediately after 9/11, the Bureau of Health Services with funding from FDNY, FEMA and CDC expanded its work hours to provide medicals 18 hours a day, 7 days a week. In 5 months, from October 2001 to February 2002, we provided 11,000 exposed FDNY rescue workers with a WTC medical. We also partnered with the CDC and NIOSH to provide specialized tests that were not part of our medical. For example, in the 4th wk after 9/11, we obtained serum and urine from nearly 400 FDNY rescue workers and measured hydrocarbons, special metals, dioxins and PCB congeners. Our results were recently published in the September 9th 2003 edition of Environmental Health Perspectives. We found most measures to be within normal background levels but a few were elevated, specifically antimony and two dioxin congeners. Luckily, these elevations were not to clinically significant levels but follow up measurements certainly need to be repeated as part of FDNY's long-term medical monitoring program.

We measured heavy metal blood levels in our firefighters throughout the rescue/recovery effort. We did not know at the time how critically important these measures were to be. Several months into the World Trade Center rescue/recovery effort, two Port Authority police officers were reported to have very high blood mercury levels. In response, authorities wanted to close down the site. That would have created enormous emotional stress to every family member still waiting for a loved one to be found. Well, the fact of the matter is that you don't measure mercury in blood. That type of measurement reflects dietary exposure. When monitoring an environmental exposure, the correct measure is urine mercury. At that point, FDNY's Bureau of Health Services had already done urine mercury levels in over 8,000 people and none were elevated. These findings allowed the site to remain open, a major untold benefit for the families of the missing.

Our monitoring indicates that the critical irritant exposure at WTC was NOT to chemical toxins. Instead, the issue of concern is exposures to World Trade Center dust, fibers and particulate matter. 10 months after 9/11, in a collaborative study with a group from Israel, we asked FDNY firefighters to expectorate sputum for particle analysis. Even 10 months later we found a pattern of particulate matter that is nearly identical to World Trade Center dust. In one FDNY firefighter with respiratory distress, a bronchoscopy was performed, temporarily placing a tube in the lung to sample the lower airways and alveoli. We found uncoated asbestos fibers (uncoated argues for an acute exposure), degraded fibrous

glass and fly ash (pulverized concrete). These findings were published in the September 2002 issue of the American Journal of Respiratory and Critical Care Medicine.

Together, our results demonstrate that FDNY firefighters and EMS rescue workers were truly exposed to respirable fibers and particulate matter placing them at current and future risk for pulmonary, cardiac and cancer related illnesses. Because FDNY medical standards for firefighters were extremely rigorous, FDNY firefighters prior to 9/11 represented a very healthy workforce, with a low prevalence of cardiopulmonary disease. Our pre-WC medicals indicated that less than 3% reported sinus congestion, cough, wheeze, chest tightness or shortness of breath. Immediately after 9/11, nearly 100% of our exposed FDNY rescue workers reported a cough. During the first week of our medical (October 2001), four weeks after the WTC, 72% still reported a cough. Six months later, 35% of our firefighters report a daily cough and currently it appears that somewhere between 10 and 25% report cough and other respiratory complaints depending on the extent of their exposure.

What about objective measures of respiratory impairment? We are the only work force to have spirometry (measurements of lung capacity and airflow rates) on every firefighter pre-WTC exposure because FDNY had a pre-existing annual medical infrastructure. Pre-WTC spirometry breathing tests showed that lung capacity and airflow for FDNY firefighters averaged 95% of predicted normal (corrected for height, age and gender) and in many it was above 100% of predicted normal. Typically, average annual loss in lung capacity due to aging alone is about 30 milliliters. After WTC, our medical monitoring program found that the average loss in breathing capacity was between 300 to 500 milliliters and even greater if symptoms were severe. Compared to reference values in this population prior to 9/11, those arriving at WTC during the first 48 hours post-collapse had a 60% higher risk for a decline of 450 milliliters or greater in the rate of airflow (the forced expiratory volume at during the first second of expiration, termed the FEV-1). Our study, in collaboration with NIOSH, was just accepted for publication in Chest, the journal of the American College of Chest Physicians.

We were only able to document this decrease because of pre-WTC measurements. If we had only post-WTC measurements, we would have concluded only that lung capacity averaged at the lower limits of normal. Instead, by understanding that the acute decrement in lung capacity was 10 times the expected annual decline, we at FDNY's Bureau of Health Services were able to aggressively institute several treatment programs. Long-term medical monitoring is critical for our rescue workers both to determine the efficacy of our treatment programs and to identify those in need for further or continued intervention.

Lung imaging has not been as useful as spirometry. Chest X-rays are not very sensitive; few had any abnormalities, but were useful for documenting a post-exposure baseline for future comparisons during our long-term medical monitoring program. Chest CAT scans were also of little value but did, along with spirometry, help document airway inflammation. Again, along with spirometry, Chest CAT scans in those most exposed should be serially repeated in our long-term medical monitoring program to evaluate the progression of airway inflammation, remodeling, asthma, emphysema and of ultimately for lung cancer screening. If cancers occur, the earliest ones may not be found for another 10 to 20 years after this event, so this is a problem that we're going to have to monitor for many years to come.

What about specialized respiratory studies that we were able to do over and above our WTC medical? These are studies we can't do on everybody because they're incredibly time intensive. Using a specialized breathing test, called a methacholine challenge test we evaluated airway inflammation in a randomized stratified sample of FDNY firefighters with varying levels of exposure and symptoms.

Most were highly exposed. They were there during Day 1, during the morning of Day 1 when the buildings collapsed. Some were moderately exposed. They were not there during the morning of Day 1, but they were there later on in Day 1 and Day 2. And then we had controls, firefighters who weren't there at all. We gave them an increasing dose of an irritating vapor (methacholine) and tested their breathing. In a normal person, when you gave them this irritating vapor, their breathing does not significantly decrease. But in someone with airway inflammation, Hyperreactivity, asthma, or reactive airways dysfunction syndrome, airflow drops significantly by at least 20%. We found that 25 percent of the highest exposed FDNY firefighters (there during the collapse) had airway hyperreactivity and may have asthma or reactive airways dysfunction syndrome. This is a big problem for firefighters who need to be able to breathe to do their job. Unfortunately, in many of those with abnormal tests shortly after 9/11, this abnormal finding has persisted. We published these findings in the July 2003 issue of the American Journal of Respiratory and Critical Care Medicine.

We use the phrase "World Trade Center Cough" to describe our most symptomatic firefighters who have required extensive medical leave and are unable to safely perform essential firefighting duties. They have severe cough, shortness of breath, wheezing, chest discomfort, sinus congestion and heartburn/acid reflux. Over half of this group had a decline in their breathing capacity of at least 500 milliliters, most with bronchodilator responses and many with hyperreactivity on methacholine challenge testing. Symptoms have improved with asthma, sinus and heartburn/reflux medications, but most remain with persistent asthmatic airway inflammation. To date, 280 FDNY firefighters have qualified for retirement disability pensions due to permanent lung impairment and we project that anywhere from 300 to 500 firefighters will ultimately be permanently impaired from respiratory disease.

Respiratory problems are not the only issues FDNY is coping with. Since 9/11 our firefighters have been functioning under incredibly high stress levels. They have lost co-workers. They have lost friends. They have lost family. They have a different role in life now. They've been exposed not just to fires. They've been exposed to a new mission. In our FDNY WTC medical monitoring program, 48% of our firefighters report difficulty sleeping; 36% report unusual irritability, 34% report difficulty concentrating, and 33% report anxiety. These are major problems for people who didn't have problems pre-WTC. Eighty percent of our firefighters, independent of their age or the extent of their WTC exposure indicate that they are concerned about their health and 20% are worried that their future may be cut short. Since 9/11, our pre-existing Counseling Services Unit was rapidly expanded to provide educational, group and individual sessions using funding from the Project Liberty (a FEMA funded program), the IAFF, FDNY, local unions and private philanthropists. Project Liberty dollars, supplemented by these other sources has allowed us to provide individual counseling sessions to over 5,700 FDNY rescue workers and families. These individual counseling sessions are in addition to the many group therapy, firehouse briefings, and department wide interventions that we have done since the initial days. New programs to meet the new needs of our members have been developed. To date, we have clearly provided more educational and counseling interventions to this workforce than have been provided to other workers at this or any prior disaster. All of these services were provided using a voluntary, non-punitive, cost-free model. These services have been highly productive and have allowed our department to continue to function, rebuild and transition into the future. Normally, FDNY has several hundred retirees per year. Since 9/11, FDNY has had several thousand retirees. Each member leaving this workforce needs our support. Each new member entering this workforce is taking the locker of a lost, injured, ill or now distant colleague. To serve their needs, and to allow FDNY to continue to serve the needs of New York, it is essential that Project Liberty be continued past its June 2004 end-date.

In conclusion, we can't travel back in time to prevent the attack on 9/11 and we can't bring back the nearly 3,000 lost, 343 firefighters, 60 police officers. We cannot prevent the exposures that have already occurred to these men and women, but through the long-term medical monitoring and counseling programs that I have described today, we can all work to restore the health of those that did survive. That is why the federal funding recently provided for long-term medical monitoring of WTC rescue workers (\$25 million for FDNY rescue workers and \$65 million for other rescue workers) is critically important. We are glad that a recent agreement has been made that should help with the release of these funds. However, we remind the members of this sub-committee that this funding is urgently and immediately needed if we are to continue to meet our commitment to each and every FDNY firefighter – a covenant that states when you come out of the flames, we will be there.

FDNY thanks you for your continued support.