An Update 20 years later: September 2001-September 2021

FDNY WORLD TRADE CENTER HEALTH PROGRAM

HEALTH IMPACTS ON FDNY RESCUE/RECOVERY WORKERS 20 Years: 2001 to 2021

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Bill de Blasio, Mayor
Daniel A. Nigro, Fire Commissioner
Thomas J. Richardson, Chief of Department

WORLD TRADE CENTER HEALTH PROGRAM
IMPACT ON FDNY RESCUE/RECOVERY WORKERS
20 Year Update

The purpose of this publication is to update our members on important information the Department has gathered concerning the physical and mental health effects of 9/11 on our membership.

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SECTION 1:
LETTERS

Message from the Mayor of the City of New York
Bill de Blasio

Twenty years ago, on September 11, 2001, our city experienced the worst day in its long history, when thousands of New Yorkers tragically lost their lives in the deadliest terrorist attack on our country's soil. In the hours that followed, and every day since, New Yorkers have shown that even when we are at our lowest, we will always show the world—and each other—our best. There is no greater example of the heroic spirit that defines our residents than the kindness, strength, bravery and courage that our first responders demonstrated in the aftermath of this horrific attack. Reporting to Ground Zero day after day, they combed through dust, debris and rubble in search of survivors and provided aid to those in need.

In the years that followed, as more and more members of the FDNY began to fall ill, it became clear that now it was our turn to care for those who have always been there for us in the darkest of times. Landmark pieces of legislation like the James Zadroga 9/11 Health and Compensation Act and the incredible leadership of the FDNY World Trade Center Health Program have ensured that these heroes receive the care and support they need. And because of the tireless work of representatives from the 9/11 survivor and first responder advocate community, uniformed agencies and the labor community, as well as our elected and local government leaders, victims will always be able to receive the help they need thanks to the passage of the Never Forget the Heroes: James Zadroga, Ray Pfeifer, and Luis Alvarez Permanent Authorization of the September 11th Victim Compensation Fund Act.

As we prepare to mark the passing of two decades since this horrible day, this report will provide the most up- to-date information on what we know about the lingering health impacts of 9/11 and highlight the work the World Trade Center Health Program is doing to support those affected by their exposure to the WTC site. We owe it to these dedicated members of the FDNY and their families to continue learning all we can about the toll this continues to take on those who have devoted their lives to service.

This year, people across the five boroughs and around the globe will come together to mark this solemn anniversary, and I join with them in honoring the hundreds of FDNY members who came to our aid that Tuesday morning. We will never forget their sacrifices, and we will never abandon them.

Sincerely,

Bill de Blasio

For 10 long, arduous months after 9/11, we worked at the site where the towers had stood and where 343 FDNY members, our friends and coworkers, lost their lives. Our members served bravely that day and selflessly worked at the site for the many days, weeks and months that followed. Our exposure to the dust, chemicals and other noxious elements present at the site have left many of us with physical and mental health illnesses and others with the potential for developing these problems.

Thankfully, the FDNY Bureau of Health Services and the FDNY WTC Health Program have been there with us from the beginning. Dr. Prezant, like me and many of you, was caught in the collapse. He, along with Dr. Kelly, knew that this exposure differed from a typical fire. Treatment services were provided immediately, and FDNY was the first to begin a medical monitoring program for all of our exposed members so that conditions could be identified and treatment provided.

Monitoring and treatment data allowed FDNY, through its medical and scientific publications, to demonstrate to Congress that our health concerns were justified. Data presented time and time again by FDNY ultimately led to Congress authorizing the Zadroga Act in 2010 and its reauthorizing in 2015 so that the WTC Health Program could continue for the remainder of our lifetimes.

Now, on the 20th anniversary of 9/11, it is fitting that the FDNY issues an updated version of its WTC health report. Nearly 16,000 of our rescue/recovery workers (firefighters, EMS and civilians—active and retired) have been part of the FDNY WTC Health Program and contributed to this report, making it the most comprehensive post-disaster health report ever done.

The same selfless dedication shown by FDNY on 9/11 has been demonstrated throughout this last year as our Department faced a new crisis, the COVID-19 pandemic. This updated report on WTC health effects includes preliminary data on how COVID-19 impacted FDNY WTC-exposed members. Just as I have done myself, I urge all of you to be vaccinated and to continue participation in the FDNY WTC Health Program's monitoring and treatment exams. As we build a new future together, the FDNY WTC Health Program is a remarkable demonstration that our sacrifices will never be forgotten and of how labor, management and government can work together to serve you, our members.

Message from the Chief of Department
Thomas J. Richardson

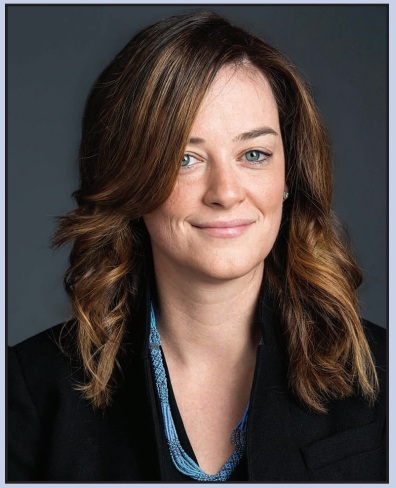
When the World Trade Center collapsed on 9/11, it unleashed a cloud of dust and debris the likes of which this City had never seen before. Among the many unknowns in the aftermath of that terrible day, one that loomed large was the question of how that cloud would affect our members' health.

Together with a host of partners (e.g., FDNY labor and management, the City, academic medical centers and the National Institute for Occupational Safety and Health, or NIOSH), the FDNY WTC Health Program was created. This program continues to provide annual monitoring exams and treatment for WTC-covered illnesses. Upon diagnosis, state-of-the-art treatment for WTC-covered physical and mental conditions is provided at no cost to our members. All WTC-exposed FDNY responders—firefighters, EMTs, paramedics, officers, our civilian workers and FDNY retirees—remain eligible for this program. To date, nearly 16,000 FDNY rescue/recovery workers continue to participate in our FDNY WTC Health Program.

Now, 20 years later, it is critically important that FDNY issues this updated health report so you can see exactly how we are all doing. It is reflective and necessary, in an effort to continue to remember those we lost on 9/11 and those we have lost since due to WTC-related illness. In 2007, FDNY published its first comprehensive report, describing how WTC exposures affected the health of our members. That information was critical to the passage of the Zadroga Act in 2010. FDNY's 15-year report, along with subsequent medical and scientific publications, was critical to the reauthorization of the Zadroga Act in 2015 as a federal health program with funding available for the next 75 years.

The same dedication shown by FDNY on 9/11 has been demonstrated throughout this last year as our City faced a new crisis, the COVID-19 pandemic. This updated report on WTC health effects includes preliminary data on how COVID-19 has impacted FDNY WTC-exposed members. Just as I have done myself, I urge all of you to consider getting vaccinated and to continue participation in the FDNY WTC Health Program's monitoring and treatment exams. We must do all that we can to remain healthy. We owe that to our families, friends, coworkers and the members of this Department, including those who, unfortunately, are no longer with us. Thank you all for your continued service to this Department and the City we are honored to serve.

Thomas J. Richardson



The world's greatest fire department sustained unimaginable losses on September 11, 2001. That terrible day, 343 FDNY members were killed as they bravely worked to rescue others. Sadly, the loss of life for our Department did not end that day. It has continued, with far too many FDNY members dying in the months and years that have followed. More than 250 FDNY lives have been lost since due to World Trade Center-related illness, after members dutifully showed up at the site day in and day out, exposing themselves to toxic and noxious chemicals as they aided in rescue and, eventually, recovery.

The lives lost since that day cross through every bureau and area of the Department, including firefighters, emergency medical technicians, paramedics, fire marshals, fire protection inspectors and dedicated civilians. They have lost their lives because of their brave and selfless service in those days and months after the attacks.

It is imperative that those who served without hesitation on our City's darkest day always receive the care and compassion they earned and deserve. Our Department—senior leadership, union representation and the members within our ranks—has worked to ensure we received the funding needed for our FDNY medical screening, monitoring and treatment, in addition to securing the reauthorization of the Zadroga Act in 2015 as a federal health program. The Fire Department will always offer support and advocacy for these members and their families.

This work does not replace the heartbreaking losses that remain, though it is my hope it fortifies our commitment to making sure our members are always taken care of with the dignity and respect they deserve. It has been my honor to lend those families even a small token of comfort. It is my hope as they visit the Wall of Remembrance at FDNY Headquarters—that they see the memorial as a sign that our commitment to their loved ones is as dedicated as their loved ones were to our great City.

Message from the World Trade Center Health Program and National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention

Dr. John Howard

Dr. Dori B. Reissman

We are pleased to see the important work of the FDNY compiled in this World Trade Center 20-year health impact report. The National Institute for Occupational Safety and Health (NIOSH) has provided funding since 2002 to FDNY for medical screening, monitoring and treatment. Over the years, we have met with numerous 9/11 responders and survivors who have benefited from the comprehensive medical monitoring and treatments available as part of the WTC Health Program.

FDNY has been not only a leader in providing monitoring and treatment early on to its workers, but also a leader in our efforts to identify and understand the health effects associated with WTC exposures. The FDNY WTC Health Program has been a model to others in its ability to serve the health needs of its membership while simultaneously providing to others through published, peer-reviewed scientific studies and the collective knowledge gained from its monitoring, treatment and scientific efforts. This information was critical to the authorization of the Zadroga Act in 2010 and its reauthorization in 2015 as a federal health program.

We continue to be impressed by the quality of the programs FDNY offers, in part reflected by the contents of this updated 20-year report to its membership. We look forward to our continued collaboration with FDNY to provide needed WTC-covered medical services along with answers to essential health questions that remain a concern to us all.

John Howard, M.D.
Administrator, WTC Health Program
Director, NIOSH

Dori B. Reissman, M.D., MPH
Director, WTC Health Program Division, NIOSH
Rear Admiral (Retired), U.S. Public Health Service

Message from FDNY's Bureau of Health Services and the World Trade Center Health Program

In the aftermath of 9/11, the health consequences to our WTC-exposed FDNY rescue/recovery workers (firefighters, EMTs, paramedics, officers, civilians and retirees) were both immediate and far-reaching. Our members struggled desperately to find lost coworkers and civilians while breathing air filled with dust, chemicals and other noxious elements. Our Department, carrying out its rescue, recovery, emergency medical care and fire suppression roles, maintained a continuous presence at the site until its closure in July 2002. As a group, FDNY rescue/recovery workers were the first in, the last out and, for many, the most exposed.

The need to evaluate and monitor the health effects of this exposure was evident from day one. That is why the Bureau of Health Services, with the help of labor, management, government and numerous partners in allied health fields, developed the FDNY WTC Health Program. Treatment began day one and monitoring evaluations began early in October 2001, just weeks after 9/11 and before any other groups were offered evaluations.

In 2007 and 2015, we issued a report to every member of our workforce (active and retired) titled "World Trade Center Health Impacts on FDNY Rescue Workers." We promised to keep you updated as new information became available. Today, we provide to you this updated report summarizing the health impacts of WTC exposure on our workforce 20 years later. The goal of this report is to continue to address the question you ask us: "How are we doing?" To answer this question, we gathered and analyzed information from the comprehensive medical questionnaires and exams you take at your monitoring and treatment visits, from medical tests and from FDNY retirement statistics. We owe it to our members to share this de-identified, aggregate information with you. We know that without the participation and support of our membership, this program could never succeed.

This report demonstrates that our workforce continues to suffer from WTC-related illnesses—and we continue to gather evidence on the possible association between WTC-exposure and several new emerging conditions, such as autoimmune-rheumatologic and cardiovascular diseases, as well as possible cognitive dysfunction.

This updated report on WTC health effects also includes preliminary data on how COVID-19 impacted FDNY WTC-exposed members. Just as we have done, we urge all of you to be vaccinated and to continue participation in the FDNY WTC Health Program's monitoring and treatment exams. To make participation as convenient as possible, our program has seven locations: FDNY BHS in Brooklyn, Manhattan (CSU only), Staten Island, Fort Totten (Queens), Brentwood (Long Island, CSU only), Commack (Long Island) and Middletown (Orange County). Stay healthy, and stay safe.

David J. Prezant, M.D.
Chief Medical Officer, FDNY
Director, FDNY WTC Health Program

Jeffrey Low, M.D.
Deputy Chief Medical Officer, FDNY
Associate Director,
FDNY WTC Health Program

Ellen Koffler, M.D.
Associate Director,
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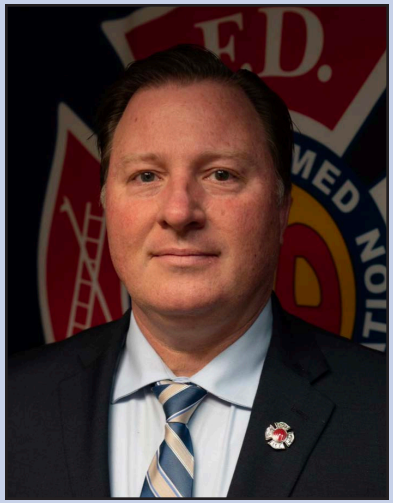
Dr. David J. Prezant

Dr. Jeffrey Low

Dr. Ellen Koffler

Message from the Firefighter and Fire Officer Unions



Andrew Ansbro

Jake Lemonda

Twenty years ago, on that fateful September day that we lost 343 of our members, those of us who took on the responsibility of bringing them home toiled selflessly and honorably in what many have described as an unimaginably toxic environment. The work that was performed on September 11 and in the months that followed has taken a horrible toll on our members. Over the past 20 years, more than 200 of our members have passed, and thousands of us have become sick from exposure during the rescue and recovery effort.

Those of us who remain cannot change the WTC exposures that we experienced, but we can improve our health through medical monitoring, early diagnosis and treatment. Many of us suffer daily with chronic sinusitis, asthma, acid reflux, sarcoidosis, cancers and mental health ailments. We must be vigilant in monitoring our health by getting tested regularly, reacting promptly to personal health changes and encouraging our brethren to do the same.

Within a month of the 9/11 attacks, Bureau of Health Services (BHS) initiated comprehensive medical monitoring for our members, and this testing is available annually. The unions worked with BHS to design the FDNY WTC Health Program for our members, and we continue to serve on the World Trade Center Health Program Steering Committee. FDNY's WTC Health Program provides valuable health monitoring, cancer screening, testing, treatment and medications, all available free of charge for any WTC-related condition.

The FDNY WTC Health Program was the first to provide monitoring and treatment, the first to document that WTC Cough Syndrome existed the first to show that lung function was permanently reduced, the first to show that cancers were increased and the first to document that certain autoimmune diseases are increased. Union leadership used that information to advocate for passage of the Zadroga Act in 2010 and its reauthorization in 2015 as a federal health program lasting for the next 75 years.

Now, 20 years later, the FDNY WTC Health Program has issued this updated health report. We urge all WTC-exposed members, active and retired, to participate in the FDNY WTC Health Program's monitoring and treatment exams. Your participation provides you with the best opportunity for early diagnosis and treatment. Also, we applaud the program for being able to offer COVID-19 vaccination, upon request, to our members (active and retired) and their families.

Andrew Ansbro
President, UFA, Local 94

Jake Lemonda
President, UFOA, Local 854

Message from the EMT, Paramedic and EMS Officer Unions

Your heroic actions on 9/11 and your dedication in the months that followed will never be forgotten. We also will never forget our members who were murdered on that day when the towers collapsed, as well as those who died in the following years from WTC-related illnesses. We thank you for making us proud.

From the onset, we worked together with FDNY BHS to design a medical examination specifically for our members. Together with the City, FDNY, UEPI, UEMSO, SOA, AFSCME, AFL-CIO and our fellow unions, we were able to secure funds from Congress to provide annual comprehensive medical monitoring and treatment through the World Trade Center Health Program at FDNY. Active members receive this comprehensive medical as part of their annual physical examination. Retirees have been and will continue to be contacted for follow-up WTC medical monitoring. This program provides valuable health monitoring, cancer screening, testing and medications, all available free of charge for any WTC-covered condition.

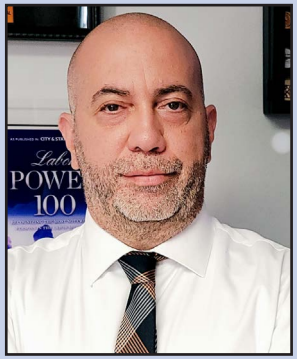
Now, 20 years later, it is fitting that the FDNY WTC Health Program issue this updated health report so you can see exactly how we are all doing. We look forward to our continued collaborative efforts with the FDNY WTC Health Program. We thank them for the care and services they provide to us, and we thank our members for their participation.

We urge all members who were exposed at the World Trade Center site to continue to participate in the FDNY WTC Health Program. We also applaud the program for being able to offer COVID-19 vaccination, upon request, to our members (active and retired) and their families. Most importantly, retirement is not an excuse to ignore your health. We all need to keep coming for our annual WTC medical monitoring exams at the WTC Health Program and for treatment as indicated. Improving or maintaining our health through the FDNY WTC Health Program is one of the most important things we can do.

Oren Barzilay
UEPI, Local 2507

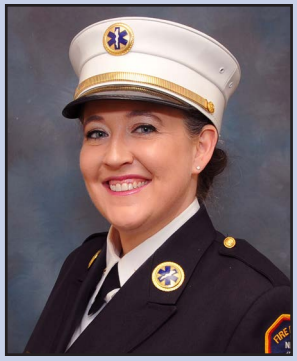
Vincent A. Variale
UEMSO, Local 3621

Kathleen Knuth
President SOA



Oren Barzilay


Vincent A. Variale


Kathleen Knuth

SPOTLIGHT #1

FDNY RESCUE/RECOVERY WORKER SPOTLIGHT:

CHIEF OF STAFF ELIZABETH CASCIO

FDNY RESCUE/RECOVERY WORKER SPOTLIGHT:
CHIEF OF STAFF ELIZABETH CASCIO

On 9/11, Chief of Staff (COS) Elizabeth Cascio responded to the terrorist attack at the World Trade Center. As an FDNY EMT, she witnessed firsthand the horrors of that terrible day. She assisted in the rescue efforts at Ground Zero throughout the month of September. Like so many other EMS responders, she thought only of the job that needed to be done, of those that could be rescued, and when that hope was extinguished, of the families that could find closure if their loved ones could be found.

"Everyone at Ground Zero knew it was a Haz-Mat incident," says COS Cascio. "But we had a job to do. And now our job is to fully participate in FDNY's WTC annual medical monitoring program. For every woman in our program, full participation also requires obtaining PAP smears and mammograms at regularly scheduled intervals." In December 2019, COS Cascio was diagnosed with invasive cervical cancer. Since 9/11, she has had numerous FDNY WTC annual medicals for cancer surveillance. Pelvic exams and Pap smears are part of the program but are done by the member's personal gynecologist. In December 2019, COS Cascio's Pap smear was positive for cervical cancer, and PET/CT scans showed that it was invasive, with the tumor impinging on her urinary tract. Over the next year, she underwent grueling chemo and radiation therapy and several surgeries—all the while continuing to work at FDNY.

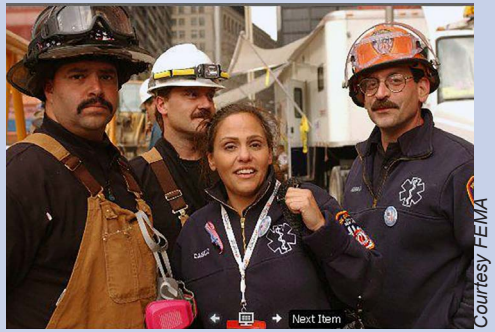
Throughout her EMS career, she witnessed too many deaths to recount, but now she had to deal with the real possibility that her own life was coming to an end. On many days, she says, "The treatment was more traumatizing than the disease. At times, the pain was almost too difficult to bear, but I refused to live in a negative space and instead forced myself to focus on the goal: to become cancer free; to choose life over death." In February 2021, she heard the words she had been praying to hear, that her cancer was in remission.

Only a few people at FDNY knew of her illness. With the publishing of FDNY's 20-year WTC report, COS Cascio chose to tell all of FDNY of her cancer and hard-fought journey to remission. Why come out now in such a public manner? "As an EMS female cancer survivor, I have an obligation to spread the message—busy lives are not an excuse for postponing annual medicals, including Pap smears and mammograms."

Of the more than 15,000 members in the FDNY WTC Health Program, 500 are women. In 2013, the federal government added many cancers as WTC-covered conditions, but the only female reproductive cancer on the list was breast cancer. With so few women in the program, it has been difficult to obtain evidence for other cancers. Over time, the federal government added certain rare cancers, such as invasive cervical cancer and ovarian cancer, to the WTC-covered condition list. The federal government is still considering other rare cancers such as endometrial cancers.

More FDNY Rescue/Recovery Worker Spotlights can be found on pages 22, 42 and 84.

"As an EMS female cancer survivor, I have an obligation to spread the message—busy lives are not an excuse for postponing annual medicals, including PAP smears and mammograms."



Courtesy FEMA

Then-EMT Elizabeth Cascio stands alongside then-EMT James Mondello (now retired) and other first responders at Ground Zero days after the terrorist attacks to take part in rescue and recovery efforts.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SECTION 2:
INTRODUCTION

Timeline

Background

FDNY WTC Health Program Utilization

TO OUR WTC-EXPOSED FDNY MEMBERS

A team of dedicated FDNY researchers publishes extensively in the medical literature to not only identify WTC-related conditions, but also help other healthcare professionals understand how to diagnose and treat WTC-related diseases. This report was written with you in mind, our WTC-exposed FDNY members, to keep you updated on new findings as they become available and inform you about your health and the health of your coworkers. This report addresses the question you most often ask us: "How are we doing?" To answer this question, we gathered and analyzed information from the comprehensive medical questionnaires and exams you take at your monitoring and treatment visits. In 2007 and 2016, we issued reports to every member of our workforce (active and retired) and promised to keep you updated as new information became available. We now provide you with an updated report summarizing the health impacts of WTC exposure on our WTC-exposed workforce 20 years later. We owe it to you and all our members to share this information.

We hope the information we provide is useful to you, your families and coworkers, non-FDNY responders, other WTC-exposed individuals and those who are interested in the health consequences of WTC exposure. This FDNY report presents only aggregate, de-identified data and contains no information that could identify any individual member. In performing its medical monitoring and treatment roles, the FDNY WTC Health Program, as a top priority, preserves the confidentiality of members' personal health records and information. In addition to this report, we look forward to our continual interactions with you as a WTC healthcare provider.

On the 20th anniversary of the World Trade Center (WTC) terrorist attack, much of the world has changed, but the strength and courage displayed in 2001 have not been forgotten. In fact, as time passes and our members' health continues to be impacted by their exposures during the rescue/recovery effort, the Fire Department of the City of New York (FDNY) WTC Clinical Center of Excellence (CCE) remains as determined as ever to provide support and top-quality healthcare to our members, both active and retired. Following the tragic loss of 343 FDNY members on 9/11, nearly 16,000 FDNY members—including firefighters, emergency medical services (EMS) providers and civilian personnel, both actives and retirees—were exposed to WTC dust, particulates, noxious gases, chemicals and fibers while working tirelessly for more than 10 months in the rescue and recovery effort. Many members were injured on 9/11 or began feeling ill during the rescue and recovery effort. Our Department began treatment the day of 9/11 for injured members and set up the first WTC monitoring program in New York City and the nation to care for all its members in October 2001, four weeks after the attack. Since then, thousands have fallen ill, and more than 200 have died of WTC-related illness. More than ever, the work of the WTC Health Program to mitigate and investigate the health effects of WTC exposure is incredibly important and a promise we continue to make. As we cross the two-decade mark since 9/11, documenting the injuries and illnesses related to work at the WTC sites remains as vital today as it was in 2001. In combination with the long-term physical and psychological consequences of WTC exposure, our WTC-exposed members increasingly face challenges of everyday life such as aging and retirement. Furthermore, the COVID-19 pandemic threatens to compound the health issues WTC-exposed responders already face. For decades to come, our Program aims to provide the best quality healthcare possible to those who made extraordinary sacrifices for our Department, our City and our nation.

This 20-year report follows the physical and mental health of our nearly 16,000 WTC-exposed EMS providers and firefighters who have enrolled in our WTC Health Program. By March 2021, more than 10,000 members have received their 10th follow-up WTC medical monitoring exam, and more than 7,000 members have received 15 or more monitoring exams. Currently, more than 11,300 members have been diagnosed and certified with at least one WTC-covered condition for physical or mental health. Conditions covered by the WTC Health Program include airway and digestive disorders such as asthma, rhinosinusitis and gastroesophageal reflux disease (GERD); most cancers; and mental health conditions such as major depressive disorder, post-traumatic stress disorder (PTSD) and substance abuse. Certain musculoskeletal disorders are covered if the injury was documented early on after 9/11. For members with covered WTC-related health conditions, free treatment, including prescription medications, is available through our program.

The WTC Health Program has made great advances in identifying and providing treatment/recovery options for our members. Our research shows that the care provided by the Program can reduce disease burden over time. In 2001, cough prevalence was more than 50% in our WTC-exposed membership, but it has since declined and remained stable around 10% through 2021. The prevalence of any lower respiratory symptom decreased by about 45% during the same time. In a study of sarcoidosis, an inflammatory disease that can result from WTC-exposure and affects multiple organs—in particular, the lungs—we found that from diagnosis to follow-up, lung involvement decreased 48%. And while cancers continue to take a toll on our members, 83% of those diagnosed 5-10 years ago are alive today, a testament to the benefits of early detection and treatment

FDNY WTC Health Program Enrolled Population

	Firefighters	EMS Providers	Total
Total Enrolled	13,108	2,114	15,222
% Male	99.7%	78.2%	96.7%
Average Age on 9/11/2001	40.4	36.3	39.8
Average Current Age	59.7	55.6	59.1
% Currently Retired	76.7%	70.4%	75.8%

provided by the WTC Health Program. These findings are explained in the Health Assessment of WTC-Covered Conditions section of this report, demonstrating the value of continued participation in FDNY's WTC Health Program.

Over the past 20 years, the FDNY WTC Health Program has met the needs of our members. Through self-administered questionnaires at monitoring exams, physician interactions and case management outreach, FDNY members' voices are heard when there is an emerging WTC health concern. One goal for our program is to utilize these research findings to advocate for expanding the number of conditions and available treatment options covered by the federal government under the WTC Health Program. Our recent research has focused on issues brought to the program's attention by membership and leadership that are potentially related to the WTC exposures, such as autoimmune diseases, hearing problems, neurological conditions, cognitive function (memory loss) and cardiovascular disease. Requesting the federal government add a condition to their list of covered conditions is a difficult and lengthy process. We were successful for some cancers, and we pledge to continue to be a credible, data-driven advocate for our members' healthcare. These studies and more are detailed further in the Newly Emerging Diseases section of this report.

Beginning in March 2020, the COVID-19 pandemic brought a novel and unforeseen challenge to the health and lives of our members. With such a rapidly evolving situation, both the WTC Health Program and Bureau of Health Services (BHS) have had to adapt and transform care quickly. Telehealth visits began in April 2020 to reduce viral spread and keep members safe. The Counseling Service Unit (CSU) began offering virtual visits in response to the added stress that members faced. We also expanded our research to identify any associations between preexisting WTC-related illnesses and the incidence or severity of COVID-19 illness, as well as to determine whether COVID-19 may have lasting impacts on WTC-related conditions. Once again, FDNY has not forgotten the sacrifice our members have shown, providing COVID-19 vaccinations hassle-free to our active members, retirees and family members. FDNY's WTC Health Program was the only WTC Clinical Center of Excellence to be able to prioritize its members for vaccination, and this was possible only because of the close relationship between leadership at FDNY, BHS and our WTC Health Program.

More than a year after the pandemic began, more than 3,000 WTC-exposed firefighters and EMS providers remain working as active FDNY first responders and, along with their colleagues, continue to respond to COVID-19 related calls and emergencies. The WTC Health Program would like to take this opportunity to thank all FDNY responders and essential workers who have been on the front lines of the pandemic response since day one. We would also like to thank our WTC Health Program, BHS and CSU staff for keeping our physical and mental health services running during this challenging time.

MISSION

The mission of the FDNY WTC Health Program is to evaluate and treat individual FDNY members (firefighters, EMS providers and civilian personnel, active and retired) who worked at the WTC sites. Central to this mission is our desire to identify injuries and illnesses that may be WTC-related. The FDNY WTC Health Program uses data from its monitoring and treatment program to analyze patterns of illnesses, modify future health initiatives and answer important questions about the health effects of WTC exposure. Monitoring and treatment are an outgrowth and ex-

pansion of what the FDNY Bureau of Health Services (BHS) does every day: improving members' health and wellness through periodic medical evaluations, preventive therapies, injury/illness evaluations and treatment.

CHALLENGES

Providing monitoring and treatment services is not without its challenges. Under the James L. Zadroga 9/11 Health and Compensation Act (Zadroga Act), federal regulations require documentation of WTC exposure and certification of each WTC-related disease separately before a member can receive treatment. To comply with these regulations, we implemented an improved electronic medical record, obtained each member's consent and then automatically provided the federal WTC Health Program Administrator at the National Institute for Occupational Safety and Health (NIOSH) with the necessary documentation for our members to be enrolled in and certified under this program. Our ability to accomplish this successfully means that no member's medical care is interrupted by this process and no member must complete countless forms before receiving needed healthcare.

We also faced other challenges. In 2011, we found an increase in cancer cases in WTC-exposed FDNY responders compared with the U.S. general population, but we could not treat our cancer patients under this program unless the federal WTC Program Administrator agreed to add certain cancers as WTC-related conditions. Our published findings, in conjunction with additional studies among other WTC-exposed populations (WTC Health Registry and the WTC General Responder Cohort), provided evidence for the WTC Program Administrator to add certain cancers as a WTC-related covered condition in October of 2012. Since that time, the FDNY WTC Health Program has been caring for cancer patients. Similar work is being done to establish for other newly emerging conditions if there is a relationship with WTC exposure. There is strength in numbers, and our best chance for adding additional diseases to the list of WTC-covered conditions is to advocate collaboratively with the other WTC centers.

There have also been procedural challenges. In 2014, the federal government formulated additional HIPAA privacy and security requirements for our program, which resulted in major renovations of the FDNY BHS clinical site, as well as numerous policy and workflow changes. In 2015, our medical codes had to be changed from ICD-9 to ICD-10 codes. Additionally, we have repeatedly been called upon to provide data-driven advocacy to support the reauthorization of the Zadroga Act in 2015, along with the Victims Compensation Fund (VCF). While the Zadroga Act authorized existence of the Health Program for the rest of our lifetimes, it is likely that we will be called on again to advocate for additional funding, just as we did successfully for the refunding of the VCF.

The COVID-19 pandemic brought new challenges where we had to act quickly to help keep our members safe. In addition to moving quickly to add telehealth mental and physical health visits and services, we improved our technology to allow members to take the questionnaires from their personal computers. This reduces infectious exposures by allowing our members to spend more time at home and less time at the clinic for monitoring exams. Once COVID-19 vaccinations became available, the WTC Health Program collaborated with FDNY BHS to offer vaccinations to our members and their families. Each challenge was successfully met, and—most importantly—on no occasion was care for our WTC-exposed members interrupted.

COLLABORATIONS

To better serve our members, the WTC Health Program and FDNY have formed collaborations with numerous partners, such as the New York City Department of Health and Mental Hygiene, New York State Department of Health, Albert Einstein College of Medicine, New York University Langone Health, Memorial Sloan Kettering Cancer Center, Mount Sinai Medical Center, Stony Brook Medical Center, University of Miami, the Mayo Clinic and the Fire Departments of San Francisco, Philadelphia and Chicago. A focus of these collaborations is to help investigate and design additional treatment, monitoring and research programs that address our members' specific needs and emerging issues. These collaborations have formed key partnerships that help WTC healthcare and research to achieve high standards and reach new heights of discovery. The WTC Combined Rescue/Recovery Cohort collaboration combines data collected from the three cohorts of WTC rescue/recovery workers (FDNY, WTC Health Registry, General Responder Cohort) to assess cancer incidence and risk associated with WTC exposure. This collaboration allowed researchers to determine cancer risk in the largest post-disaster cohort ever studied. In 2012, FDNY researchers received funding from the Jimmy V Foundation for Cancer Research to participate in a collaborative study with the Albert Einstein College of Medicine and Memorial Sloan Kettering Cancer Center to find early blood markers for certain types of hematologic malignancies, such as multiple myeloma and leukemia. Through this partnership, we found that environmental exposure to the WTC disaster was associated with myeloma precursor disease and may be a risk factor for early multiple myeloma development. One of our most recent research collaborations is with the Fire Departments of San Francisco, Philadelphia and Chicago. By comparing our Department with theirs, we hope to better distinguish between the impact of firefighting and WTC exposure on the health of our members, with emphasis on not only cancer, but also other physical and mental health conditions. In 2019, the WTC Health Program collaborated with national experts in cognition to develop strategies to determine whether there is increased risk of cognitive impairment as a result of the WTC exposures, and we recently received funding with Stony Brook Medical Center to study memory loss in FDNY WTC-exposed retirees.

FUNDING

In October 2001, only four weeks after the attack, FDNY BHS began performing standardized medical screenings on FDNY WTC-exposed rescue/recovery workers with funding provided by the City and FDNY. Ours was the first comprehensive, post-WTC exposure medical performed by any medical institution. In November 2001, the Centers for Disease Control and Prevention (CDC) granted $4.8 million to FDNY to help fund this program from 2002 to 2004. The funding expanded upon the services originally started, using funding through the September 11 Recovery Grant from the American Red Cross (ARC) Liberty Disaster Relief Fund and funding for WTC-related mental health treatment that originally came from multiple sources, including the FDNY, International Association of Fire Fighters (IAFF), ARC, Federal Emergency Management Agency (FEMA)–Project Liberty, Substance Abuse and Mental Health Services Administration (SAMHSA) and various philanthropies. The CDC funding allowed the FDNY WTC Program to include affected retirees, who previously would have been excluded from BHS monitoring and treatment, and to expand treatment services, including the provision of free medications, mental health counseling, medical specialty appointments and surgery.

In 2010, with combined labor and management support, the James L. Zadroga 9/11 Health and Compensation Act (Zadroga Act) was passed and on July 1, 2011, was implemented to provide funding for the FDNY WTC Health Program through June 30, 2016. This funding paid for monitoring and treatment exams, staffing, scheduling and follow-up services. With this funding, annual or periodic medical evaluations have been improved and expanded to include a WTC periodic medical with higher quality pulmonary function tests and comprehensive medical and mental health questionnaires. The Zadroga Act also provided funding for specialized diagnostic testing for our active and retired members; free cancer screening tests, such as colonoscopies and mammograms; and free medications. This funding also supports the FDNY Data Center to provide quality assurance and data analysis and research studies so that the FDNY WTC Health Program can answer the most important questions ("How am I doing, and how are my co-workers doing?"); provide objective evidence that new conditions, such as cancer, are WTC-related; plan for future WTC-related health needs; and release findings to our members.

In December 2015, the Zadroga Act was reauthorized by Congress with funding to continually provide critically important healthcare services to WTC-exposed members until 2090. This successful advocacy effort was made possible through the combined efforts of all of the WTC Health Programs (FDNY, Mount Sinai, Stony Brook, Queens Long Island Jewish/North Shore—now known as Northwell, New York University (NYU), Robert Wood Johnson and Bellevue Medical Centers), the WTC Health Registry, the mayor, city council, the New York Congressional Delegation, FDNY labor and management, the IAFF, the American Federation of Labor and Congress of Industrial Organizations (AFL-CIO) and our many other supporters.

Since 2011, more than a dozen research grants have been funded to study the health impact of the WTC exposures on our FDNY members. The findings from these grants inform clinical care and our understanding of the health of the WTC-exposed members. Much of this work has been done in collaboration with our partners as mentioned above.

SPOTLIGHT #2

FDNY RESCUE/RECOVERY WORKER SPOTLIGHT:

FIRE MARSHAL CONRAD TINNEY

FDNY RESCUE/RECOVERY WORKER SPOTLIGHT:
FIRE MARSHAL CONRAD TINNEY

Fire Marshal (FM) Conrad Tinney of the FDNY was dispatched to the chief medical examiner's office in Manhattan on 9/11 to expedite the handling of the remains. "It was pure madness," he says. "We identified the first 20 bodies by sight because we had worked with these guys before." The remains kept arriving at the morgue, body part after body part. A total of 343 firefighters died that day.

FM Tinney stayed at the morgue for five days, until Charles Hirsch, M.D., the chief medical examiner, threatened to have him physically removed if he didn't go home. He soon returned to duty and spent the following weeks shuttling back and forth between the morgue and the "pile." He didn't wear a mask or respirator. "We were told [by the U.S. Environmental Protection Agency] that the air was fine," he says.

As fall turned to winter, FM Tinney came down with bronchitis, which persisted for months. A scan administered by the WTC Health Program the next spring picked up a small nodule in his left lung. FDNY physicians recommended that FM Tinney undergo periodic scans to keep a close eye on the growth. Seven years later, FM Tinney, now retired from FDNY but still part of the FDNY WTC Health Program, was told that the growth on his lungs was cancerous and would have to be removed. After resection and chemotherapy for Stage 3 lung cancer, FM Tinney went into renal failure. Then his immune system crashed, and he was prescribed an experimental immune-boosting therapy that ultimately saved his life. Next came multiple rounds of radiation therapy aimed at eliminating any lingering cancer in his chest—a successful, though difficult, endeavor.

All the while, FM Tinney strove to live as fully as possible, indulging in his passions of photography and travel, including journeys to Vietnam, Kenya and Namibia. That all came to a halt last year, and not just because of the pandemic. After years of being cancer-free, his "good" lung started filling with fluid, which doctors found was the result of lymphoma. After months of treatment—which included a chest drainage tube and chemotherapy and was complicated by pneumonia—the lymphoma is now, thankfully, in remission. FM Tinney once again dodged the bullet. "I'm still here," he says. "You have to look at the good part of it. People ask, 'How's your day?' and I say, 'I got up this morning.'"

The Spotlight profiles in this report are adapted from an article by Gary Goldenberg that first appeared in EINSTEIN magazine, a publication of Albert Einstein College of Medicine. Please visit https://magazine.einsteinmed.org/winter-spring-2021/ones-who-ran-toward-danger/ to read the full article.

Also, a video of FM Tinney talking about his cancer journey can be found on the FDNY WTC Health Program website at https://fdnywtcprogram.org/tinney.html

More FDNY Rescue/Recovery Worker Spotlights can be found on pages 12, 42 and 84.

Photo by Albert Einstein College of Medicine/Jörg Meyer

A CT scan administered by the WTC Health Program picked up a small nodule in his left lung. FDNY physicians recommended that FM Tinney undergo periodic scans to keep a close eye on the growth. Close follow-up led to early diagnosis and successful treatment of his lung cancer and his subsequent lymphoma. FM Tinney dodged the bullet and is alive today.

2001

Historical Information

9/11 WTC attacks

FDNY BHS treats members for WTC injuries at site

FDNY CSU support groups begin with debriefing groups at site

FDNY becomes Project Liberty mental health site

WTC medical monitoring exams begin seven days a week, three shifts per day

FDNY BHS identifies "WTC Cough Syndrome"

Speaking Engagements

Dr. Kelly testifies before U.S. Congress on WTC health impact

Dr. Prezant addresses IAFF Convention on WTC health impact

FDNY Support

FDNY CSU sets up units in Staten Island and Fort Totten, Queens

Funding

FEMA and Project Liberty funding arrive for FDNY-CSU Mental Health Programs

The September 11 Victim Compensation Fund is established

FDNY is awarded $4.8 million from CDC for medical screening for years 1 and 2

Partnership

FDNY BHS and CDC collaborate to test for heavy metals, PCBs and PAHs

2002

Speaking Engagements

Dr. Prezant and Senator Hillary Clinton hold joint press conference to secure $12 million

Dr. Kelly addresses New York Congressional Delegation on 9/11 health effects

Dr. Kelly addresses Congressional Committee on Environmental Conservation, Health and Labor

FDNY BHS gives testimony at New York Academy of Medicine Specialists WTC Meeting

Statistics

FDNY BHS completes more than 10,000 WTC medical monitoring exams on FDNY members

More than 1,000 members treated at FDNY BHS for WTC Cough Syndrome

More than 3,000 members seen at FDNY CSU

FDNY Research

Publication: "Cough and Bronchial Responsiveness in Firefighters at the World Trade Center Site"

2002

FDNY Support

FDNY Free Tobacco Cessation Program begins, supported by Pfizer, IAFF, ACCP and Chest Foundation

Partnership

Joint labor management initiative for WTC FDNY CD73 Exposure Reports

2003

Speaking Engagements

IAFF Annual Health Convention—WTC Health Effects

Dr. Weiden testifies before Congress on WTC Health of first responders

Statistics

First Anniversary of FDNY WTC Tobacco Cessation Program—more than 600 members treated with more than 30% success rates

FDNY Support

James E. Olsen Foundation provides FDNY BHS with 10,000 colon cancer screening kits

FDNY Research

Publication: "Biomonitoring of Chemical Exposure among New York City Firefighters Responding to the World Trade Center Fire and Collapse"

Publication: "Persistent Hyperreactivity and Reactive Airway Dysfunction in Firefighters at the World Trade Center"

2004

Speaking Engagements

9/11 World Trade Center Health Effects Conference at NYU

Funding

$90 million federal grant is awarded to WTC Consortium; $25 million is awarded to FDNY BHS for five years (2004–2009) to provide medical monitoring exams

Partnership

NIOSH WTC Medical Monitoring Steering Committee begins

Joint labor-management partnership with FDNY and Mount Sinai NY/NJ WTC Health Consortium, including Bellevue Hospital

FDNY Research

Publication: "Symptoms, Respirator Use, and Pulmonary Function Changes Among New York City Firefighters Responding to the World Trade Center Disaster"

2005

FDNY Support

FDNY BHS begins increasing staff size for enhanced medicals

Funding

American Red Cross Liberty Disaster Relief September 11 Fund Recovery Grant: $5.6 million for FDNY-BHS WTC medical treatment (7/05–7/07)

2006

Speaking Engagements

Dr. Kelly and Dr. Prezant testify before Congress for WTC treatment funding

Commissioner Scoppetta testifies before Congress on WTC health effects

FDNY Support

Retiree WTC Medical Monitoring Program officially begins

BHS begins WTC treatment with free medications

Funding

FDNY Commissioner Nicholas Scoppetta and Dr. Prezant meet key Congressional members for WTC medical funding

FDNY receives $1.5 million from NIOSH to continue CSU treatment centers

FDNY receives $20 million supplement from NIOSH to begin free medication program and expand treatment

Partnership

U.S. Representative Carolyn Maloney and U.S. Senator Robert Menendez introduce the Zadroga Act

WTC DOHMH WTC Clinical Treatment Guidelines for Adults Exposed to WTC (FDNY and Mount Sinai coauthors)

Mayor Bloomberg forms WTC Health Panel

2007

Speaking Engagements

Mayor Bloomberg testifies before U.S. Senate for WTC treatment programs

Senators Schumer and Clinton and Lt. Martin Fullam, FDNY advocate for WTC Zadroga Act funding

FDNY Research

Publication: "World Trade Center "Sarcoid-Like" Granulomatous Pulmonary Disease in New York City Fire Department Rescue Workers"

2008 - 2009

FDNY Support

FDNY BHS adds additional satellite locations on Staten Island and in Fort Totten, Queens for WTC Health Program medical monitoring and treatment

FDNY BHS adds satellite location in Long Island for WTC Health Program medical monitoring and treatment

FDNY BHS adds satellite location in Orange County

2010

FDNY Support

FDNY BHS creates temporary satellite office in Florida to offer medical monitoring exams to retired FDNY responders in Florida

FDNY Research

Publication:
"Lung Function in Rescue Workers at the World Trade Center after 7 Years"

2011

Partnership

President Barack Obama signs into law the James Zadroga 9/11 Health and Compensation Act

The September 11 Victim Compensation Fund is reestablished

WTC health programs collaborate to determine "common exposure variables"

FDNY Research

Publication:
"Early assessment of cancer outcomes in New York City firefighters after the 9/11 attacks: an observational cohort study"

2012 - 2013

Partnership

Zadroga Act expands to cover WTC-related cancers

FDNY Support

FDNY WTC Health Program expands to include a comprehensive cancer care program consisting of screening, diagnostic evaluations, treatment, case management and expanded family support units

WTC Cancer Case Management Team established to address the healthcare needs of members and improve delivery of healthcare services

2014

Speaking Engagements

Zadroga Reauthorization Bill introduced by Senator Gillibrand and Representatives Maloney, Nadler and King

FDNY Support

FDNY WTC Health Program expands screening practices to include colonoscopy and mammography

FDNY WTCHP expands screening practices to include low-dose chest CT for lung cancer detection

2015

Partnership

Jon Stewart, Dr. Prezant and 9/11 workers visit Congress to advocate for reauthorization of the James Zadroga Act.

Congress passes James Zadroga 9/11 Health and Compensation Reauthorization Act

FDNY Research

Publication:
"Nested Case–Control Study of Selected Systemic Autoimmune Diseases in World Trade Center Rescue/Recovery Workers"

2016

FDNY Research

Publication:
"Blood Eosinophils and World Trade Center Exposure Predict Surgery in Chronic Rhinosinusitis: A 13.5-Year Longitudinal Study"

Publication:
"FDNY and 9/11: Clinical Services and Health Outcomes in World Trade Center-Exposed Firefighters and EMS Workers From 2001 to 2016"

2017

FDNY Research

Publication:
"The Effect of World Trade Center Exposure on the Timing of Diagnoses of Obstructive Airway Disease, Chronic Rhinosinusitis, and Gastroesophageal Reflux Disease"

Publication:
"Post-9/11 sarcoidosis in WTC-exposed firefighters and emergency medical service workers"

2018

Statistics

More than 2,000 members have been certified for cancer

Close to 11,000 members have at least one certification for a physical or mental health condition

FDNY Support

Shared World Trade Center survivor stories to all FDNY members

FDNY Research

Publication:
"Blood Leukocyte Concentrations, FEV_1 Decline, and Airflow Limitation. A 15-Year Longitudinal Study of World Trade Center-exposed Firefighters"

Publication:
"Multiple Myeloma and Its Precursor Disease Among Firefighters Exposed to the World Trade Center Disaster"

2019

Funding

The September 11 Victim Compensation Fund is reauthorized through fiscal year 2090

Partnership

2019 World Trade Center Health Program Cognitive Aging and Impairment Scientific Workshop

Statistics

Nearly 10,000 FDNY members have come in for their 10th follow-up WTC medical monitoring exam

FDNY Research

Publication:
"Hearing Loss Among World Trade Center Firefighters and Emergency Medical Service Workers"

Publication:
"Post-9/11 Peripheral Neuropathy Symptoms among World Trade Center-Exposed Firefighters and Emergency Medical Service Workers"

Publication:
"Abnormalities on Chest Computed Tomography and Lung Function Following an Intense Dust Exposure: A 17-Year Longitudinal Study"

Publication:
"Long-term Cardiovascular Disease Risk Among Firefighters After the World Trade Center Disaster"

2020

FDNY Support

Began telehealth visits in April

FDNY begins COVID-19 vaccinations to active members on December 23

FDNY Research

Publication:
"Pre-COVID-19 Lung Function and Other Risk Factors for Severe COVID-19 in First Responders"

Publication:
"PTSD and Depressive Symptoms as Potential Mediators of the Association between World Trade Center Exposure and Subjective Cognitive Concerns in Rescue/Recovery Workers"

Statistics

First COVID-19 case in New York State diagnosed on March 1

The World Health Organization declares COVID-19 a pandemic on March 11

5,592 physical health telehealth visits conducted by FDNY

8,070 mental health telehealth visits conducted by FDNY

2021

FDNY Support

FDNY expands COVID-19 vaccinations to FDNY retirees and family members

Statistics

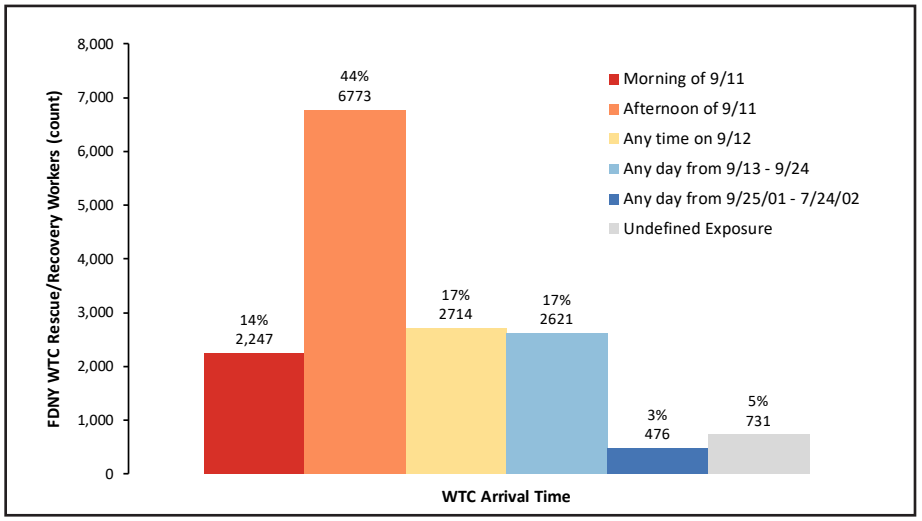
More than 6,500 FDNY World Trade Center Health Program members receive the COVID-19 vaccine through FDNY

FDNY Research

Publication:
"Cancer survival among World Trade Center rescue and recovery workers: A collaborative cohort study"

Shortly after the WTC disaster, we classified FDNY WTC-exposed rescue/recovery workers (firefighters and EMS providers) into groups based on their estimated time of first arrival at the WTC site. Arrival groups have been helpful in explaining health conditions that developed after 9/11 and persist even today.

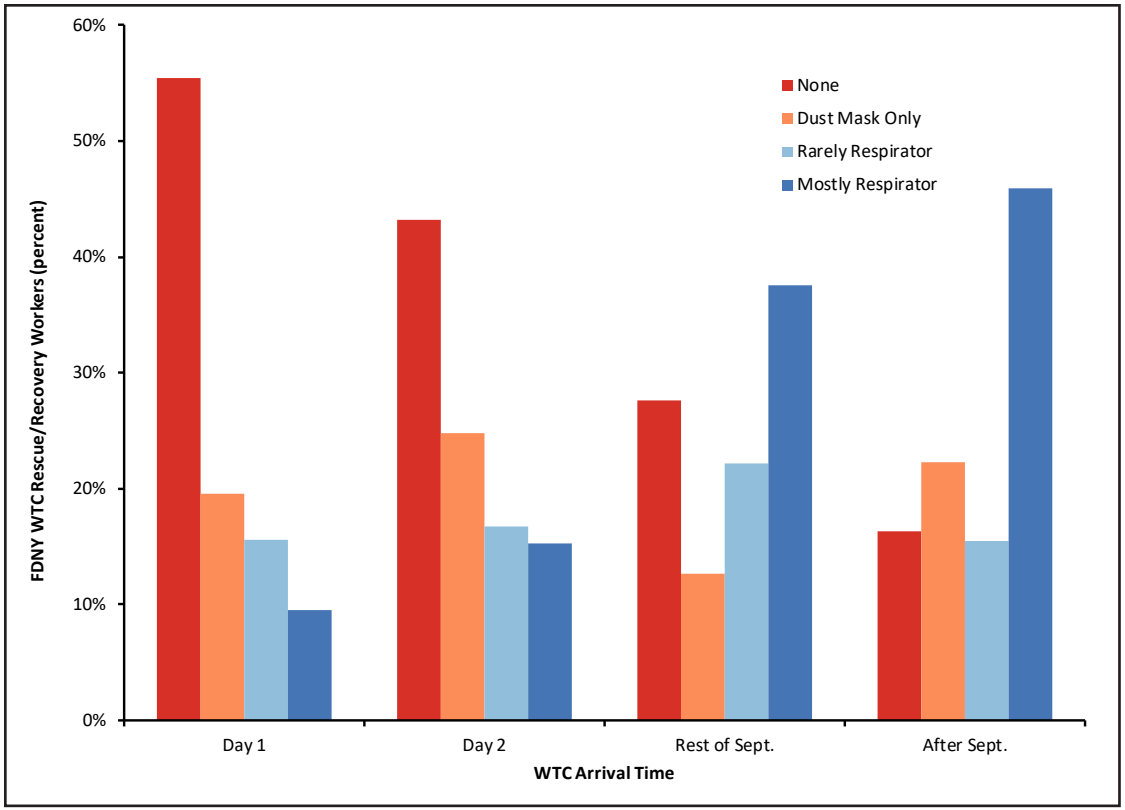
WTC Arrival Time at the Disaster Site



Nearly every active member, 99% of the FDNY workforce, responded to the WTC disaster. Our members would have responded even if a job-wide mobilization had not occurred. Members who retired prior to 9/11 also responded to the disaster site and volunteered to help in whatever ways possible. In the trauma of that day, 343 died on scene. Others were taken to local hospitals (including locations in New Jersey), most with orthopedic injuries and a few with respiratory injuries so severe as to require intubation and mechanical ventilation. Members critically injured by falling debris required hospitalization, and some required surgery. In the first 24 hours, 240 FDNY members were treated in emergency departments, and 28 of them were admitted to hospitals. Thankfully, all of those who made it to a hospital survived.

Following 9/11, members spent, on average, three to four months assisting in rescue/recovery operations at the WTC site. Some members were present for the full 10 months that the site was open, concluding their efforts in July 2002. The following pages document the extent of symptoms and physical health diagnoses experienced by our WTC-exposed FDNY workforce. As demonstrated in this section, respirator use was infrequent, particularly in the first weeks after 9/11. Many members had respiratory difficulties (upper and lower airway problems) beginning their first day at the site, but for others, symptoms surfaced in the days, weeks, months and even years after 9/11. We found that earlier WTC arrival times were associated with the highest incidence of lower and upper respiratory symptoms, including acid reflux (GERD or heartburn), as well as respiratory disease diagnoses (chronic rhinosinusitis, asthma, chronic bronchitis, obstructive sleep apnea and compromised pulmonary function) and led to an increase in disability retirements. Based on these data, we helped convince the federal government to extend WTC coverage to rarer pulmonary conditions, including sarcoidosis and, a few years later, certain cancers. We remain hopeful that we will succeed in expanding WTC coverage to include rheumatologic (autoimmune) diseases.

Early Masks/Respirator Use



While dust masks were common, respirators were seldom used on 9/11 and in the early days thereafter.

When the towers collapsed, an enormous dust cloud with a high concentration of particulate matter enveloped Lower Manhattan. FDNY responders inhaled this thick, polluted air, a situation made worse by strenuous work that required increased respiratory effort and open-mouth breathing. On day one, those with self-contained breathing apparatus (SCBA) had clean air for about 15 minutes. After SCBAs ran out of air and for those who responded without SCBAs, there were few respirators available. Some who used protection wore only dust masks, which provided little, if any, real protection. Similarly, some wore N95 "TB" respirators, which—while better than dust masks—did not provide adequate respiratory protection for the particulate and chemical exposures found at this collapse/fire disaster site. The correct mask for this type of exposure, a P-100 respirator, was not widely available until after the first week, and then it was difficult to wear for any length of time due to its bulk and interference with voice communication in this difficult, hazardous work environment. This intense environmental exposure is directly related to many of the symptoms and illnesses described in this report.

FDNY WTC members reported close ties to someone lost at the WTC site.

98%
Percent of members lost someone they knew on 9/11

71%
Percent of members lost FDNY close friends

57%
Percent of members lost FDNY acquaintances

8%
Percent of members lost FDNY relatives

23%
Percent of members lost non-FDNY relatives and friends

An overwhelming 98% of FDNY WTC-exposed rescue/recovery workers (firefighters and EMS providers) knew at least one person who died at the WTC site; many were beloved friends. Not only were the deceased brave rescue/recovery workers, they were also spouses, fiancés, significant others, parents, family, children, siblings, friends and coworkers.

The close bonds formed between the survivors and those we lost help to explain, in part, the extent of our members' suffering in the aftermath of 9/11. Members whose firehouses/EMS stations suffered greater losses were more likely to have symptoms of PTSD. However, despite their grief, our members dedicated themselves to serving NYC and rebuilding the Department.

Many members who worked at the WTC site did not allow themselves time to grieve for those lost or to adjust to their new normal, so mental health problems tended to surface later, once the search slowed and they had time to process their emotions. For some, this process was delayed until after retirement. FDNY Counseling Service Unit (CSU)-trained peer counselors provide support and encouragement for members to seek professional counseling and treatment from trained mental health practitioners (social workers, psychologists and psychiatrists) at CSU or, when needed, from outside organizations. Referrals to private practitioners are offered through the WTC Health Program.

Annual Monitoring Visits to the FDNY WTC Health Program

WTC medical monitoring exams are provided annually to every member who served at any WTC site during the rescue/recovery effort and is enrolled in our WTC Health Program. In the first post-9/11 year (9/11/01—9/10/02), nearly 10,000 of our members received a WTC Health Program monitoring exam at FDNY. As of March 2021, more than 15,300 FDNY WTC-exposed members have received multiple monitoring exams.

Continued participation is one measure of program success. Retention remains high despite having to shut down traditional in-person monitoring for a brief time during the COVID-19 pandemic. Telehealth treatment visits were available throughout the pandemic.

FDNY strongly encourages participation in the monitoring program in order to track changes in our members' health, provide age-appropriate cancer and other screening tests and deliver WTC-related medical treatment and medication, all at no cost. One reason for the success of our program is our ability to understand and then fulfill the healthcare needs of our members.

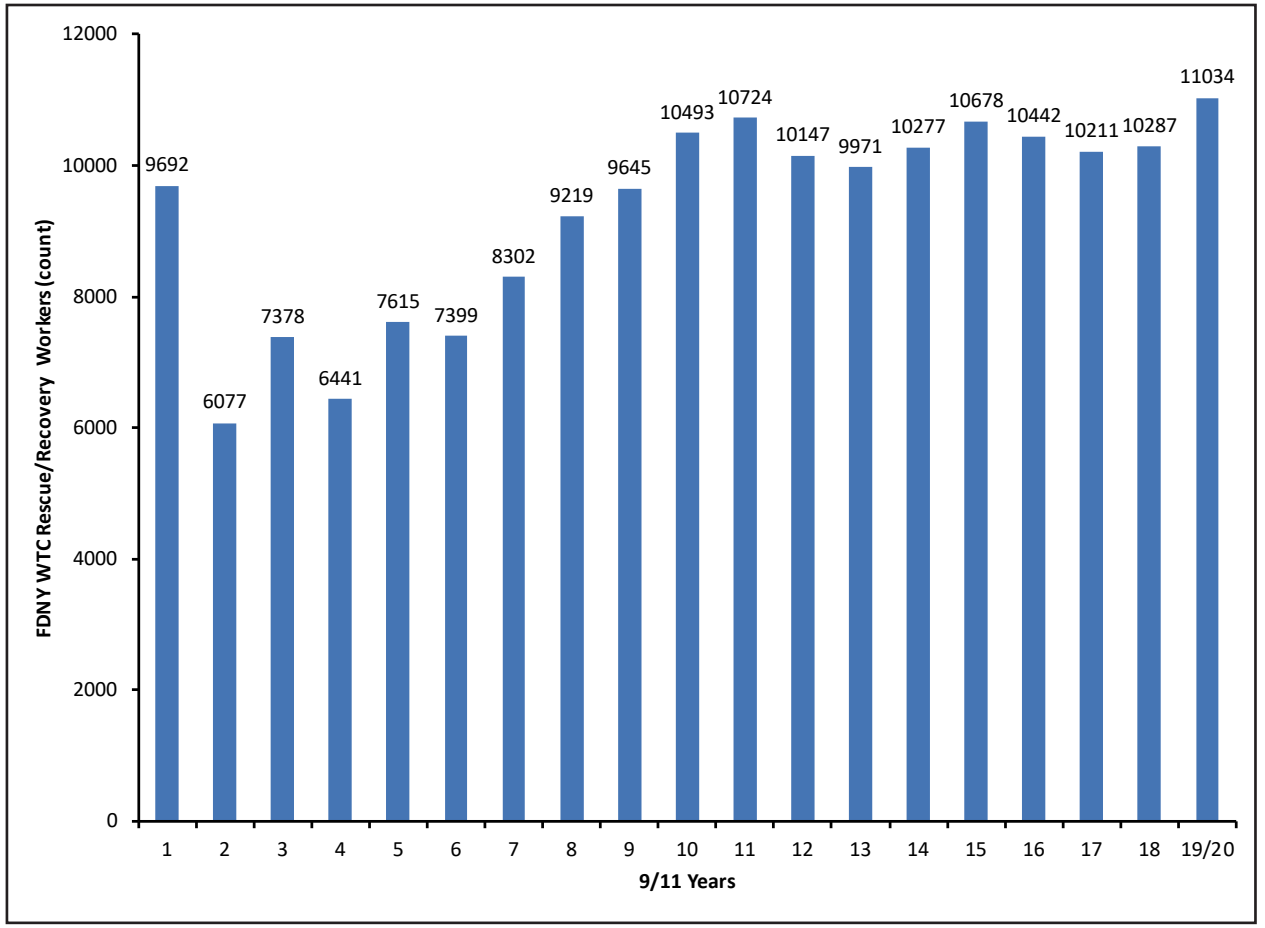
WTC medical monitoring exams include:

- **Revised physical and mental health questionnaires**
- **Chest x-rays every two years**
- **Pulmonary function tests**
- **Blood pressure and weight measurements**
- **Blood and urine tests**
- **Cardiograms (if needed)**
- **Physician evaluation**
- **Cancer screening and evaluation**
  - **Blood tests for hematologic cancers such as leukemia**
  - **Low-dose chest CT scans for lung cancer**
  - **Upper GI endoscopies for gastroesophageal cancer**
  - **Colonoscopies for colon cancer**
  - **Mammographies for breast cancer**
  - **PSAs for prostate cancer (provided by external funding)**
  - **Pap smears by external OB-GYN for cervical cancer**

Retention rate:

- **78% of firefighters who had a prior monitoring exam had a repeat in 2019–2021**
- **63% of EMS workers who had a prior monitoring exam had a repeat in 2019–2021**

Number of WTC-Exposed Rescue/Recovery Workers Who Had a Monitoring Visit by Year



Note: 9/11 years are defined as each year period beginning on September 11 of that calendar year (e.g., 9/11 year 1 is 9/11/2001–9/10/2002). Data for 9/11 year 19/20 covers the time period of 9/11/2019–3/10/2021.

Monitoring Questionnaires

FDNY BHS designed health questionnaires detailing exposures and symptoms, which became an integral part of the monitoring exam within weeks of 9/11. Within six months, more than 10,000 members had completed these questionnaires. Obtaining this self-reported information proved critically important because it allowed us to quickly understand the scope of the health impact of 9/11 and design the necessary treatment and long-term monitoring programs needed by our members. It also proved useful in allowing our members to document their exposures and early health findings so that no one could question their future applications for WTC health and pension benefits.

The mental health portion of our first screening/monitoring questionnaire asked FDNY WTC-exposed rescue/recovery workers (firefighters and EMS providers) about their emotional well-being through questions aimed at identifying symptoms and behavioral patterns related to stress, especially PTSD and anxiety. It examined changes in respondents' ability to function in their personal and professional lives, which could have resulted from the 9/11 disaster. Members largely reported issues with anger, irritability and anxiety; memory and concentration; changes in eating, sleeping and exercise patterns; and increases in alcohol and tobacco use. The questionnaire also collected data on the number of people using our counseling services and the types of counseling used.

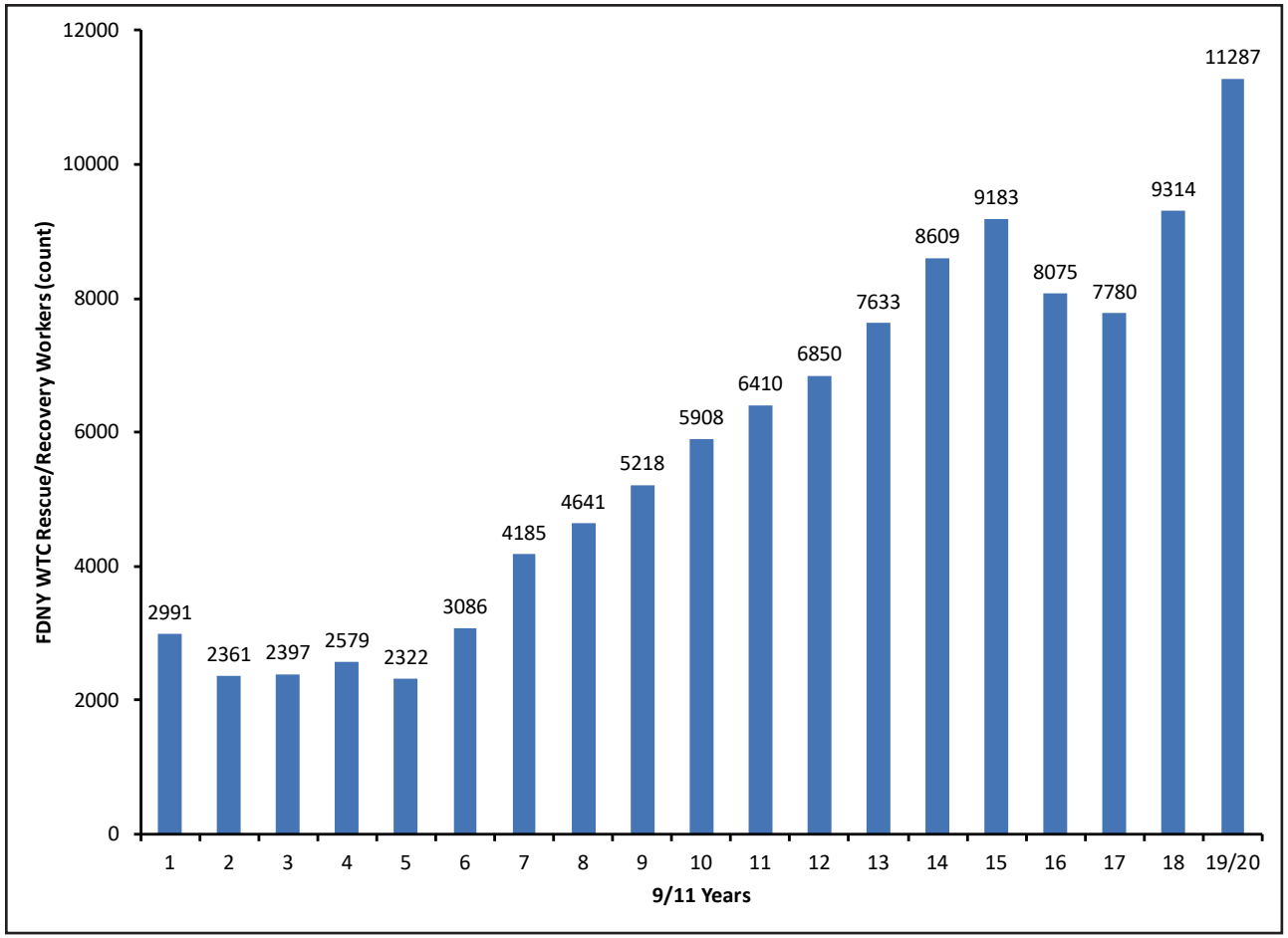
After successful administration of our first post-9/11 questionnaires, the WTC Health Program continued to develop a series of self-administered, computerized questionnaires for use in conjunction with the annual or periodic medical monitoring exam of active members and retirees. This was important to assess the longer-term physical and psychological impact of 9/11 on FDNY rescue/recovery workers and their families. For the first time since any disaster, FDNY BHS provided the same extensive monitoring exam to firefighters and EMS providers, regardless of whether they were active or retired. As time went on, questions were added based on growing needs from our members to assess chronic and newly emerging conditions.

Starting in 2006 a separate mental health questionnaire was introduced, relying on validated mental health questionnaires to screen for "probable" mental health conditions. Our findings show the persistent impact of the 9/11 tragedy, with the greatest effects reported by FDNY rescue/recovery workers who were either at the WTC site during the morning of the collapses or who lost loved ones (family, coworkers and friends). We found a substantial overlap in health conditions; for example, most with PTSD also developed anxiety, depression and physical health issues. Since we did not collect mental health information pre-9/11, this report presents these data from 9/11 forward to demonstrate trends in mental health symptoms and conditions over the past 20 years.

Annual Treatment Visits to the FDNY WTC Health Program for a Physical Health Condition

Years before the Zadroga Act was enacted, FDNY BHS started a treatment program for WTC-related conditions. Based on information from these early BHS visits, we were the first to describe the WTC Cough Syndrome (cough, obstructive airway disease [asthma and chronic bronchitis], rhinosinusitis and gastrointestinal reflux) and document that treatment was effective (*New England Journal of Medicine*, 2002). In December 2006, FDNY BHS received funding to expand monitoring and treatment services for WTC-related physical and mental health illnesses. We hired dedicated, WTC-focused healthcare personnel who received specialized training to provide monitoring, treatment evaluations and interventions. Referrals can be made to our in-house lung specialists (Drs. Prezant, Weiden, Nolan and Salzman) and are available at treatment visits for external (non-FDNY) doctor visits, such as ENT doctors (for sinus and throat problems), GI doctors (for acid reflux) and cancer specialists. FDNY also provides case management for all WTC-covered cancer care and other severe illnesses. When indicated, highly WTC-exposed rescue/recovery workers are offered advanced imaging (CT, MRI and PET scans) and other specialized diagnostic tests. Recognizing that medications have been effective but costly for members, the City and their unions, NIOSH continues to fund a no-cost prescription medication program for WTC-related conditions. Not including monitoring exams, as of March 1, 2021, about 14,600 of our FDNY WTC-enrolled members have received 325,730 physical health treatment visits to FDNY physicians through our Program.

Number of WTC-Exposed Rescue/Recovery Workers Who Had a Treatment Visit by Year



Note: 9/11 years are defined as each year period beginning on September 11 of that calendar year (e.g., 9/11 year 1 is 9/11/2001–9/10/2002). Data for 9/11 year 19/20 covers the time period of 9/11/2019–3/10/2021.

In addition to monitoring exams, thousands of FDNY members visit the FDNY WTC Health Program for treatment of WTC-related physical health conditions each year.

If you are experiencing symptoms and have not yet done so, please schedule a treatment appointment at our WTC Health Program by calling 718-999-1858, where free treatment and medications are available for WTC-covered conditions.

Cancer Screening Program

At every monitoring exam, members are asked to participate in cancer screening and given other relevant health maintenance information. Eligibility for cancer screening is age-specific or requires specific health characteristics or history. The WTC Health Program cancer screening criteria are based on the U.S. Preventive Services Task Force (USPSTF) recommendations and other national guidelines. Early diagnosis and treatment are instrumental to favorable cancer outcomes.

Low-dose chest CT (LDCT) is recommended for all members age 50-80 who meet criteria based on self-reported smoking history (20 or more pack years), WTC arrival time (exposure) and lung function.

- Since the establishment of the screening program in 2015, more than 3,000 members have received a chest CT.
- 32 lung cancers have been identified.

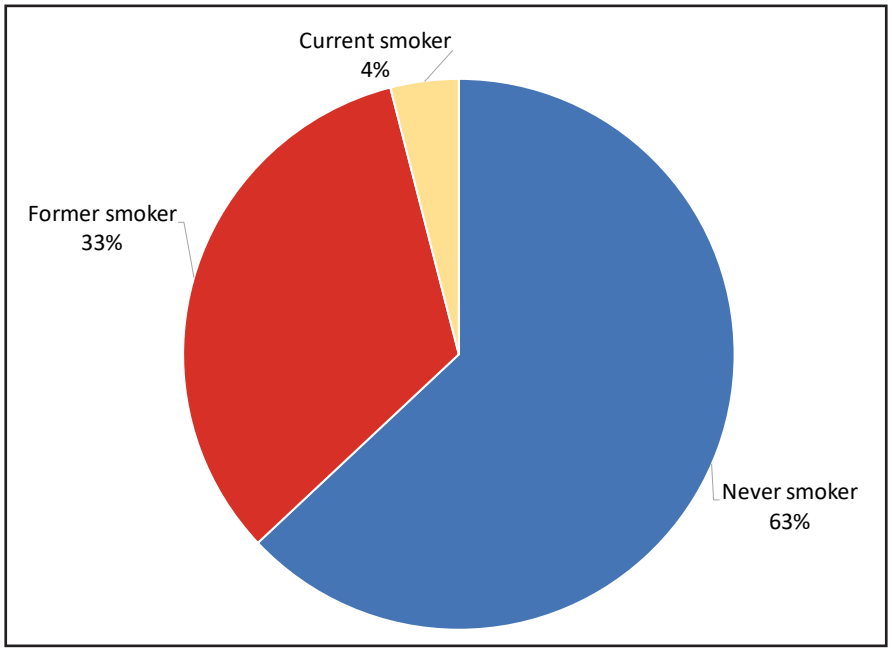
Screening colonoscopy is recommended for all members age 45 and above unless otherwise advised by a physician based on family history.

- Since the establishment of the screening program in 2014, more than 7,000 colonoscopies have been performed on more than 5,000 members.
- 36 colon/rectal cancers have been identified.

Mammography is recommended for all women age 40 and above unless otherwise advised by a physician based on family history.

- Since establishing the screening program in 2015, more than 500 mammograms have been performed on more than 200 members.
- Several cancers have been identified.

Smoking Status of the FDNY WTC Health Program Members



Since respiratory health and cancer prevention are so important to our FDNY membership, we track smoking behaviors in our members and offer free tobacco cessation services. As can be seen in the chart, 63% of our members have never smoked, a proportion similar to the proportion of those who have never smoked among a NYC comparison population. Even better news is that the proportion of our former smokers is higher than among a NYC comparison population. Overall, only 4% of our members report current smoking—about one-third of the current smoking rate for NYC. In part, this is due to the free tobacco education and cessation treatments we have provided since 9/11. For many, 9/11 was a reachable, teachable moment for tobacco cessation. While we cannot undo the harmful WTC exposure, we can prevent future exposures to cigarette smoke—exposures that are known to result in increased rates of heart and lung disease and cancer.

To help you quit, we continue to offer our members a free, confidential tobacco cessation that can include treatment with nicotine replacement products, bupropion and/or Chantix. We want everyone to be "Tobacco Free with FDNY." To date, more than 900 members have participated in this program.

- In an early study that we published in *Chest* (2006), 47%, 36% and 33% had stopped smoking at three, six and 12 months of follow-up, respectively.
- Of the 134 members whom we have been able to reach for verification, about 80% are tobacco-free more than 15 years later.
- We are proud to have such excellent tobacco cessation rates; in fact, our quit rates are among the best in the nation.

Call 718-999-1942 to make an appointment for smoking cessation.

About 4% of all FDNY WTC-exposed rescue/recovery Workers currently smoke—a rate much lower than the rate in NYC overall.

EMS providers have a higher smoking rate than firefighters.

- **EMS providers: 12% current smokers**
- **Firefighters: 3% current smokers**

Since 9/11, there have been 190,124 visits by 7,888 WTC-enrolled members to our WTC Health Program for mental health counseling or treatment.

All firefighters and EMS providers with at least one mental health condition can receive mental health treatment, at no cost, through the WTC Health Program.

Call 212-570-1693 to make an appointment with the CSU.

If you have stress or mental health concerns, please call the WTC Health Program or CSU at any of the locations listed the following page. These calls and any services you receive under the WTC Health Program are confidential and not part of your BHS medical record.

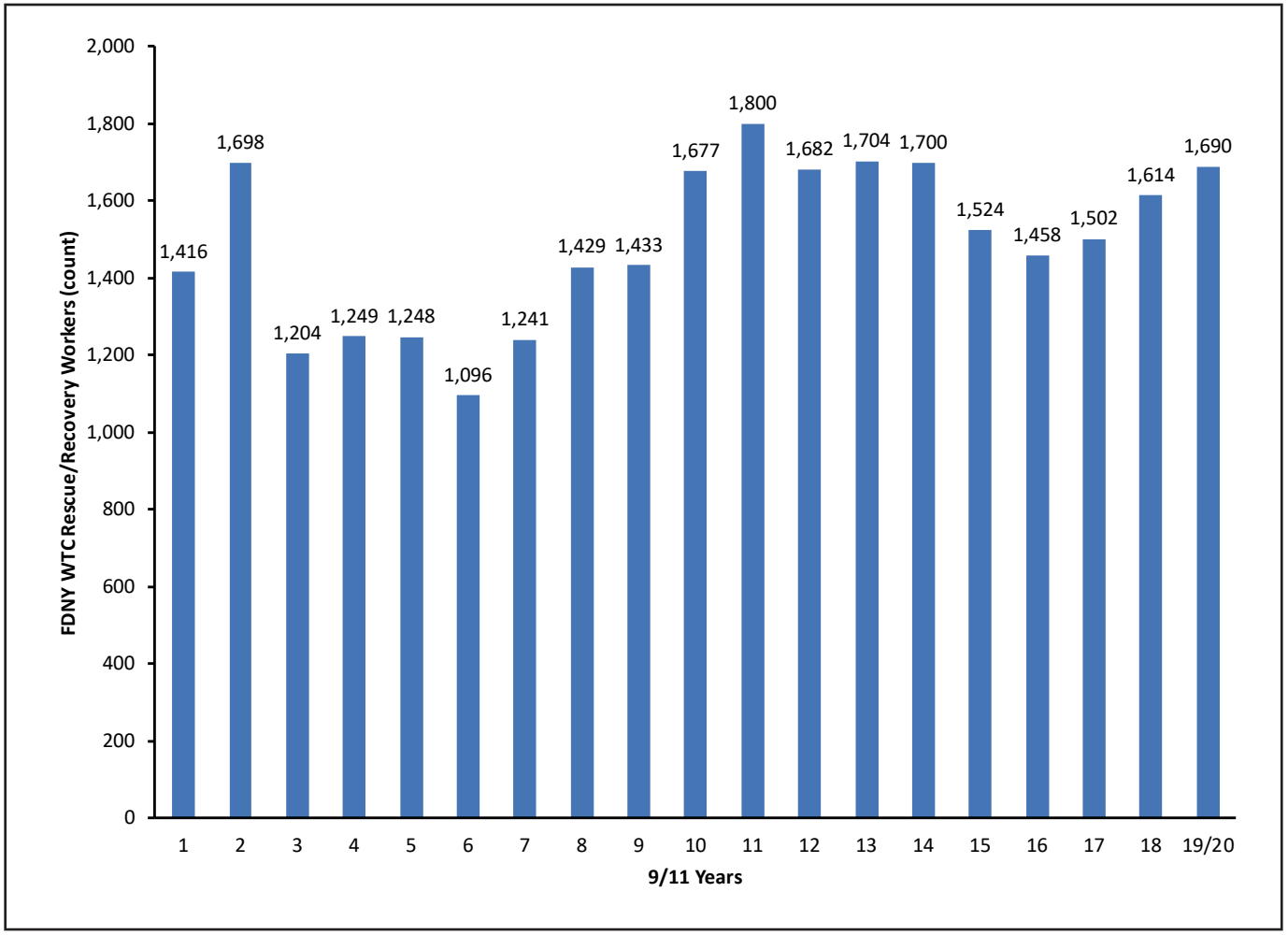
Annual Mental Health CSU Visits

The FDNY Counseling Service Unit (CSU) has responded to the mental health needs of the FDNY community for more than 35 years. Prior to 9/11, CSU mostly provided counseling for family issues, personal stress or bereavement. In response to the WTC attacks and the tragic loss of 343 members of our FDNY family, CSU quickly adapted and expanded their programs by tapping into counselors from two partner organizations: the International Association of Fire Fighters (IAFF) and the National Fallen Firefighters Foundation (NFFF). CSU staff visited every firehouse and EMS station and added satellite locations to provide mental health services to members and their families, including the families of deceased FDNY rescue/recovery workers. Because CSU had significant experience with our members, programs were developed to meet their specific needs. For example, post-9/11 trauma groups were available at several FDNY CSU locations, which were established in members' communities, and peer counselors were deployed throughout FDNY. Two weeks following 9/11, CSU facilities were expanded to include not only our Manhattan location, but also new locations on Staten Island and in Fort Totten (Queens) and later in Suffolk and Orange Counties. With their collective experience, along with use of de-identified aggregate analyses of the mental health questionnaire administered during FDNY WTC Health Program annual monitoring exams, CSU has helped identify mental health concerns and their relation to work done at the 9/11 disaster site. Immediately after 9/11, the most frequent conditions were PTSD and grief/bereavement, through which CSU was there to help our members deal with this "new normal."

Now, 20 years later, our dedicated CSU staff continues its mission of caring for the mental health of our members (both active and retired). In addition to any continuing issues, we now increasingly identify members with difficulty adjusting to life changes such as retirement and/or chronic illnesses. Programs introduced by CSU recognize the shifting and varying needs of our members by expanding our focus from PTSD to also include depression and substance abuse: all issues that can be compounded by retirement, aging and comorbid physical health conditions. This knowledge gained from 9/11 has enabled CSU to help first responders after other disasters, such as Hurricane Sandy and the COVID-19 pandemic.

As illustrated, the post-9/11 increase in the use of CSU counseling services reflects our community's greater acceptance of mental health services and support. The continued utilization of CSU indicates that members understand the need for counseling in a confidential setting where they are accepted and understood. To encourage this further, we have increased our counseling staff to include dedicated counselors and peers from our EMS workforce.

Number of WTC-Exposed Rescue/Recovery Workers Who Had a Visit to CSU by Year



Note: 9/11 years are defined as each year period beginning on September 11 of that calendar year (e.g., 9/11 year 1 is 9/11/2001–9/10/2002). Data for 9/11 year 19/20 covers the time period of 9/11/2019–3/10/2021.

FDNY CSU Locations and Numbers

Manhattan Counseling Unit
251 Lafayette Street, 3rd floor
New York, NY 10012
212-570-1693

Addiction Transition Program
251 Lafayette Street, 4th floor
New York, NY 10012
212-925-6671

Fort Totten Counseling Unit
Fort Totten Building 413A
Bayside, NY 11359
718-352-2140

Staten Island Counseling Unit
1688 Victory Boulevard, Suite 101A
Staten Island, NY 10314
718-815-4111

Brentwood Counseling Unit
Suffolk County Community College
Crooked Hill Road
Brentwood, NY 11717
631-851-6888

Middletown Counseling Unit
2279 Goshen Turnpike
Middletown, NY 10941
845-695-1029

SPOTLIGHT #3

FDNY RESCUE/RECOVERY WORKER SPOTLIGHT:

LT. TERRENCE JORDAN

FDNY RESCUE/RECOVERY WORKER SPOTLIGHT:
LIEUTENANT TERRENCE JORDAN

Lieutenant (Lt.) Terrence Jordan, then in his early 40s and a member of the FDNY's Marine Company 9, was on Randall's Island for compulsory training when the planes hit the towers. He made his way to the Brooklyn Navy Yard, commandeered a boat loaded with medical supplies and raced at full throttle to the North Cove Marina near Ground Zero, arriving shortly after the buildings collapsed.

"The air was filled with an incredibly thick cloud of dust—you couldn't see two feet in front of you," Lt. Jordan recalls. He had bypassed his firehouse and so hadn't brought his mask and respirator. That hardly mattered to him in the heat and dust of the moment.

Moving through the eerie quiet, Lt. Jordan and his team followed the periodic beeps of fire safety equipment programmed to emit a distress signal when the wearer stops moving. Lt. Jordan and his team ultimately found Captain (Capt.) Alfredo Fuentes buried in the rubble with life-threatening head and lung injuries. Their actions saved his life—see page 84 for Spotlight on Capt. Fuentes. Lt. Jordan stayed on site at the debris piles to search for more survivors for three straight days.

His own troubles started on day one, with an asthma-like attack. Lt. Jordan gulped a few mouthfuls of bottled oxygen, caught his breath, and rejoined the rescue effort. More asthma attacks followed, prompting him to go for testing a few days later, where the news was grim. His lungs were severely damaged. FDNY physicians told him, "'Terry, you won't be going to another fire. You'll have to retire.'"

Since 9/11, Lt. Jordan has struggled with chronic obstructive pulmonary disease, severe emphysema, bronchitis and asthma. In 2010, he had a stroke that partially paralyzed his right side. "I go to more doctors than you could imagine," says Lt. Jordan. For years now, he has been tethered via a min-tracheal tube to oxygen 24 hours a day.

Still, he remains remarkably upbeat. "I have my issues," says Lt. Jordan, a father of seven, "but I'm in reasonably good shape because of the World Trade Center Health Program. I don't want my life to be defined by a terrorist incident," he says. "I have a pretty good life. I just had my ninth grandchild. I never would have seen any of my grandchildren had I not survived 9/11. I'm luckier than so many other people."

The Spotlight profiles in this report are adapted from an article by Gary Goldenberg that first appeared in EINSTEIN *magazine, a publication of Albert Einstein College of Medicine. Please visit "https://magazine.einsteinmed.org/winter-spring-2021/ones-who-ran-toward-danger/ to read the full article.*

More FDNY Rescue/Recovery Worker Spotlights can be found on pages 12, 22 and 84.

Photo by Albert Einstein College of Medicine/Jörg Meyer

"I have my issues, but I'm in reasonably good shape because of the WTC Health Program. I don't want my life to be defined by a terrorist incident. ... I never would have seen any of my grandchildren had I not survived 9/11. I'm luckier than so many other people."


FDNY
FIRE
FIRE FIGHTER II

SECTION 3:
HEALTH ASSESSMENT OF WTC-COVERED CONDITIONS

Physical Health

Cancer

Mental Health

Monitoring and treatment appointments are available at our WTC Health Program by calling 718-999-1858. Free treatment and medications are also available for WTC-covered conditions.

The Counseling Services Unit (CSU) is here to provide free and confidential support. A mental health condition is not required for evaluation or for help with stress/coping strategies. Treatment and medications are available for WTC-covered conditions. Call 212-570-1693 for more information or to schedule an appointment.

11,318
Members with at least one certification to date*

9,810
Members with at least one physical health certification

3,097
Members with at least one cancer certification

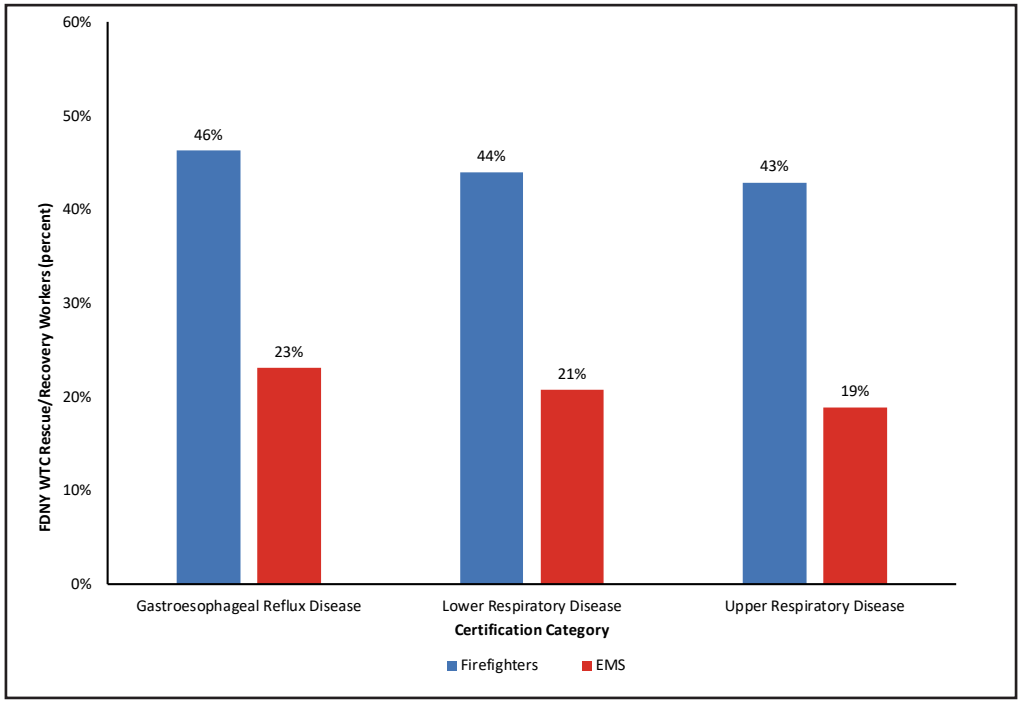
4,301
Members with at least one mental health certification

*Persons may be certified for more than one condition.

The James Zadroga 9/11 Health and Compensation Act of 2010, along with its reauthorization in 2015, provides the World Trade Center (WTC) Heath Program with funding through 2090. The WTC Health Program provides no-cost medical monitoring for all enrolled members and no-cost treatment for those with certified WTC-related health conditions as well as for any medically associated conditions that result from the treatment or progression of a certified condition. A certified condition is an illness or health condition for which the federal government has agreed that exposure to 9/11-related airborne toxins, hazards or other adverse conditions was likely to be a significant factor in aggravating, contributing to or causing the illness or health condition.

Conditions covered by the WTC Health Program include upper and lower respiratory conditions (e.g., chronic rhinosinusitis, asthma, chronic obstructive pulmonary disease (COPD), pulmonary fibrosis), gastroesophageal reflux disease (GERD), most cancers, mental health conditions (e.g., post-traumatic stress disorder (PTSD), depression, anxiety, substance abuse) and musculoskeletal injuries (if documented early on after 9/11). Once a certification is approved, the relevant diagnostic and treatment services for the certified condition become available to the member at no cost as long as they are authorized by the WTC Health Program. Members can be certified for multiple conditions and therefore have access to services in multiple care suites. The list of WTC-related health conditions may be amended by the federal WTC Program Administrator to include other health conditions as more information is learned about the relationship between 9/11 exposures and those health conditions. In 2012, the administrator added certain cancers based on data provided by the FDNY WTC Health Program that was shortly thereafter corroborated by the WTC General Responder Program and the WTC Health Registry.

Physical Health Certifications in FDNY WTC-Exposed Rescue/Recovery Workers (2001–2021)



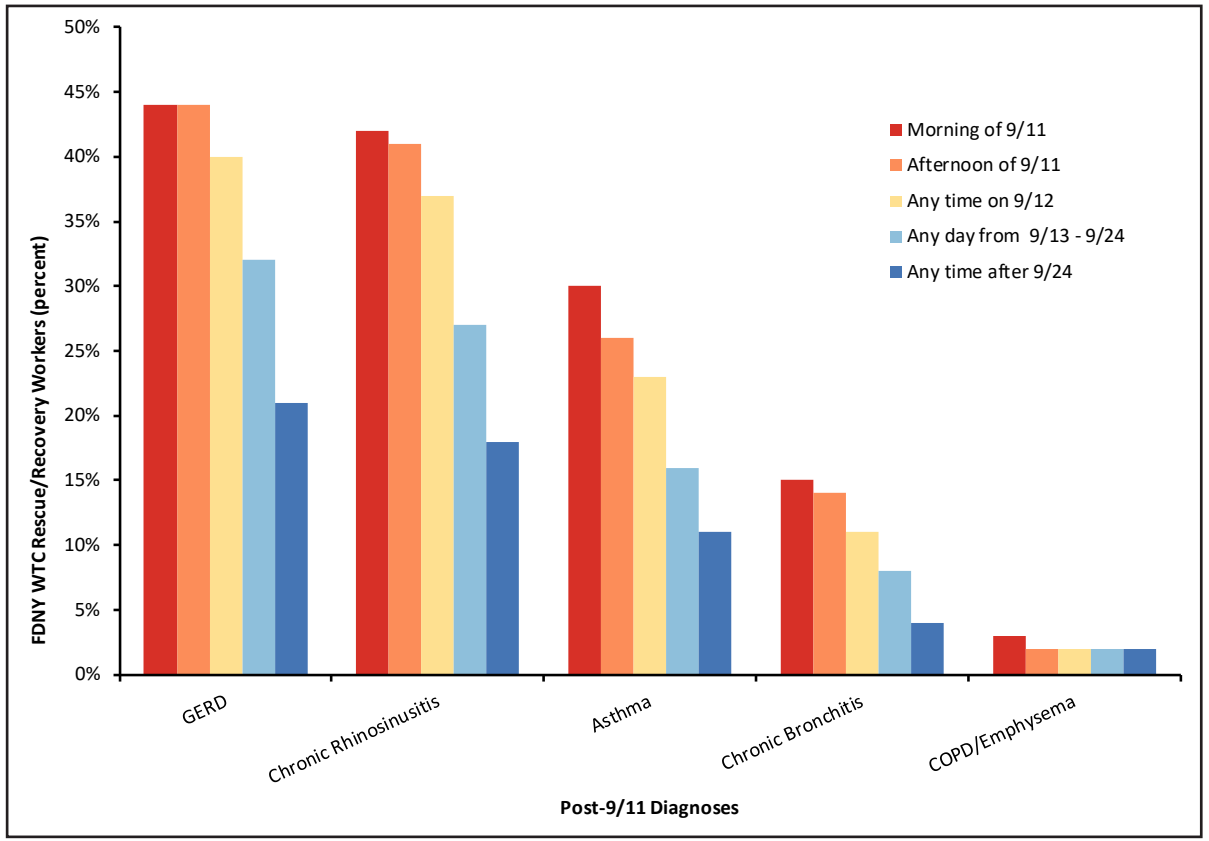
As of March 2021, 9,019 firefighters and 791 EMS providers have at least one physical health certification. Currently, the most common certified physical health conditions are gastroesophageal reflux disease (GERD), lower respiratory diseases and upper respiratory diseases, affecting more than 40% of WTC-exposed firefighters and more than 19% of WTC-exposed EMS providers.

Lower respiratory diseases are most often due to obstructive airway diseases such as asthma and chronic bronchitis, and less commonly chronic obstructive pulmonary diseases (COPD) and emphysema. Lower respiratory conditions were associated with WTC exposure (earlier arrival time to the site) and lower levels of lung function. Previous studies found that the group of FDNY WTC-exposed rescue/recovery workers with asthma, bronchitis and COPD/emphysema cases have the lowest level of lung function, indicating that post-WTC respiratory injury was associated with both obstructive airway disease and functional impairment. Lower respiratory disease also includes certifications for interstitial lung diseases (e.g., sarcoidosis and pulmonary fibrosis), which are less common but may produce far more serious consequences. Upper airway disease (rhinosinusitis, polyps, vocal cord abnormalities) was similarly associated with earlier WTC arrival time, but not with reduced lung function.

Currently, the most common certified physical health conditions are GERD, lower respiratory diseases and upper respiratory diseases, affecting more than 40% of WTC-exposed firefighters and more than 19% of WTC-exposed EMS providers.

Even 20 years after the WTC attack, the relationships between early WTC exposure and aerodigestive diseases remain the same.

Respiratory Diagnoses by WTC Arrival Time (2001–2021)



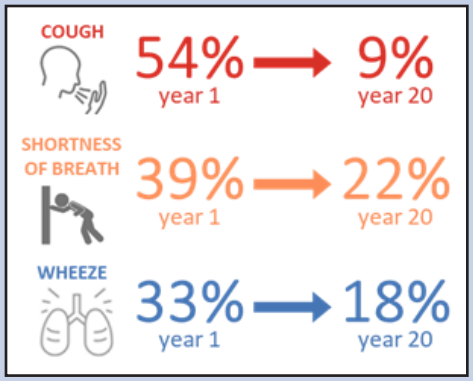
Respiratory symptoms among FDNY WTC-exposed rescue/recovery workers have persisted over time, and associations between early arrival at the WTC site and physician-diagnosed respiratory conditions remain. As demonstrated in this figure, those arriving early on or soon after the attacks consistently have the highest prevalence of illness across multiple categories of respiratory disease. The entire WTC-exposed workforce (firefighters and EMS providers combined), regardless of arrival time or retirement status, had the following disease prevalences: 39% GERD, 36% chronic rhinosinusitis, 23% asthma, 12% chronic bronchitis and 2% COPD or emphysema.

Many of our exposed members have more than one of the conditions described above (chronic rhinosinusitis, GERD, or obstructive airway disease); 40% have two or more.

Diagnoses of Obstructive Airway Disease, Chronic Rhinosinusitis, and Gastroesophageal Reflux Disease Can Occur Years After WTC Exposure

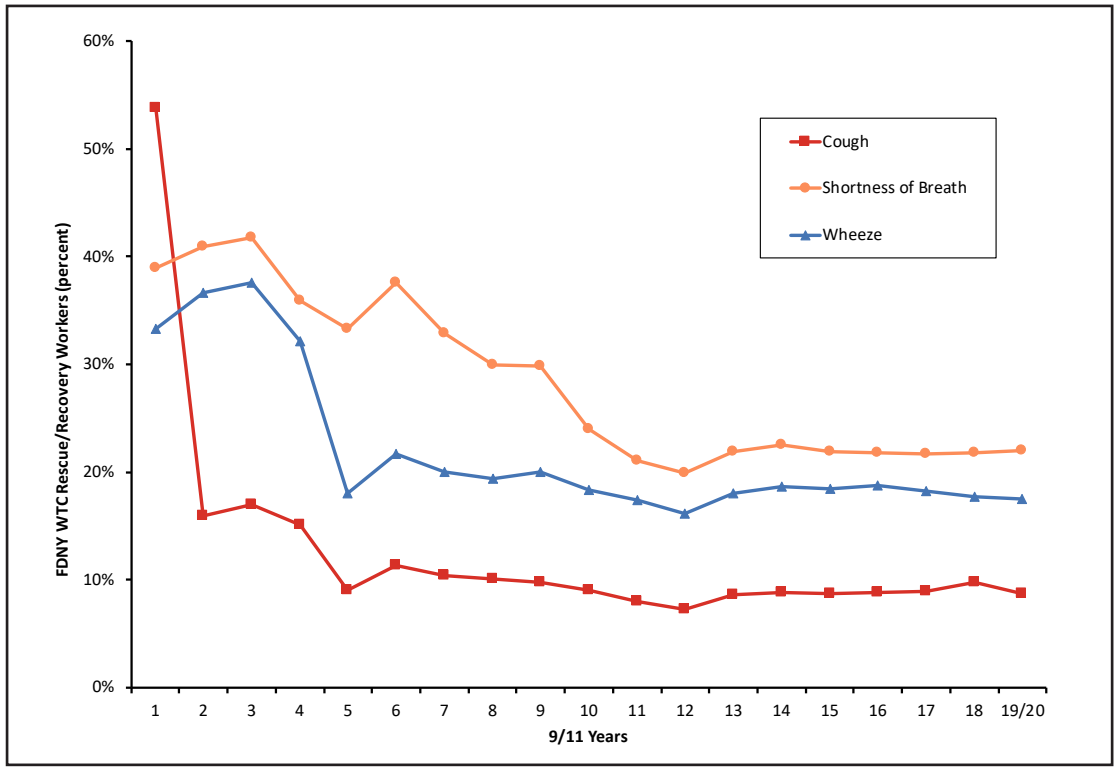
Adverse respiratory effects of WTC exposure have been widely documented, but the length of time that exposure remains associated with disease is uncertain. We have conducted several studies to estimate the time interval between WTC exposure and the diagnosis of obstructive airway disease, chronic rhinosinusitis and gastroesophageal reflux disease (GERD).

New obstructive airway diagnoses were associated with WTC exposure for at least seven years after September 11, 2001. The highest rates of these new diagnoses were among the highest exposure group (the morning of 9/11) during the first 15 months after exposure. A diagnosis of obstructive airway disease increased the risk of being diagnosed with chronic rhinosinusitis and/or GERD at a rate approximately four times that of those without a diagnosis of obstructive airway disease. It is possible that extended duration between exposure and the time of diagnosis may have been due to delayed diagnosis. Nevertheless, the results support recognizing these diagnoses among rescue/recovery workers as WTC-related even when diagnosed years after exposure.



The number of members reporting lower respiratory symptoms has decreased with time and treatment.

Lower Respiratory Symptoms Over Time

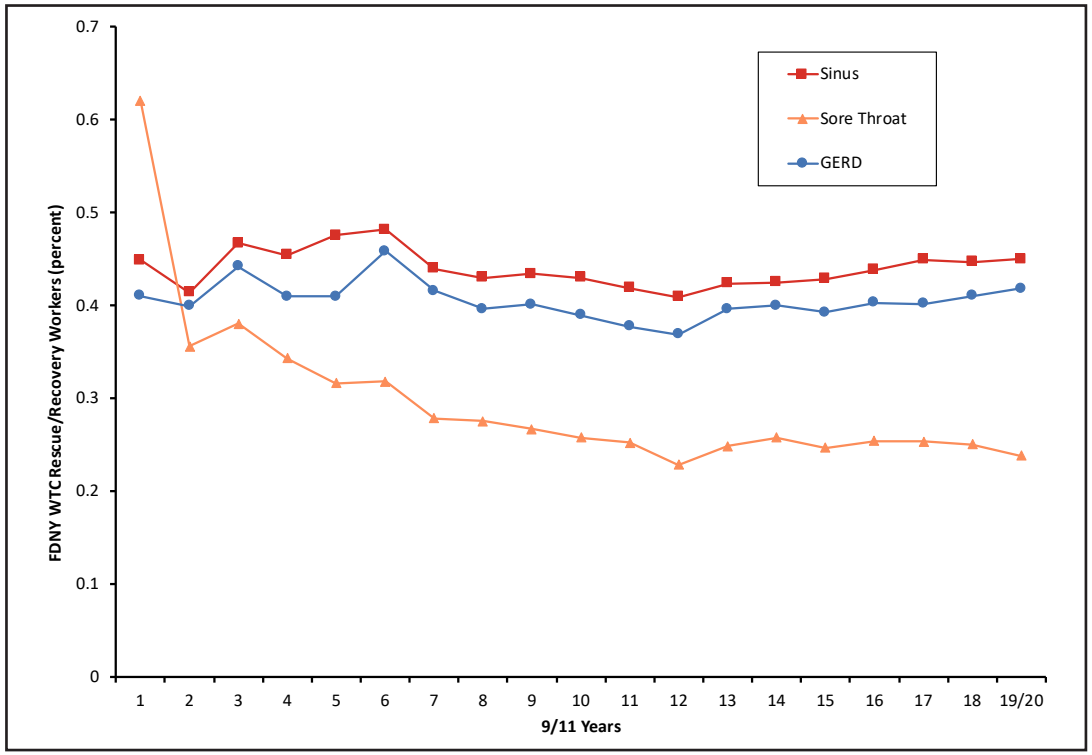


Note: 9/11 years are defined as each year period beginning on September 11 of that calendar year (e.g., 9/11 year 1 is 9/11/2001–9/10/2002). Data for 9/11 year 19/20 covers the time period of 9/11/2019–3/10/2021.

Being exposed to the clouds of dust and debris on 9/11 resulted in frequent daily cough symptoms for almost all of those present at the WTC site. Although cough was the first major respiratory symptom, with time and treatment, cough symptoms improved. More than half of our population had cough symptoms within the first year after 9/11, but at year 20, only 9% reported persistent cough. Wheezing and shortness of breath also decreased from year one to present, but not to the same degree. By year 20, 18% of our members continued to report wheezing, and 22% reported shortness of breath.

Nearly two decades after 9/11, earlier WTC arrival time is still associated with a higher prevalence of lower respiratory symptoms. Persistent lower respiratory symptoms are often associated with greater declines in lung function. Treatment for this is available and is one of several reasons why FDNY WTC-exposed rescue/recovery workers should continue their participation in our WTC Health Program.

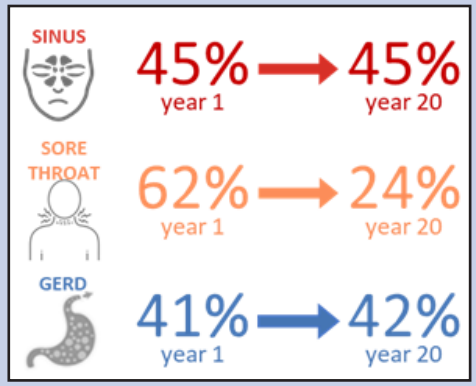
Upper Respiratory and Gastroesophageal Reflux Disease Symptoms Over Time



Note: 9/11 years are defined as each year period beginning on September 11 of that calendar year (e.g., 9/11 year 1 is 9/11/2001–9/10/2002). Data for 9/11 year 19/20 covers the time period of 9/11/2019–3/10/2021.

FDNY first responders frequently report the following symptoms: upper respiratory (nasal/sinus congestion/drip, sinus headaches and sore/hoarse throat) and gastroesophageal reflux disease (GERD) (chest burning/tightness, belching difficulty swallowing, cough and sore/hoarse throat).

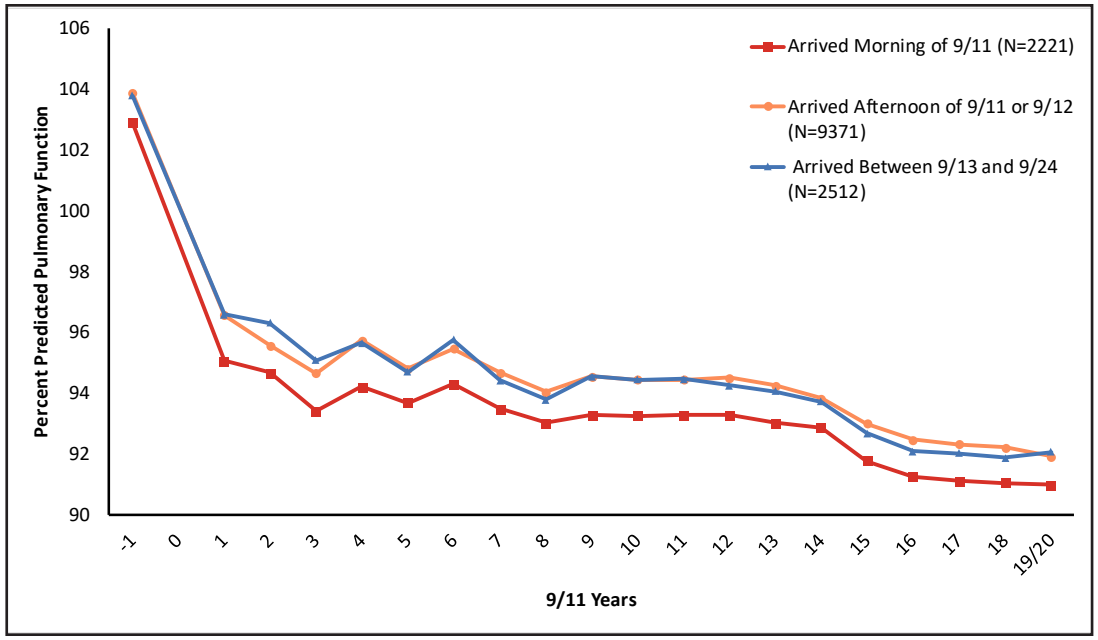
"WTC Cough Syndrome" is the term, first coined by FDNY BHS, used to describe the presence of lower respiratory symptoms, upper respiratory symptoms and GERD in WTC-exposed rescue/recovery workers. Although sore throat has declined over time, from a high of 62% in the first post-9/11 year to 24% 20 years later, symptoms of chronic rhinosinusitis (sinus) and GERD have consistently been reported by about 40% of the WTC-exposed workforce, and at a higher prevalence than lower respiratory symptoms. Whether this is due to differences in the effect of WTC dust inhalation on upper and lower airways, or differences in the effectiveness of medications used for the treatment of upper and lower airways, has been difficult to determine.



The number of members reporting sore throat symptoms has decreased with time and treatment.

The number of members reporting sinus or GERD symptoms has remained unchanged.

Pulmonary Function Over Time in Firefighters and EMS Providers



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After our first studies documenting substantial declines in lung function during the first six to 12 months after 9/11, considerable uncertainty remained about the persistence of this effect. The hope was that the drop was an acute, short-term reaction to the dust exposure that would resolve over time, eventually returning to normal lung function levels.

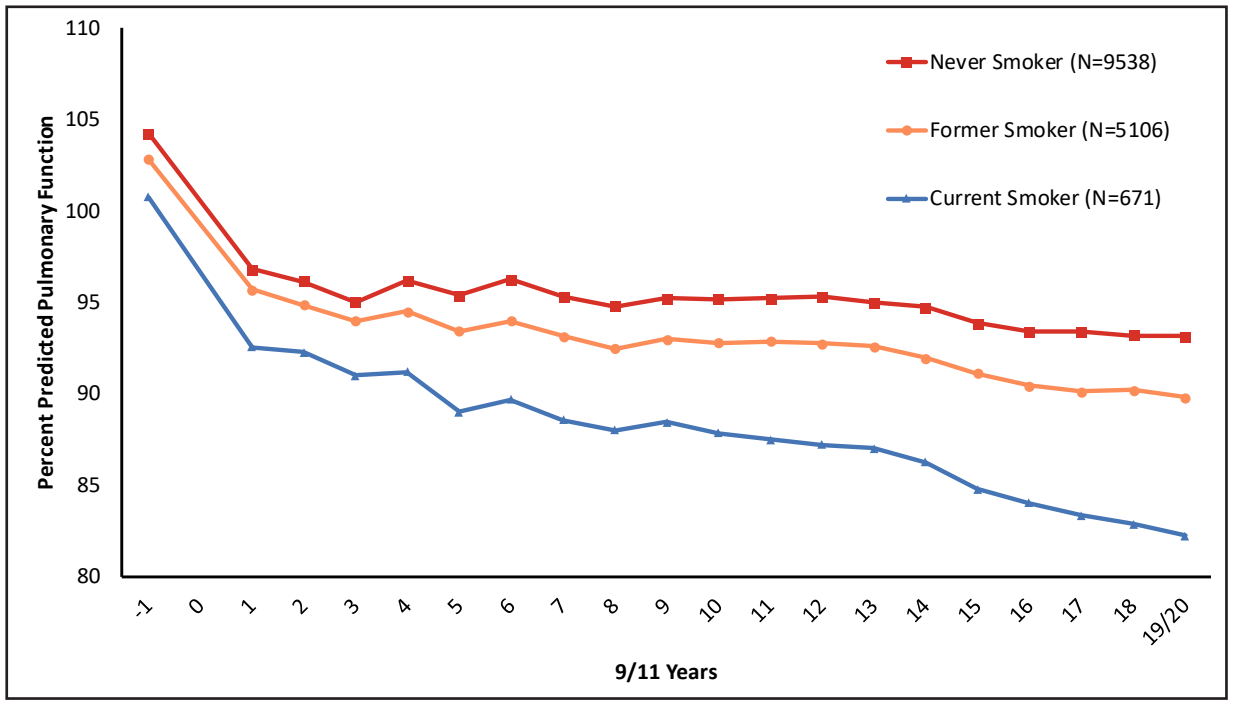
Investigating this, we extended the first study through seven years post-9/11 analyzing 61,746 pulmonary function test results from 12,781 FDNY WTC-exposed rescue/recovery workers. On average, recovery of lung function was not observed; abnormal lung function continued to persist. We extended this work through September 10, 2014, and through September 10, 2015, among EMS providers. Both studies continued to demonstrate a lack of lung function recovery. The 2016 study revealed that the trajectory of lung function decline differed by WTC exposure level and smoking status. The 2017 study demonstrated no clinically significant difference in lung function decline by sex or race/ethnicity.

Members who arrived at the WTC site the morning of 9/11 had greater lung function decline compared with those who arrived later.

Lung function decline is greater in smokers, and the decline slows considerably in those who stop smoking.

It is never too late to quit smoking, and FDNY WTC Health Program can help. Call 718-999-1942 for more information about the free, highly successful and completely confidential WTC Tobacco Cessation Program.

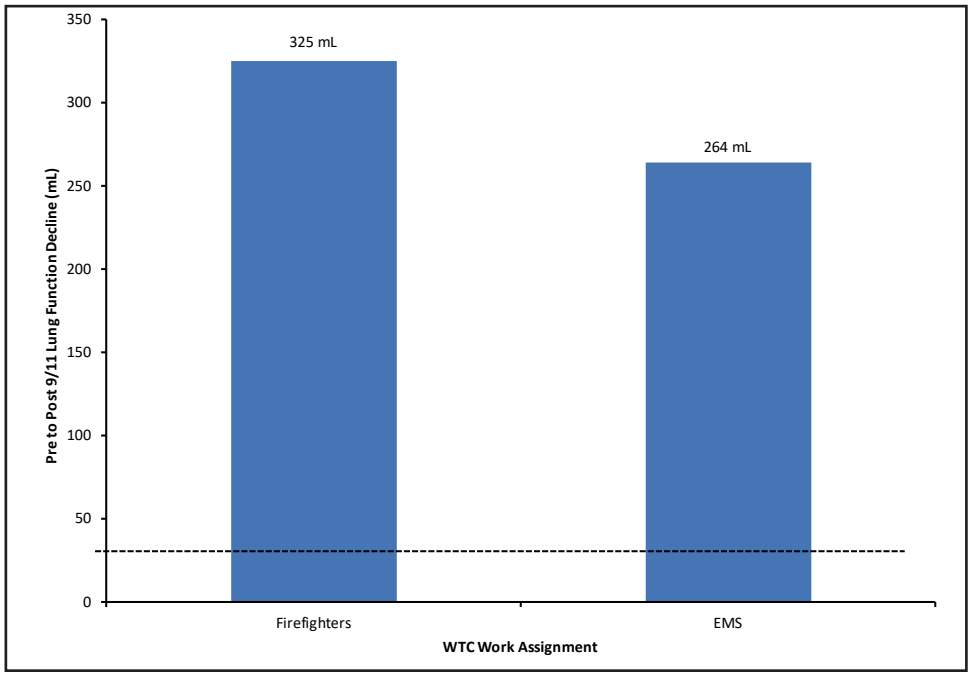
Pulmonary Function Over Time in Firefighters: Impact of Cigarette Smoking



Note: 9/11 years are defined as each year period beginning on September 11 of that calendar year (e.g., 9/11 year 1 is 9/11/2001–9/10/2002). Data for 9/11 year 19/20 covers the time period of 9/11/2019–3/10/2021. The period from 9/11/2000– 9/10/2001 is represented as 9/11 year -1.

Cigarette smoking had an additional negative effect on lung function in the years after 9/11. The initial rate of decline following WTC exposure was not significantly influenced by smoking status. After 2005, however, those who had never smoked had significantly better lung function than current smokers. Former smokers were more similar to never smokers than current smokers. Following the severe initial decline in lung function after 9/11, the proportion of never-smoking FDNY WTC-exposed rescue/recovery workers who had an abnormally low FEV_1 increased for firefighters from 2% before 9/11 to 10% in 2014 and for EMS providers from 6% before 9/11 to 15% in 2014. Stopping smoking demonstrated a positive impact on lung function. Firefighters and EMS providers who quit smoking before 2008 had significantly higher lung function than current smokers (not shown in this graph). For firefighters and EMS providers who quit after 2008, we hope that additional years of smoking cessation will allow for improvement in lung function similar to that seen in those who stopped before 2008. These findings underscore the important role tobacco smoke plays in increasing the risk of poor lung function, especially among those who worked at the WTC site.

Early Pulmonary Function Loss Within the First Post-9/11 Year by Work Assignment



Note: Dotted line represents annual pre-9/11 rate of lung function decline.

One important part of the FDNY routine medical evaluations is a pulmonary function test (PFT). The PFT measures forced vital capacity (FVC), which is the total breath out (expiration) and the forced expiratory volume in the first second (FEV_1) of expiration in milliliter (mL) units. In the general U.S. population, both FVC and FEV_1 decline at an average rate of about 30 mL per year as part of normal aging. Prior to 9/11, FDNY firefighters' and EMS providers' age-related lung function declines were similar to the general population, demonstrating that self-contained breathing apparatus (SCBA) provides exceptional respiratory protection during usual firefighting and hazardous exposures.

During the first weeks after 9/11, respiratory protection was not readily available, and when available, it was not well utilized. In the first year after 9/11, both firefighters and EMS providers had average declines that were 10 to 12 times greater than normal. firefighters' greater decline of FEV_1 compared with EMS providers was likely due to their different tasks and exposures during the rescue/recovery effort. Job-related tasks and proximity to the Ground Zero site both impacted the loss of lung function. For those with symptoms or substantial declines in lung function, treatment is recommended to prevent further reductions, maximize lung health and improve quality of life.

Blood Leukocyte Concentrations, FEV_1 Decline, and Airflow Limitation: A 15-Year Longitudinal Study of WTC-Exposed Firefighters

Higher levels of white blood cells are associated with greater declines in lung function in WTC-exposed rescue/recovery workers.

While most FDNY WTC-exposed members did not return to their pre-9/11 lung function, they have not had further declines after adjusting for normal aging-related declines. Unfortunately, for 12% of those exposed, lung function continues to decline at a faster rate than should occur with normal aging.

We asked if there was a way to identify members who might have greater lung function decline as time went on. We found that white blood cell counts drawn soon after 9/11 were related to accelerated lung function (FEV_1) decline and airflow limitation. The specific white blood cells involved are eosinophils and neutrophils; higher concentrations were each associated with accelerated FEV_1 decline. This was especially true for smokers (both former and current).

Above-average white blood cell counts appear to serve as a biomarker, or biological indicator, for those most vulnerable to airway injury after 9/11 irritant exposures, especially when there is a history of smoking. This is a very important finding because new drugs are now available that target eosinophils' negative effect on asthma, airway hyperreactivity and lung function. This could be a promising new form of treatment for our WTC-exposed members with asthma who require frequent doses of oral steroids or have demonstrated accelerated declines in lung function. These medications are now covered, and we have just begun to offer this treatment to the most symptomatic amongst this subset of patients. We hope to report soon on its effect.

Eosinophils, a biomarker found in blood, taken right after 9/11 are related to airway injury years later.

54% of those with severe asthma had elevated eosinophils.

Predictors of Asthma/COPD Overlap in FDNY Firefighters with WTC Dust Exposure

The WTC collapse left many WTC-exposed rescue/recovery workers with airway injury, including loss of lung function, obstructive airflow limitations, and airway hyperreactivity. In our WTC-exposed members with airway injury, asthma is the most common illness, and chronic obstructive pulmonary disease (COPD) is uncommon. We have found, however, that some have findings consistent with both asthma and COPD. Asthma/COPD overlap is a newly defined subtype of airway injury in which patients may, unfortunately, experience a poorer quality of life and higher mortality compared to those with isolated COPD (those with COPD but not asthma) or isolated asthma (those with asthma but not COPD).

Other than smoking, risk factors for asthma/COPD overlap have not been well characterized. We wanted to identify early predictors of asthma/COPD overlap among WTC-exposed firefighters and found that elevated blood eosinophil concentrations measured soon after 9/11 predicted irritant-associated asthma/COPD overlap, but not isolated-COPD or isolated-asthma. Eosinophils are white blood cells that are associated with allergic and immune responses. Elevated eosinophil counts can cause airway inflammation/swelling that can affect the sinuses and lungs.

With different blood biomarkers for asthma/COPD overlap, isolated COPD and isolated asthma, there may be different pathologic processes responsible for these diagnoses and therefore, different potential treatments. This is a very important finding because new drugs are now available that target eosinophils' negative effect on airway inflammation, hyperreactivity and lung function. This could be a promising new form of treatment for our WTC-exposed members with asthma/COPD overlap who require frequent doses of oral steroids or have demonstrated accelerated declines in lung function. These medications are now covered by our program. We have just begun to offer this treatment and hope to report soon on its effect.

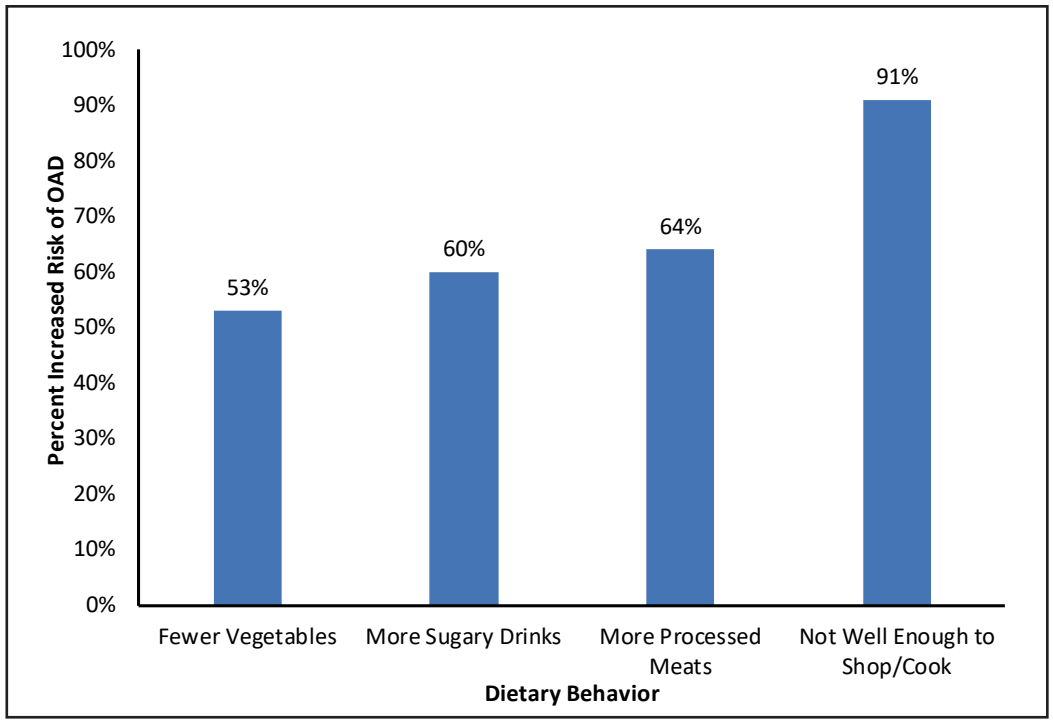
Abnormalities on Chest Computed Tomography and Lung Function Following an Intense Dust Exposure: A 17-Year Longitudinal Study

Since FDNY firefighters experienced intense dust exposure at the WTC site on and after 9/11, we and other WTC Health Program researchers wanted to discover whether high-intensity WTC exposure led to lung abnormalities that would be found on chest computed tomography (CT).

We found that post-9/11 wheeze and shortness of breath were associated with chest CT abnormalities such as bronchial wall thickening, mild emphysema-like changes and air trapping (retention of air in the lungs where it is difficult to exhale completely and may lead to the perception that it is difficult to take a full breath in). The risk of accelerated decline of FEV_1 (lung function declines greater than with normal aging) was associated with increasing bronchial wall thickening and emphysema-like changes on CT imaging. The good news is that those with CT abnormalities demonstrated lung function declines that were still mild enough to allow for effective interventions, such as quitting smoking, or treatments that target specific inflammatory pathways. This highlights the importance of the WTC Health Program's ability to provide free respiratory medications and tobacco cessation programs to our members, and the importance, generally, of early detection.

Diets with few vegetables and rich in processed meats, fried foods or sugary drinks were associated with higher risk for obstructive airway diseases (asthma, bronchitis or emphysema).

Impact of Diet on Obstructive Airway Disease



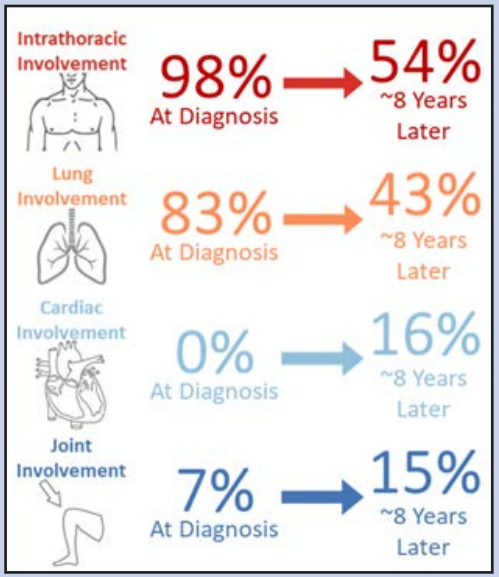
It is well known that diet has an impact on cardiovascular disease and aging. A question our research aims to answer is: are healthy diets also associated with a lower risk of having WTC-related lung disease? In collaboration with New York University (NYU) researchers, we assessed the food types/habits and physical activity of FDNY WTC Health Program members by adding a validated diet questionnaire known as the Rapid Eating and Activity Assessment for Participants-Short Version (REAP-S) to our WTC annual monitoring assessment. We looked at compounds that are formed when protein/fat combine with sugar or when foods are exposed high temperatures, also called glycated foods, which include foods like red meat, fried foods and butter. Diet quality and glycated food content were assessed for their relationship with obstructive airway diseases including asthma, chronic obstructive pulmonary disease (COPD) and asthma/COPD overlap.

Low and moderate dietary quality, eating more processed meats and fried foods, consuming sugary drinks, eating fewer vegetables and whole grains and having a diet abundant in glycated foods were significantly associated with obstructive airway disease even after adjusting for smoking history. Based on these findings, we are now studying whether dietary interventions similar to the Mediterranean diet can improve lung function and quality of life in WTC-exposed members with obstructive airway disease.

Sarcoidosis Among FDNY WTC-Exposed Rescue/Recovery Workers

Sarcoidosis is an autoimmune, inflammatory disease that can produce lumps of inflammatory cells (granulomas) in any organ, but it mainly does so in the lungs, lymph nodes and skin. These organs are thought to be entry points for occupational and environmental agents. While the cause of sarcoidosis is unclear, our previous work has demonstrated associations with both firefighting and WTC exposure. The incidence of sarcoidosis in the FDNY WTC-exposed cohort was twice the expected number compared to a demographically similar, age-adjusted unexposed cohort from the Rochester Epidemiology Project, a Mayo Clinic collaboration. Increased incidence rates for sarcoidosis have also been reported by the WTC General Responder cohort and the WTC Health Registry.

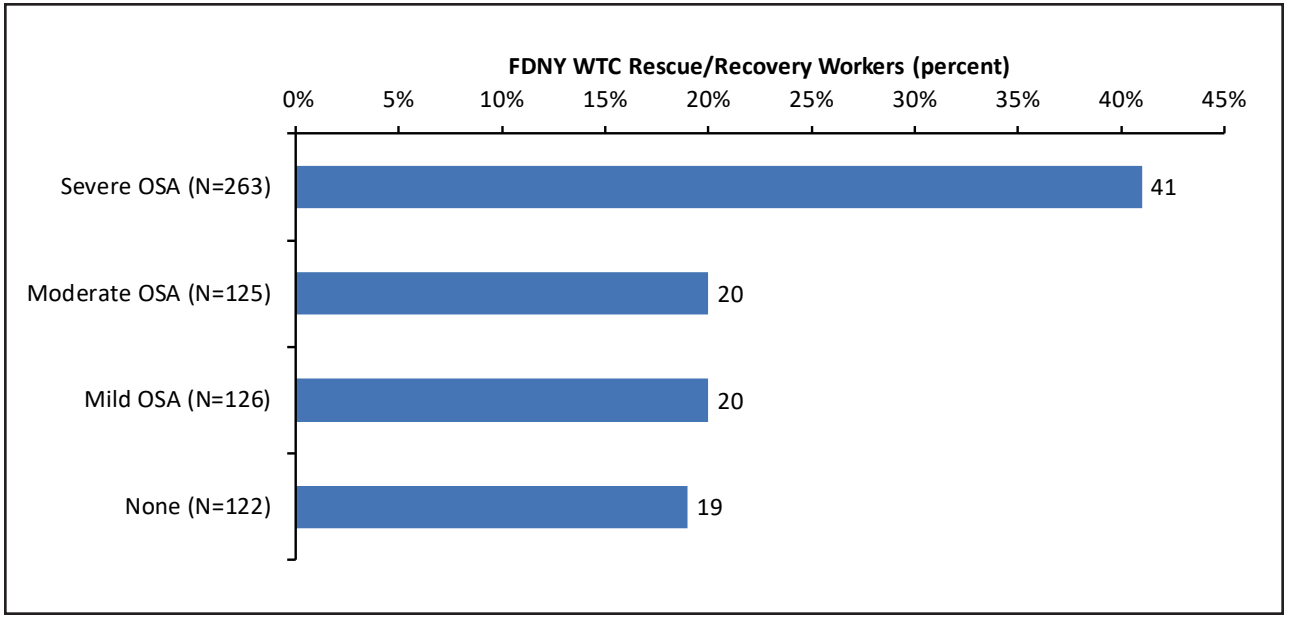
In a study from 2015, we identified 74 confirmed cases of sarcoidosis in our FDNY WTC-exposed membership. At the time of diagnosis, nearly all had sarcoid inflammation involving only their intrathoracic organs (lungs and/or lymph nodes). About eight years later, many had resolution of their intrathoracic inflammation, but 16% developed potentially life-threatening cardiac involvement, and 15% developed life-altering joint involvement. Cardiac and joint involvement was more prevalent in WTC-related sarcoidosis than reported among sarcoidosis patients from the general population who did not have WTC exposure. These results support the need for advanced cardiac screening in asymptomatic patients with strenuous, stressful public safety occupations given the potential fatality of a missed diagnosis. Treatment of extra-thoracic sarcoidosis is extremely expensive, but thankfully, all treatments are completely covered by the WTC Health Program.



If you have fatigue, sleepiness and snoring, you are at high risk for obstructive sleep apnea (OSA).

- **The WTC Health Program provides free testing and treatment for OSA.**
- **61% of high-risk FDNY WTC-exposed rescue/recovery workers were classified as having moderate to severe OSA on sleep testing.**
- **Given the potential for negative outcomes (arrythmias, stroke, etc.), moderate to severe OSA should be treated.**

Obstructive Sleep Apnea

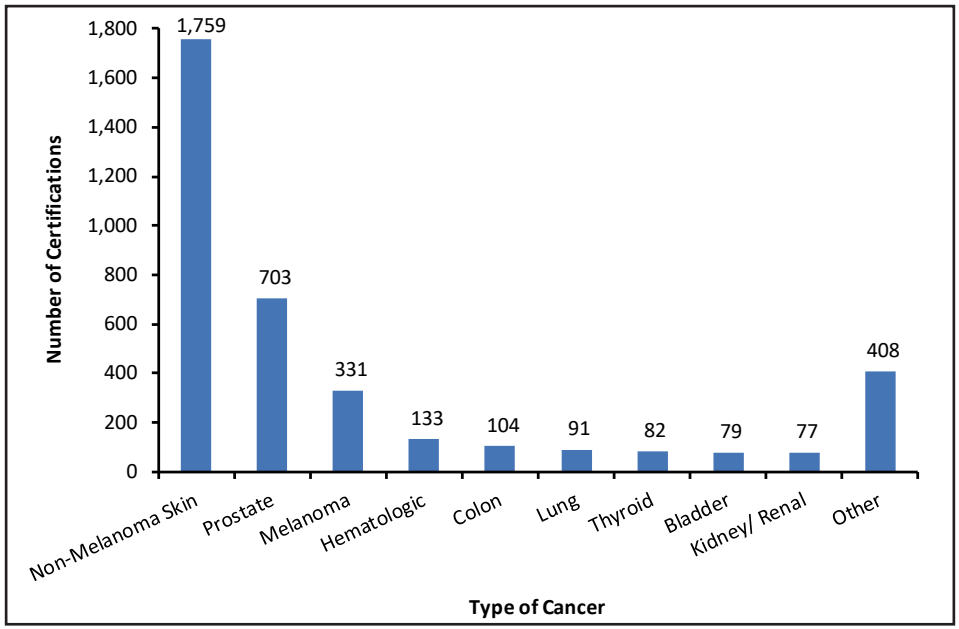


Between September 11, 2005 and September 10, 2008, more than a third of male FDNY WTC-exposed rescue/recovery workers were found to be at high risk for obstructive sleep apnea (OSA), according to our health questionnaire responses. At that time, only 7% reported a physician diagnosis of OSA.

Based on this research, free sleep tests were offered to 636 high-risk men to see whether sleep tests confirmed a diagnosis of OSA. Results demonstrated that sleep-test-confirmed OSA was present in the vast majority of those tested, however, it is easily treated and those affected can remain on full duty. Given the high prevalence of this condition in our workforce and the potential for serious health consequences, our members are encouraged to discuss sleep testing and treatment at their next WTC monitoring or treatment exam. For those who have difficulty with OSA treatment, appointments with our OSA specialists are now available at the FDNY WTC Health Program at no cost.

As of March 2021, 4,481 members scored high risk for OSA on our questionnaire at their most recent monitoring visit. Currently, 3,026 enrolled responders have a certification for OSA, and 83% have been treated in the past five years.

NIOSH-Certified Cancers in FDNY WTC-Exposed Rescue/Recovery Workers (2001–2021)



Note: Members can have more than one cancer certification. Hematologic cancer includes leukemia, multiple myeloma, Hodgkin's lymphoma, non-Hodgkin's lymphoma and other hematopoietic.

In 2011, we demonstrated an increased incidence of cancers in WTC-exposed FDNY rescue/recovery workers, as compared with non-exposed FDNY members and the general U.S. population. Studies in other WTC-exposed populations from the WTC Health Registry and the WTC General Responder Cohort reported similar overall findings when compared to the U.S. general population. These analyses were instrumental in convincing the federal government to include many cancers as WTC-related covered conditions under the WTC Health Program.

Since most cancers do not develop for years or even decades after an exposure, the National Institute for Occupational Safety and Health (NIOSH) WTC Program Administrators determined cancer certification criteria based on the available literature to date. In order to qualify for a WTC-related cancer certification, hematologic cancers must have first occurred 1.5 years after WTC exposure, thyroid cancer must have first occurred 2.5 years after exposure, other solid tumors must have first occurred four years after exposure and mesothelioma must have first occurred 11 years after exposure.

As of March 2021, 3,097 members had at least one cancer certification; as some were diagnosed with more than one cancer, there were 3,819 cancer certifications in total.

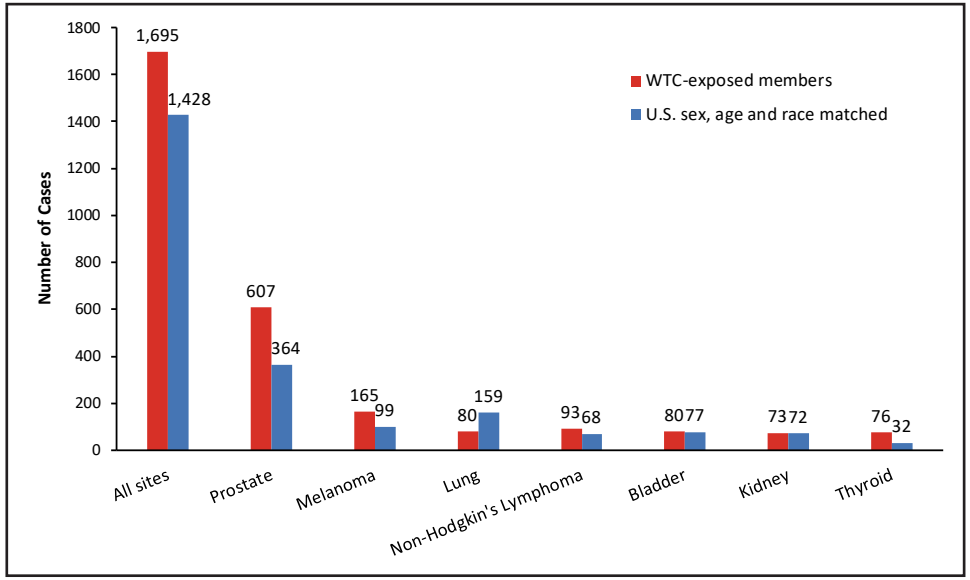
More than 3,000 members are certified for at least one type of cancer as of March 2021.

Top five cancer certifications: non-melanoma skin, prostate, melanoma skin, hematologic and colon.

Compared with a U.S. reference population, FDNY WTC Health Program found higher rates of thyroid cancer, prostate cancer and certain hematologic cancers.

Lung cancer rate was lower, presumably due to lower tobacco smoking rates.

Cancer in FDNY Firefighters from 9/11/2001 to 9/10/2016



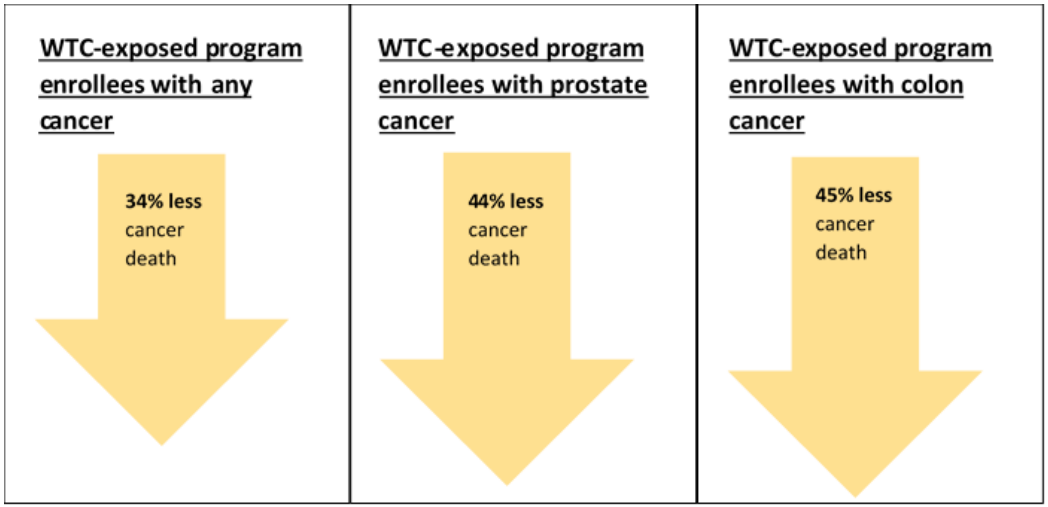
FDNY was the first group to publish an analysis of post-9/11 cancers in WTC-exposed rescue/recovery workers. We assessed cancer rates in nearly 10,000 FDNY WTC-exposed males and confirmed each cancer through matching with state cancer registries or through appropriate medical record documentation. Rates in WTC-exposed and non-WTC-exposed FDNY members were compared to rates from demographically similar individuals in the U.S. general population, as reported from the National Cancer Institute Surveillance Epidemiology and End Results (SEER). Among the WTC-exposed firefighters, we demonstrated a 10% increase in overall cancer rates in the eight years following WTC exposure.

Our seminal 2011 study was instrumental in convincing the federal government to include certain cancers as WTC-related covered conditions under the WTC Health Program benefits. A few years later, we extended follow-up of cancer incidence among FDNY WTC-exposed firefighters through 2009 and used non-WTC-exposed firefighters from San Francisco, Chicago and Philadelphia as a comparison group. Compared with these non-WTC-exposed firefighters, WTC-exposed firefighters demonstrated significantly elevated rates of thyroid cancers over the entire study period and elevated rates of prostate cancer during the second half of the study period.

Since the latency period of certain cancers can be up to decades long, further follow-up of the relationship between WTC exposure and cancer incidence was, and is, still needed. Current FDNY research focuses on specific cancer incidence rates, survival rates, sequelae (conditions that occur as a result of a previous disease), risk factors and screening practices.

HIGHLIGHTED FINDING

WTC Health Program Improves Survival for Cancer Patients



This study was the first analysis of survival among WTC responders who developed cancer. We found that WTC-exposed cancer patients enrolled in a WTC Health Program (in either FDNY's Program or the General Responder Cohort Program) had longer survival times compared with other New York State cancer patients. The cancer-specific mortality rate for WTC Health Program enrollees is 34% lower than demographically similar New York State residents with cancer, strongly suggesting that enrollment in the WTC Health Program, with cancer screening and case management, improves cancer survival. The reduction in cancer-specific mortality was even greater for enrollees diagnosed with prostate cancer and with colon cancer, of which enrollees had nearly half the cancer-related death rate compared with the New York State population. Likely causes include early detection, access to a full battery of no-cost treatment options at some of the finest medical centers in the nation, comprehensive case management and social support from family and fellow responders.

The projected medical cost for the first year of treatment from all cancers diagnosed between 2012 and 2031 was more than $235 million.

Our studies underestimate actual future cancer rates and costs.

- **Only already diagnosed cancers were used to predict the future.**
- **Our studies are limited by the small numbers of women.**
- **Future studies are needed to address these issues.**

Estimation of Future Cancer Burden Among FDNY Rescue/ Recovery Workers Exposed to the WTC Disaster

In 2018, we attempted to predict how many new cancer diagnoses might occur between January 1, 2012 and December 31, 2031 within the FDNY WTC-exposed cohort. The model estimated more prostate, thyroid and melanoma cancer cases compared to a demographically similar NYC population, but lower lung, colorectal and kidney cancers. The projected aggregate 20-year medical cost for the first year of treatment of all cancers was estimated at $235,835,412. Regardless, the greater cancer burden within the WTC Health Program underscores the importance of cancer prevention efforts, continued screening in WTC-exposed rescue/recovery workers and continued funding of the WTC Health Program.

Prostate Cancer Incidence Over Time Among WTC-Exposed Rescue/Recovery Workers

Risk of prostate cancer increased starting about five years after 9/11.

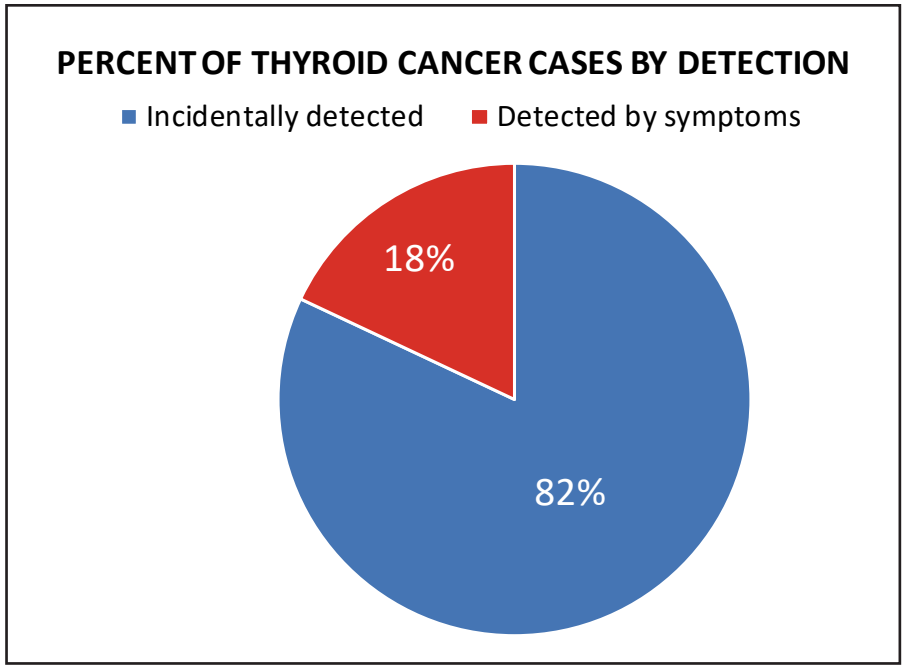
Previous studies of cancer risk among WTC-exposed rescue/recovery workers have provided preliminary evidence of increased cancers; however, there was a need for a larger-scale study with longer follow-up time and proper comparison groups to better understand the risk of cancer in the WTC population. To achieve this goal, WTC researchers combined three WTC-exposed cohorts from across New York City: the FDNY, the General Responder Cohort and the WTC Health Registry.

Previous research has identified an increased risk of prostate cancer in responder cohorts compared to the male U.S. general population. A study was launched to estimate the latency time (the time that passes between WTC exposure and diagnosis) for prostate cancer among male WTC rescue/recovery workers. Participants were followed beginning six months after enrollment in a WTC cohort until death or December 31, 2015. The comparison population was the New York State general population.

We observed an increased incidence of prostate cancer beginning 5.25 years post-exposure, a substantially shorter time than recorded among non-WTC studies in which estimations of latency are closer to 10-20 years. A dose-response trend (incidence rates increasing with greater WTC exposure) was also observed in both the early (2002–2006) and later (2007–2015) periods of follow-up. This evidence suggests a relationship between WTC exposure and prostate cancer and increases our understanding of the long-term consequences of WTC exposure. These types of surveillance efforts prove extremely valuable for the study of both the affected cohorts and environmental epidemiology.

Rate of incidentally detected thyroid cancer in FDNY members was three times higher than that of the comparison population.

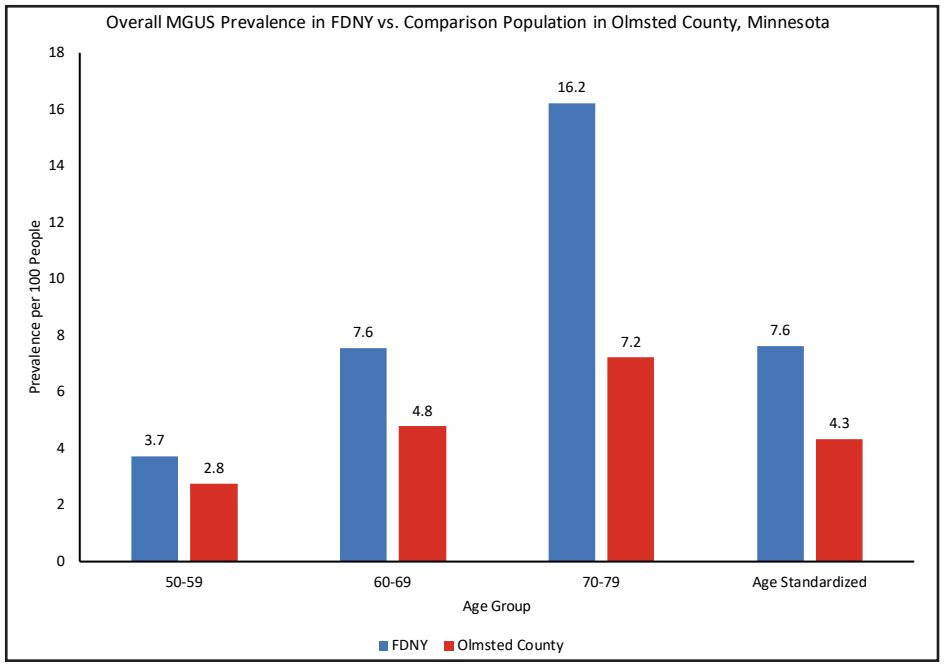
Evaluation of Medical Surveillance and Incidence of Post-9/11 Thyroid Cancer



WTC-exposed rescue/recovery workers have an elevated risk of thyroid cancer compared with the U.S. general population. The reason for this elevation is not fully understood. One possibility is a biological mechanism through which exposure to WTC toxic dust could have led to increased rates of thyroid cancers. Alternatively, or possibly in addition medical surveillance and screening of the WTC-exposed population for other WTC-related conditions could have picked up asymptomatic thyroid cancers.

To explore these possibilities, we identified confirmed cases of thyroid cancer in males diagnosed between September 12, 2001 and December 31, 2018 and categorized them by whether the cancers were found incidentally or due to symptoms reported to a clinician. We found that the risk of asymptomatic cancer incidence among the FDNY cohort was three times higher than that of the comparison cohort of demographically similar men in Olmsted County, Minnesota. These results, published in *JAMA Internal Medicine,* provided strong evidence that the increased rate of thyroid cancer in WTC-exposed cohorts was mostly due to heightened surveillance. As a result, almost all the thyroid cancers diagnosed in the FDNY cohort were of the least aggressive and most treatable type.

Multiple Myeloma and Its Precursor Disease Among WTC-Exposed Rescue/Recovery Workers



WTC-exposed firefighters were nearly twice as likely to have the MGUS precursor to multiple myeloma than the general population.

The WTC attacks created an unprecedented environmental exposure to known and suspected carcinogens that may increase the risk of developing a hematologic cancer known as multiple myeloma. Multiple myeloma is a cancer of the plasma cells that are found in bone marrow and an important part of the immune system. Another plasma cell disorder called monoclonal gammopathy of undetermined significance (MGUS)—particularly the light-chain MGUS subtype—increases the risk of developing multiple myeloma and other conditions.

Between 2013 and 2015, we collected blood and serum samples during WTC monitoring exams from consenting individuals to determine the prevalence of MGUS among our WTC-exposed members. Of 781 male firefighters over age 50 with available serum samples, we found that the age-standardized prevalence rate of MGUS and light-chain MGUS combined was 7.63 per 100 persons, 1.8 times higher than rates from the demographically similar Olmsted County, Minnesota reference population. In addition, the age-standardized prevalence rate of light-chain MGUS was more than three times higher.

These findings indicate that WTC exposure is associated with multiple myeloma precursor disease (MGUS and light-chain MGUS) and may be a risk factor for the development of multiple myeloma at an early age, particularly the more dangerous light-chain subtype.

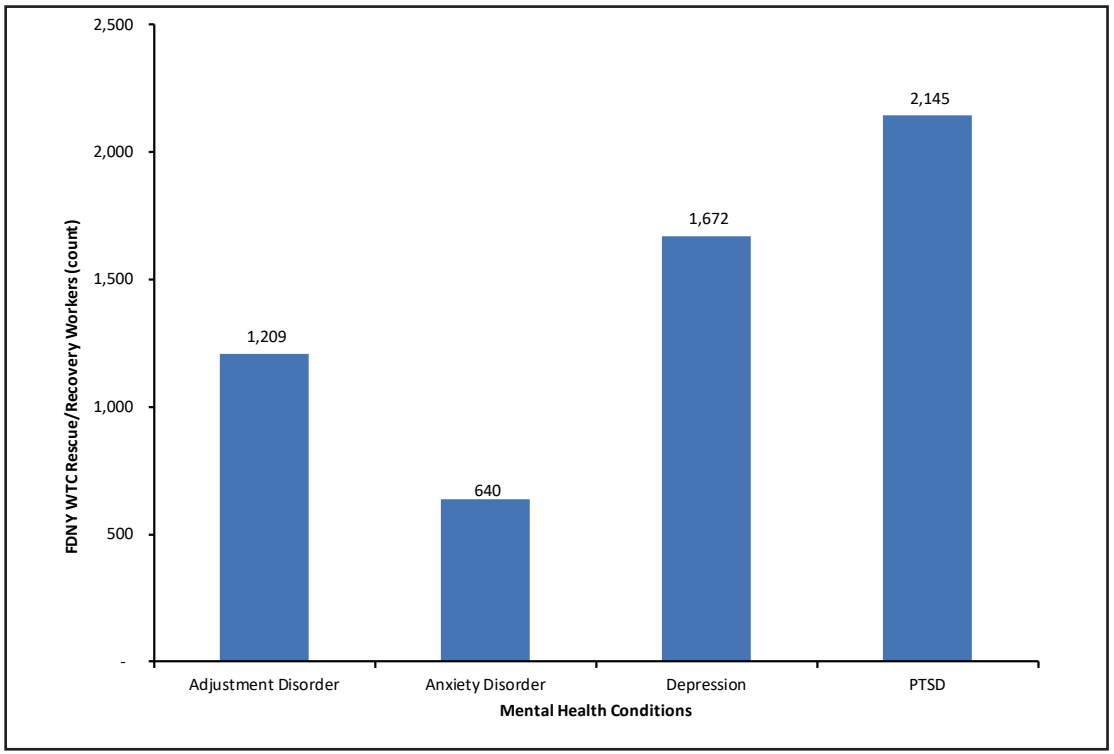
If you are a current or former smoker age 50 or above, please call the FDNY WTC Health Program at 718-999-1858 to see if you are eligible for our lung cancer screening program.

Chest CT Lung Cancer Screening in WTC-Exposed Rescue/Recovery Workers

Lung cancer screening programs can detect lung cancers early when the treatment is more successful. Deciding who to recommend for lung cancer screening requires choosing screening criteria that best assess characteristics of each individual person in a given population to determine those most at risk. In the U.S., there are several different guidelines that can be used to make these decisions. Lung cancer screening guidelines and models pay special attention to age and smoking history. Therefore, using our extensive smoking, chest CT and cancer data, we were able to determine which guideline would work best in our unique WTC-exposed rescue/recovery worker population.

We evaluated the performance of four main screening guidelines. By applying the unique characteristics of each guideline to our population, we were able to determine how many people would be screened by each guideline and how many lung cancers would be identified. The results of our study showed that the guideline that recommends starting screening at age 50 for those who smoked, on average, at least one pack of cigarettes per day for 20 years performed the best; this guideline is known as the National Comprehensive Cancer Network (NCCN) guideline. Using the NCCN screening guideline, we were able to identify 50 lung cancers in our population since 2002. By comparison, the other guideline and models would have captured around 30 lung cancers, 20 fewer cases than captured by the NCCN guideline. Recently, the U.S. Preventive Services Task Force issued a similar recommendation for the entire country. As a result of these findings, the WTC Health Program has formally adopted the NCCN guideline for chest CT lung cancer screening. Early diagnosis allows us to provide potentially life-saving treatments to our members.

NIOSH-Certified Mental Health Conditions



FDNY rescue/recovery workers with the highest amount of WTC exposure had the greatest risk for adverse physical health effects. The same relationship with WTC exposure has been found for mental health effects.

WTC-related mental health services are provided under the Zadroga Act as part of the FDNY WTC Health Program. As with WTC-related physical health conditions, certification by the NIOSH WTC Program Administrator is required for us to provide no-cost treatment. The FDNY WTC Health Program can streamline this process by submitting certification requests for any member with symptoms and appropriate documentation.

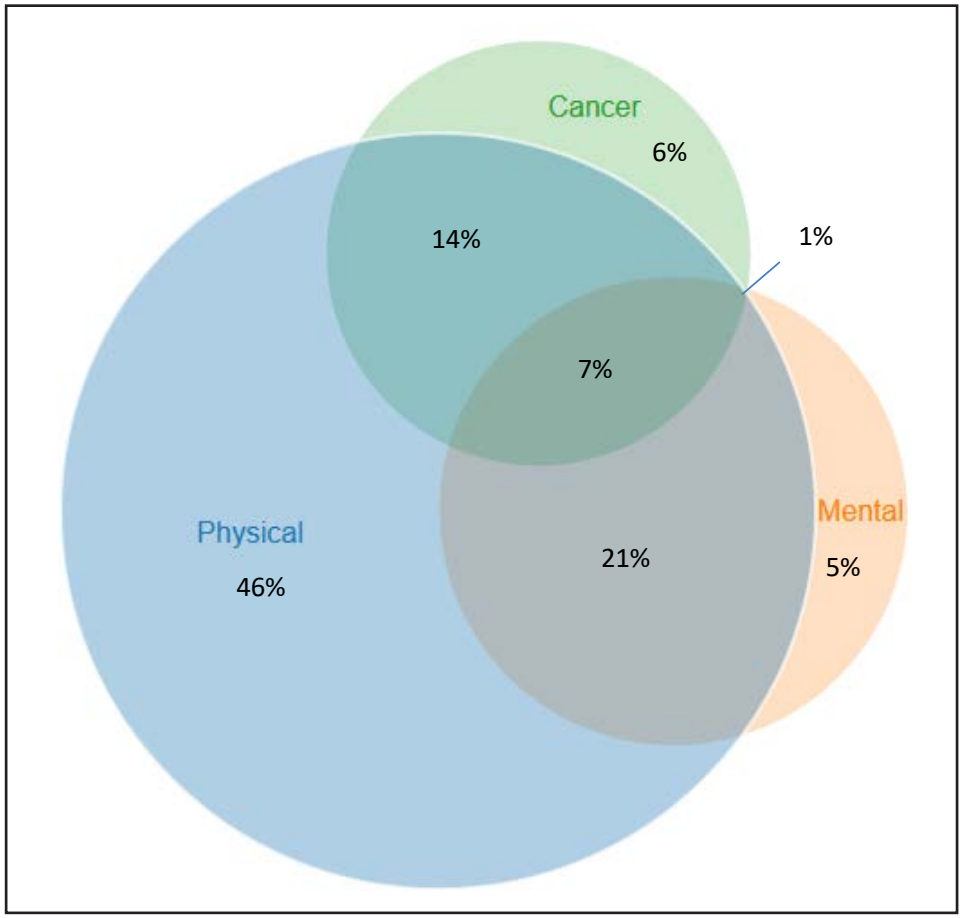
As of March 11, 2021, about 3,900 firefighters and 400 EMS providers have at least one mental health certification; the most common ones are graphed here. Members can be certified for more than one mental health condition. These conditions are often made worse by stressful situations such as adjustment to retirement or the development of physical health problems (such as cancers or serious respiratory illness). Members are continually encouraged to take advantage of counseling services to address these and other mental health conditions when needed.

Depression and post-traumatic stress disorder (PTSD) are the most common NIOSH-certified WTC-related mental health conditions.

83% of members still self-report 9/11 as a traumatic experience at their most recent monitoring exam.

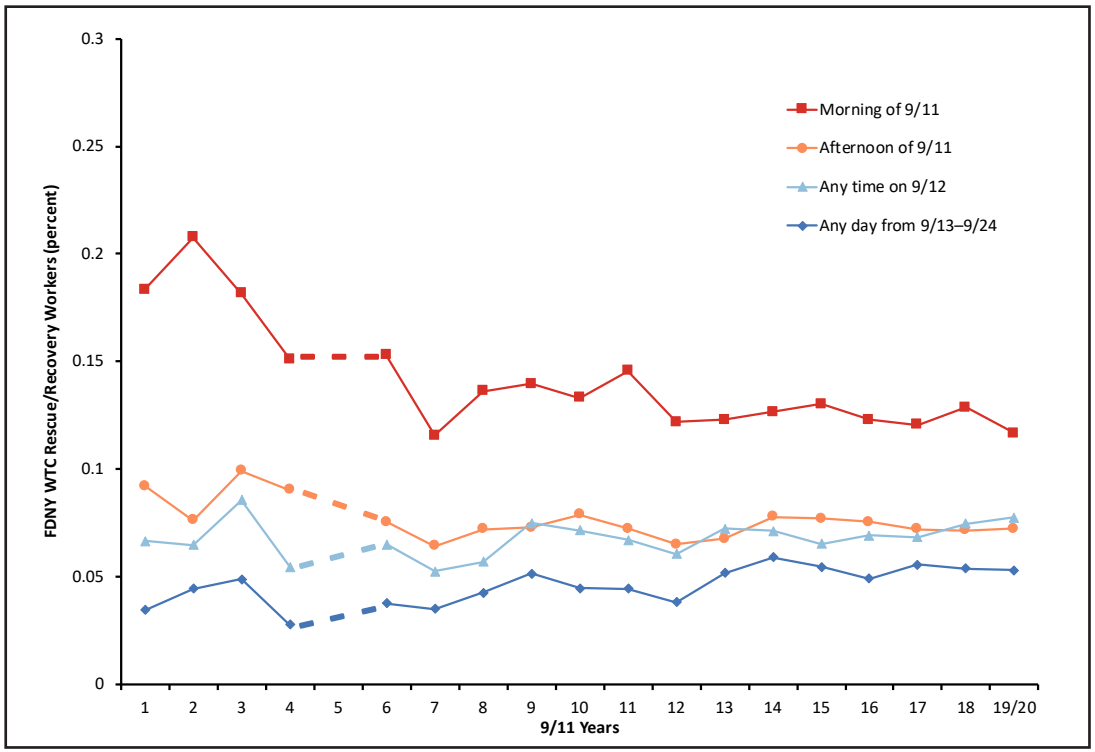
More than 40% of the WTC-exposed rescue/recovery workers have a certification in more than one WTC certification domain.

Comorbidity of Certifications: Physical Health, Mental Health and Cancer Certifications



Those with mental health conditions often have to deal with the stress and suffering from physical health conditions as well. This figure shows the comorbidity of certification domains for the 11,318 members who have at least one certification for a physical health condition, a mental health condition or cancer as of March 11, 2021. 21% are certified for both a physical and mental health condition, and 7% are certified for all three care suites: physical health, mental health and cancer.

PTSD Over Time by WTC Arrival Time



Note: 9/11 years are defined as each year period beginning on September 11 of that calendar year (e.g., 9/11 year 1 is 9/11/2001–9/10/2002). Data for 9/11 year 19/20 covers the time period of 9/11/2019–3/10/2021. Data for year 5 is unavailable (shown with dashes).

Nearly 20 years after the WTC attacks, 9% of the WTC-exposed FDNY rescue/recovery workers still meet symptom criteria for post-traumatic stress disorder (PTSD).

As seen in the graph, PTSD symptom rates generally improved over the first few years after 9/11 and have since remained steady. But even now, FDNY rates still remain higher than the U.S. population: 5% to 12% as compared to around 2%. Nearly 20 years after 9/11, the number of members who screened positive for PTSD continue to show an association with early arrival at the WTC site. FDNY WTC-exposed rescue/recovery workers who arrived at the WTC site during the morning of 9/11 were the most likely to be symptomatic immediately post-9/11 and to have remained so over time. PTSD may persist, worsen or resurface in association with physical injuries or illnesses sustained during or after 9/11 or with any new stressful experience following the disaster.

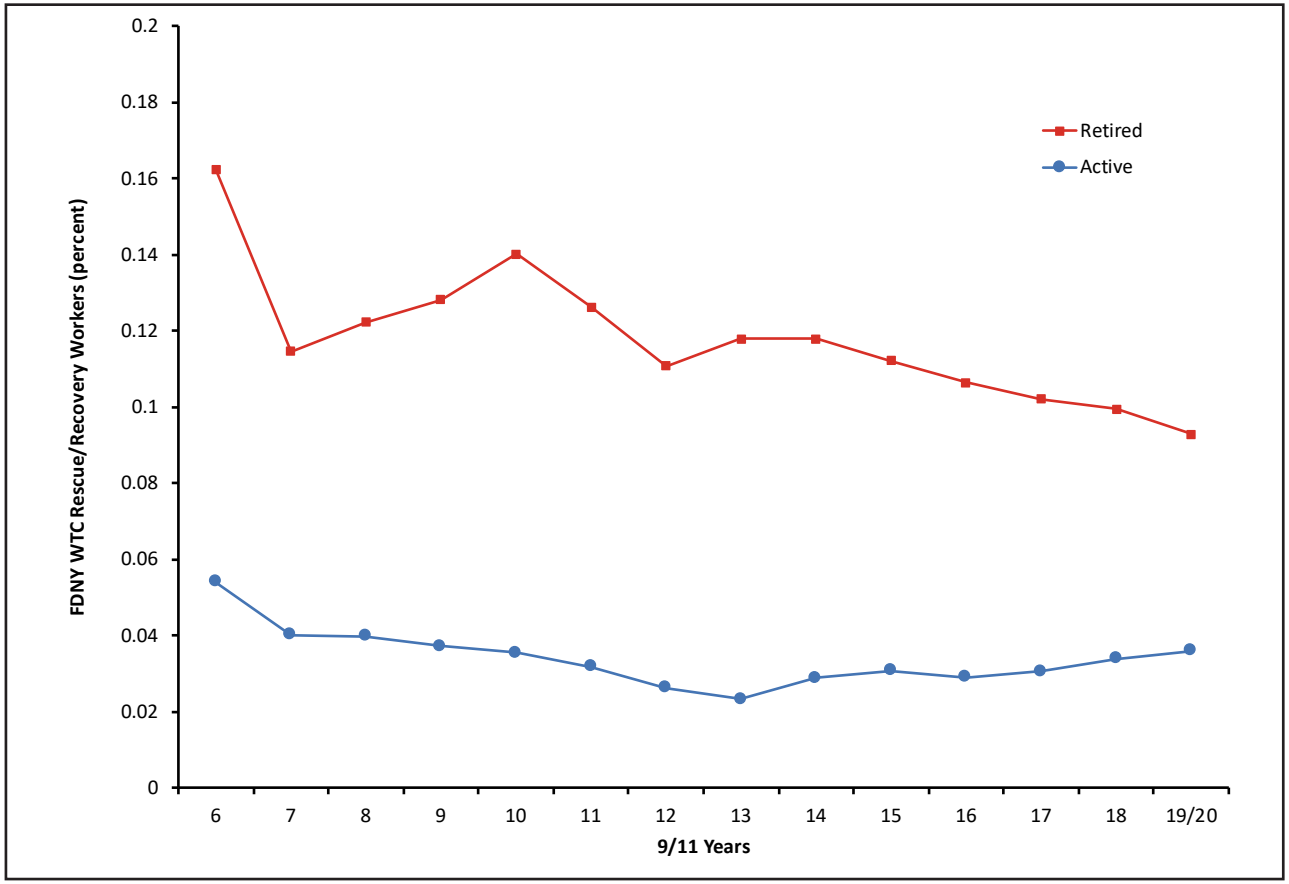
Early arrival at the WTC remains a strong predictor of PTSD, even 20 years after 9/11.

The prevalence of PTSD symptoms is consistently higher among retired FDNY WTC rescue/recovery workers but has improved with time and treatment.

RETIRED 16% year 6 → 9% year 20

ACTIVE 5% year 6 → 4% year 20

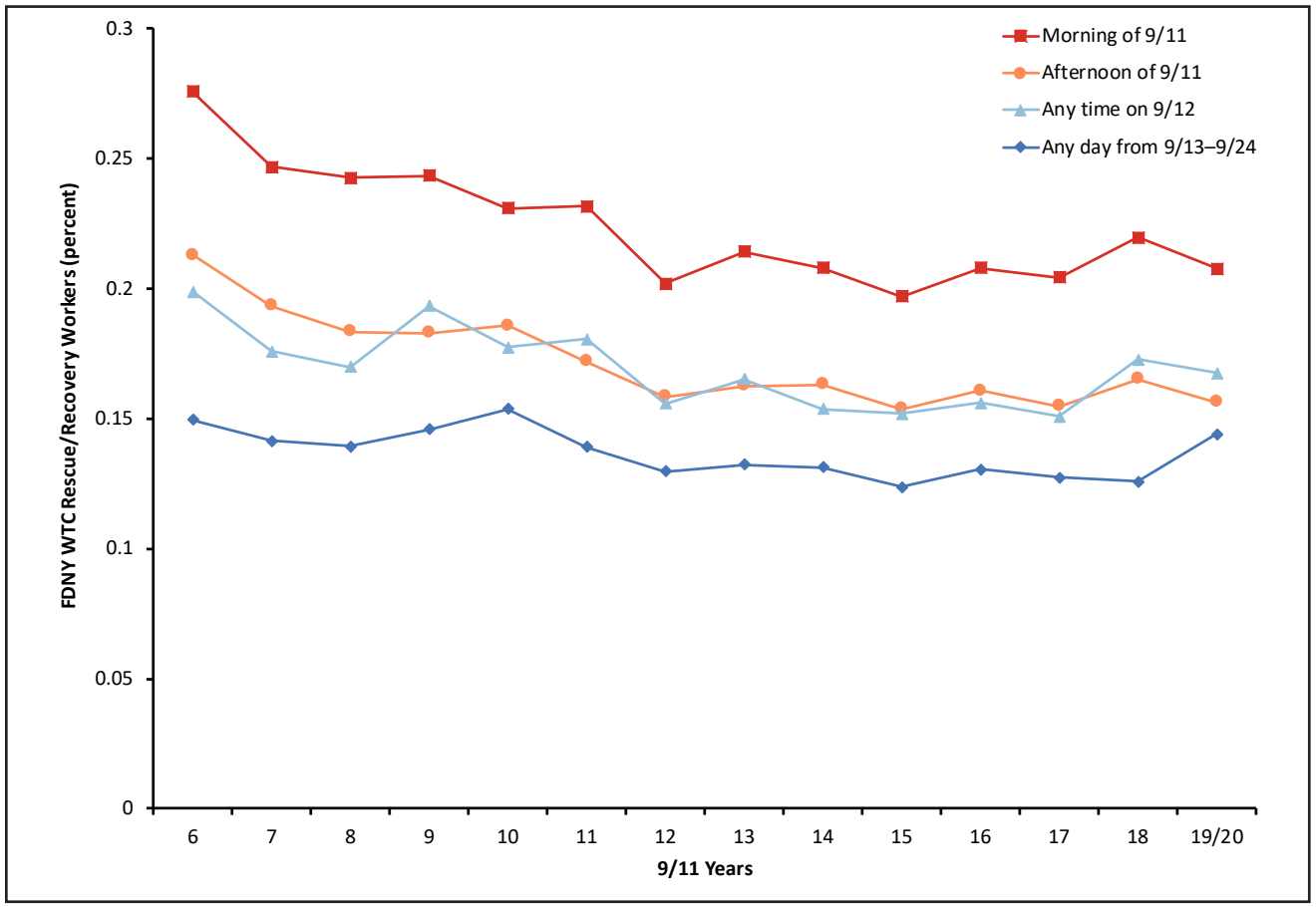
PTSD Over Time by Retirement Status



Note: 9/11 years are defined as each year period beginning on September 11 of that calendar year (e.g., 9/11 year 1 is 9/11/2001–9/10/2002). Data for 9/11 year 19/20 covers the time period of 9/11/2019–3/10/2021.

Retired FDNY WTC-exposed rescue/recovery workers have a consistently higher prevalence of screening positive for PTSD than their active (i.e., not retired) counterparts. At year 6 (years 1-5 were not captured for most retirees), nearly 16% of retirees screened positive for PTSD compared with 5% of actives. By year 20, retirees screening positive decreased to 9%. These data highlight that maintaining participation and coverage under the WTC Health Program is crucial for retirees so they may continue to have the support of peers and access free mental health counseling.

Depression Over Time by WTC Arrival Time



Note: 9/11 years are defined as each year period beginning on September 11 of that calendar year (e.g., 9/11 year 6 is 9/11/2006–9/10/2007). Data for 9/11 year 19/20 covers the time period of 9/11/2019–3/10/2021.

Nearly 20 years post-9/11, 18% of the FDNY WTC-exposed rescue/recovery workers screened positive based on symptom criteria for depression.

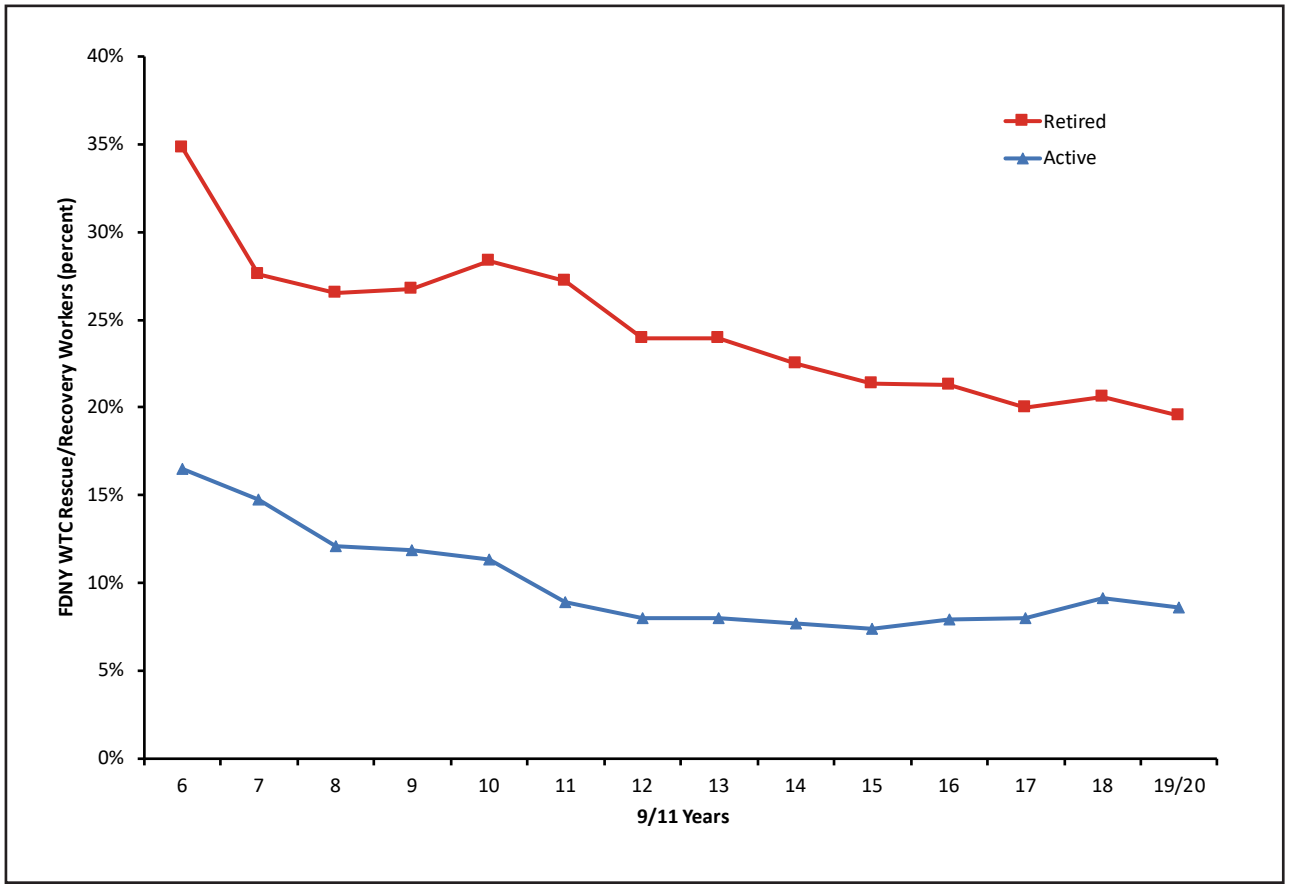
High rates of depression remain associated with early arrival to the WTC site and were similar in firefighters and EMS providers. Symptoms of depression are even higher in retirees (next page). The rates of those who screened positive for depression, as shown in this graph, are higher than rates among similar U.S. populations.

Arrival group remains associated with depression, even 20 years after 9/11.

	year 6	year 20
Morning of 9/11	28%	21%
Afternoon of 9/11	21%	16%
Any time on 9/12	20%	17%
Any day from 9/13 – 9/24	15%	14%

The prevalence of depression symptoms is consistently higher among retired FDNY WTC rescue/recovery workers, but it has improved with time and treatment.

Depression Over Time by Retirement Status



Note: 9/11 years are defined as each year period beginning on September 11 of that calendar year (e.g., 9/11 year 6 is 9/11/2006–9/10/2007). Data for 9/11 year 19/20 covers the time period of 9/11/2019–3/10/2021.

Retired FDNY WTC-exposed rescue/recovery workers consistently screened positive for depression at a higher rate compared with their active counterparts. At year 6 (depression was not captured in years 1-5), nearly 35% of retirees had screened positive for depression compared with 17% of actives. Over time, this has decreased for both groups such that by year 20, 20% of retirees and 4% of actives screened positive. As with PTSD, the high proportion of retirees screening for depression underscores the need for their continued participation and coverage under the FDNY WTC Health Program.

SECTION 4:
NEWLY EMERGING CONDITIONS

Autoimmune Diseases
Cardiovascular Diseases
Hearing Problems
Neurological Conditions
Cognitive Concerns
COVID-19

529
Number of members with cardiovascular disease*

119
Number of members with rheumatologic autoimmune disease

44%
Percent of members reporting at least one cognitive concern

2%
Percent of members with self-reporting peripheral neuropathy

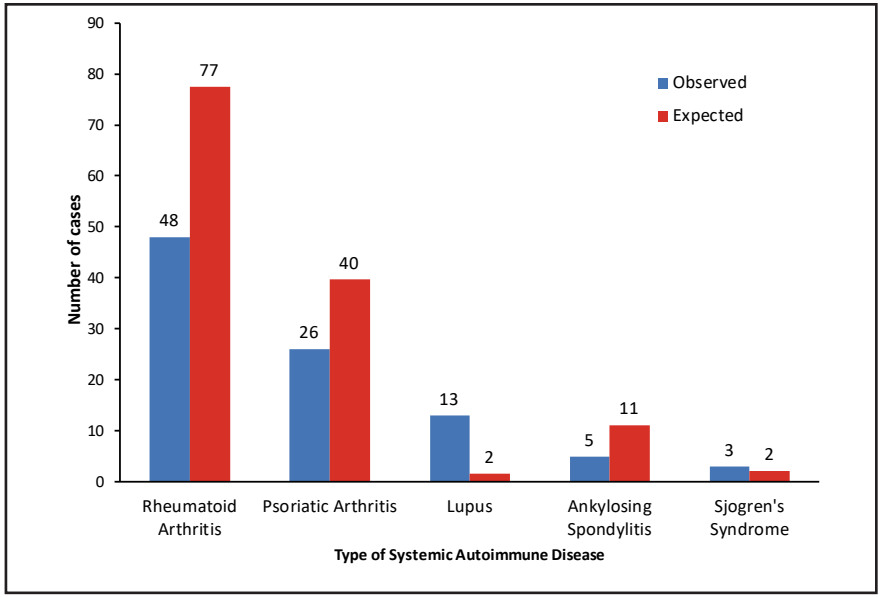
*Restricted to firefighter study population and confirmed diagnoses through December 31, 2017.

Nearly two decades after the collapse of the World Trade Center (WTC) towers, new disease trends continue to emerge within WTC-exposed cohorts of rescue/recovery workers. Some conditions and diseases may take decades to develop, and many are exacerbated by aging. Emerging conditions that we and others are currently focusing on include autoimmune diseases, cardiovascular diseases, hearing issues, neurological conditions, cognitive concerns (including memory loss) and coronavirus disease 2019 (COVID-19). If and when we determine a significant association with WTC exposure, either directly or as an associated condition, we work with the other WTC cohorts (General Responder Cohort, WTC Health Registry and the Survivor Cohort) to petition the National Institute for Occupational Safety and Health (NIOSH) federal WTC Program Administrator for a decision on whether the illness can be added to the list of WTC-covered conditions.

The following research summaries recap some of the advancements made by the Fire Department of the City of New York (FDNY) and the WTC Health Program on understanding emerging concerns in the WTC-exposed cohort —a feat not possible without the patience, participation and dedication of our WTC Health Program firefighters and EMS providers.

Rheumatologic Autoimmune Diseases in FDNY WTC-Exposed Rescue/Recovery Workers: 9/11/2001–9/10/2019

We at FDNY were the first to publish analyses of post-9/11 rheumatologic autoimmune diseases in relation to WTC exposure in FDNY rescue/recovery workers. Typically, these diseases are rare in middle-aged males. Rheumatoid arthritis was the most common autoimmune diagnosis in our population, followed by psoriatic arthritis, lupus, poly/dermatomyositis, scleroderma, Sjögren's syndrome, antiphospholipid syndrome, ankylosing spondylitis and Wegener's granulomatosis.



Note: Expected values based on non-WTC-exposed population. Only select autoimmune diseases were available for non-WTC-exposed population for analysis.

While in the first study there was no statistically significant association between early WTC arrival time (acute exposure) and these diseases, there was an association with chronic, long-duration WTC exposure. The risk of having one of these autoimmune diseases increased by 13% for each month worked at the site. In a second study, FDNY rates were compared with expected rates in a non-WTC-exposed, non-firefighter, male cohort. When examining the occurrence of these diseases according to level of WTC exposure, those in the lower WTC exposure group had 10 fewer cases than expected, whereas those with the higher WTC exposure group had 7.7 excess cases (i.e., higher than expected).

These findings have prompted the other WTC health programs and the WTC Health Registry to expand their surveillance efforts to include these diseases. Early detection can facilitate early treatment, which has been shown to minimize organ and joint damage and improve quality of life.

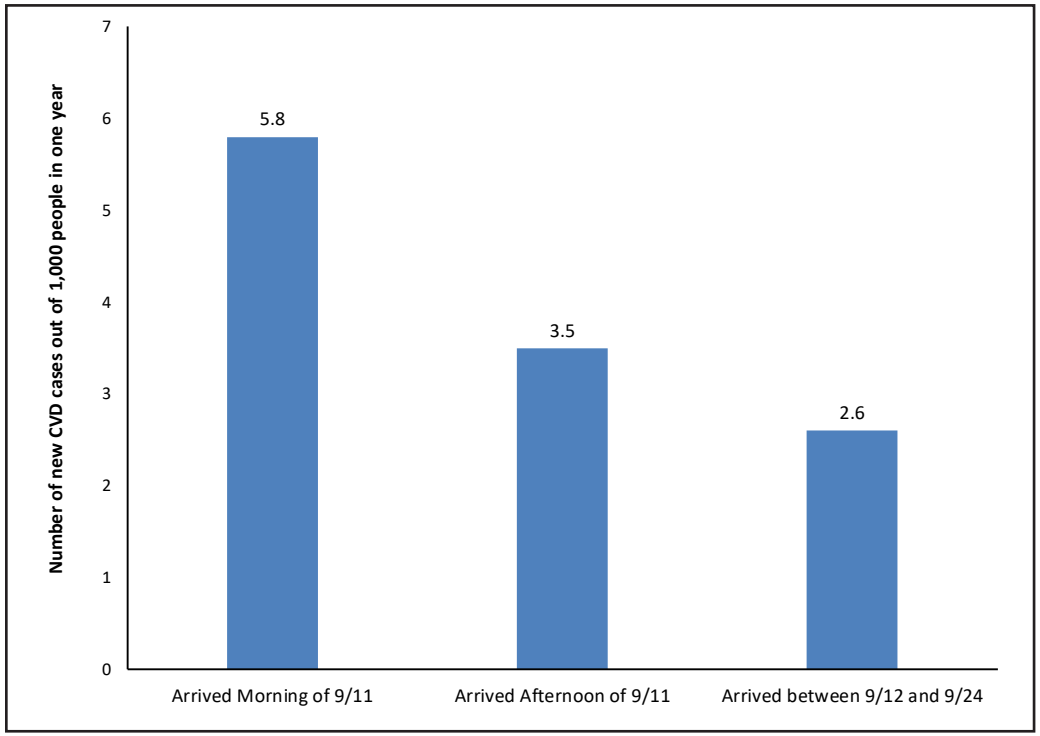
Just as we did for cancer, we have petitioned the federal government to add rheumatologic autoimmune diseases as WTC-covered health conditions. The federal WTC Health Program Administrator is waiting for results from the other WTC cohorts. Last year, the WTC Health Registry published results similar to our own. The General Responder Cohort is currently finalizing their results, and if those are confirmatory, we plan to then re-petition the federal WTC Health Program Administrator in the coming year.

The FDNY WTC Health Program began to track the specific autoimmune diseases after 9/11. Twenty years later, 119 people have been diagnosed with a systemic autoimmune disease.

Thirteen WTC-exposed male rescue/recovery workers have been diagnosed with lupus, which is much greater than we would expect based on the general population (see graph).

This study reminds us that chest pain in WTC-exposed members should not automatically be attributed to more commonly recognized WTC illnesses like asthma or gastroesophageal reflux disease (GERD). When chest pain is new or different, it is important to consider cardiovascular disease.

Cardiovascular Diseases among FDNY WTC-Exposed Rescue/Recovery Workers



Note: Cardiovascular disease (CVD) cases included myocardial infarctions, cerebrovascular accidents, coronary artery bypass grafts, percutaneous coronary interventions, congestive heart failure and CVD death.

Cardiovascular disease (CVD) is the greatest source of morbidity and mortality in the U.S. Decades of research have identified its major modifiable risk factors, including hypertension, high cholesterol and smoking. Recently, environmental exposures have become a concern. We examined the association between WTC exposure and the risk of CVD after 9/11 in FDNY firefighters. Primary CVD outcomes included myocardial infarction, stroke or cardiovascular disease-related death, among others.

During the 16 years after 9/11, there were 529 primary outcome events. We found a significant association between WTC exposure and CVD risk. As shown in the figure, those who arrived the morning of 9/11 had about 38% greater risk of developing a primary CVD event compared with those who arrived later. Acute WTC dust exposure and repeated exposures over the months of the rescue/recovery effort were associated with elevated CVD risk.

Hearing Problems Among FDNY WTC-Exposed Rescue/Recovery Workers

Firefighters and EMS providers are routinely exposed to multiple chemical and physical hazards such as noise and heat. Excessive noise exposure is hazardous to hearing. On 9/11, the noise environment included the sounds of the collapsing buildings, impacts from falling debris and sirens, which produced seismic vibrations more than 2.1 on the Richter scale. Furthermore, during recovery operations, hearing injury exposures were exacerbated in some by limited use of hearing protection.

Higher rates of self-reported hearing difficulty among WTC-exposed community members as well as FDNY WTC-exposed rescue/recovery workers prompted our further investigation in 2018 to determine whether there was a significant association between WTC exposure and hearing difficulty. Among FDNY WTC-exposed rescue/recovery workers, self-reported ear symptoms and hearing problems increased after 9/11. We found that the greater the WTC exposure, the more likely to have persistent ear symptoms such as tinnitus (ringing in the ears) but not self-reported hearing difficulties.

In a second study, we focused on whether there was an association between WTC exposure and objective evidence of hearing loss as measured on the audiometric (hearing) tests FDNY has administered to its members for decades. We found that those arriving the morning of 9/11 were more likely to have low-frequency hearing loss at their first post-9/11 examination. Participants in the study who arrived before September 13, 2001 and who spent six or more months at the WTC site had a greater risk of hearing loss over time in both the low frequencies and high frequencies. By 2016, 37% of the study cohort had abnormal hearing sensitivity in either ear, and 20% of the study cohort had it in both ears.

This study demonstrates the importance of hearing conservation programs in rescue/recovery workers. It also illustrates the need to include exposure assessment, risk mitigation (e.g., engineering and administrative controls, personal protective equipment) and health monitoring of exposed persons in disaster plans. Furthermore, health monitoring, including audiometry, should extend well beyond the end of recovery operations and should be regularly evaluated to optimize early detection and, for those with significant hearing loss, interventions such as hearing aids. Loss of hearing is not a trivial issue, as it greatly impacts quality of life.

Using FDNY hearing test results, WTC exposure was associated with a greater risk of hearing loss over time.

- **37% had abnormal hearing sensitivity in either ear.**
- **20% had abnormal sensitivity in both ears.**

If you have one of the neurological conditions listed in the table, please don't forget to report it during your next annual medical exam.

Self-Reported Neurological Conditions Among FDNY WTC-Exposed Rescue/Recovery Workers

Self-reported condition*	Reported at least once
Peripheral neuropathy	258 (1.8%)
Bell's palsy	151 (1.0%)
Parkinson's disease	70 (0.5%)
Multiple sclerosis	42 (0.3%)
Myasthenia gravis	25 (0.2%)
Amyotrophic lateral sclerosis (ALS)	5 (0.03%)

*Have not yet been confirmed with medical records.

Recently, some of our members have reached out to us inquiring as to whether there is an association between neurological conditions and WTC exposure. In response, we are now beginning to examine how WTC exposure affects neurological health. Neurodegenerative diseases occur when the cells of the nervous system (brain, spinal cord and peripheral nerves) begin to function abnormally. As these diseases often worsen over time, it is important for the WTC Health Program to understand whether there is an association with WTC exposure. As we do with many of our studies, we turn to our Annual Monitoring Questionnaire to first study members' self-reports of any of the neurological conditions listed in this table. All self-report cases are then confirmed by requesting medical record documentation, the same as we have done with cancer and autoimmune diseases. We can also compare rates of neurological conditions in our WTC-exposed cohort with rates in the general population, when available.

The most common self-reported condition is peripheral neuropathy, with 258 members (1.8% of our cohort) reporting it at least once. Peripheral neuropathy affects communication between the brain/spinal cord and the rest of the body; it can result in weakness, numbness and/or pain commonly involving the hands and feet. Known causes include diabetes, chemotherapy and autoimmune diseases. Neurodegenerative conditions such as Parkinson's disease, multiple sclerosis, myasthenia gravis and amyotrophic lateral sclerosis (ALS, also called Lou Gehrig's disease) have also been reported, but in fewer numbers.

While the mechanism by which WTC exposure may result in neurological conditions remains unclear, if future research confirms that any of these conditions are significantly increased compared to the general population, the federal WTC Program Administrator could be petitioned to add coverage for them under the WTC Health Program.

WTC Exposure Level, PTSD and Cognitive Concerns (Including Memory Loss) in WTC-Exposed Rescue/Recovery Workers

Given the aging population of the U.S., cognitive impairment (including memory loss) is a growing public health issue. Among U.S. adults 45 years and older, 11% have reported subjective cognitive decline and, among older adults, subjective cognitive decline has been associated with biologic indicators of Alzheimer's disease as well as dementia. Age, depression, and post-traumatic stress disorder (PTSD) are risk factors for cognitive impairment and dementia. As WTC-exposed rescue/recovery workers age, concerns regarding the neurological effects of WTC exposure have surfaced, especially due to the high rates of PTSD and depression seen as compared with the general U.S. population. Researchers from Stony Brook University have demonstrated that WTC-exposed non-FDNY responders performed worse on neuropsychological testing when compared with normative data, and that PTSD symptoms were associated with worse cognitive function. This work, in addition to FDNY members' inquiries about possible WTC exposure-related cognitive decline, encouraged us to add a subjective measure of cognition to the FDNY monitoring questionnaire, the Cognitive Function Instrument, in order to identify the prevalence of and risk factors for self-reported cognitive concerns.

Among the FDNY WTC-exposed members, most of the cognitive concerns reported were memory related. Participants who experienced high-intensity WTC exposure were more likely to report subjective cognitive concerns than were responders who had lower-level WTC exposure. However, this association was highly related to whether a member had PTSD. Current PTSD was associated with subjective cognitive concerns during the same time period. Furthermore, PTSD in the year after 9/11 was associated with a greater likelihood of subjective cognitive concerns 17 years later.

We just received funding from NIOSH to begin a study in collaboration with Stony Brook University to determine whether self-reported cognitive decline can be validated by neuropsychological testing.

A greater proportion of FDNY members with high WTC exposure reported cognitive concerns including memory loss than those with moderate or low exposure.

The majority of FDNY WTC-exposed members with current PTSD reported that they were relying more on written reminders (60%), were having more difficulty remembering names and words (52%) and felt increasingly socially isolated (53%).

At least 67% of active FDNY WTC-exposed rescue/recovery workers received the COVID-19 vaccine.

About 4,600 retired FDNY WTC-exposed rescue/recovery workers received the COVID-19 vaccine through FDNY.

COVID-19 Pandemic and WTC-Exposed Rescue/Recovery Workers

In March 2020, the World Health Organization declared Coronavirus Disease 2019 (COVID-19) a pandemic. Since then, more than 500,000 people have died from COVID-19 in the United States. As of March 2021, New York State experienced nearly 2 million cases (1 per 100 people) and nearly 50,000 deaths (2.6 per 1,000 people). COVID-19 is a multisystem disease primarily affecting the respiratory tract. The 9-1-1 system received 30,469 more medical calls from March 16 to April 15, 2020 compared with March 16 to April 15, 2019 (161,815 vs. 127,962). On March 30, 2020, call volume increased 60% compared with the same day in 2019. The proportion of life-threatening call types increased compared with 2019 (42.3% vs. 36.4%). The COVID-19-associated NYC 9-1-1 emergency medical services (EMS) volume surge was primarily due to respiratory and cardiovascular call types. Despite safety protocols and use of personal protective equipment (PPE), 41% of EMS providers and 35% of firefighters were placed on medical leave for COVID-19-suspected illness during the first wave of the pandemic between March 1 and May 31, 2020.

Even though most of our WTC-exposed members retired prior to the pandemic, many of the FDNY WTC-exposed cohort members were heavily exposed to the pandemic due to where they lived. WTC Health Program retirees may not have been on the front lines of the pandemic, but in New York and other parts of the U.S., they may have been physically and psychologically affected. As the pandemic progressed, it was found that older age and certain comorbid health conditions play a role in developing severe COVID-19 (defined as hospitalization or death). Many individuals had to remain isolated from family and friends during this stressful and uncertain time, which could be detrimental to mental health. Fear of infection and dealing with the loss of loved ones—both take a toll on one's mental health.

Health Consequences of COVID-19

Symptoms of COVID-19	Percent of WTC-exposed rescue/recovery workers who reported COVID-19-suspected illness
Fatigue	52%
Muscle/joint pains or aches	49%
Cough	46%
Fever/chills	43%
Headache	43%
Shortness of breath	41%
Loss of taste or smell	32%
Sore throat	31%
Wheeze	28%
Chest pain/discomfort/tightness	27%
Nausea/vomiting/diarrhea/stomach pain	23%
Pins and needles, prickling, burning, pain in hands or feet	16%

To better understand the toll COVID-19 had on the physical and mental health of our WTC-exposed members, we included COVID-19 related questions in the Self-Administered Mental Health Questionnaire. These new questions assess self-reported physical and mental health symptoms related to COVID-19, exposure, stressors and coping mechanisms. As of March 2021, for all WTC-exposed rescue/recovery workers (currently active or retired), the most common COVID-19 symptoms reported were fatigue (52%), muscle/joint aches or pains (49%) and fever/chills (43%).

Of all WTC-exposed members who responded to the survey, 35% reported the death of a loved one, 24% reported experiencing isolation from family/friends, 14% reported sleep problems and 9% reported feeling lonely or sad. Additionally, 21% reported a fear of infecting a family member with COVID-19. In response to the pandemic, the FDNY Counseling Services Unit (CSU) began to offer both virtual and in-person appointments for individuals, couples and families. Peer counseling was expanded to include more EMS peers as support. CSU support services are available to everyone, not just those with a mental health condition. COVID-19 emotional support is just one of many services available. Call 212-570-1693 for more information or to schedule an appointment.

Future research on the health implications of COVID-19 among our WTC-exposed members:

- **Determine whether preexisting WTC-related health conditions are associated with a greater risk of severe COVID-19 outcomes, and if so, which specific WTC-related conditions place one at greatest risk.**
- **Determine whether COVID-19 illness exacerbates preexisting WTC-related conditions.**
- **Examine the impact of the pandemic on anxiety, depression and post-traumatic stress.**
- **Examine the long-term health impacts of COVID-19.**

SPOTLIGHT #4

FDNY RESCUE/RECOVERY WORKER SPOTLIGHT:

CAPT. ALFREDO FUENTES

FDNY RESCUE/RECOVERY WORKER SPOTLIGHT:
CAPTAIN ALFREDO FUENTES

In the span of 29 minutes on 9/11, Captain (Capt.) Alfredo Fuentes, the acting chief of FDNY's Marine division, escaped death not once but twice. After emerging unscathed from the south tower collapse, he heard that people were trapped inside the Marriott Hotel and joined the rescue efforts there. At 10:28 a.m. came a second roar. "I looked up, and the north tower was collapsing," he says. "I couldn't run because of all the rubble. I just bent over, covered my head, said the 'Hail Mary' again, and got ready for the hit."

That was Capt. Fuentes' last memory of 9/11. Somehow, he managed to radio for help. FDNY rescuers, including Lieutenant (Lt.) Terrence Jordan, dug him out from the rubble—see page 42 for a Spotlight on Lt. Terrence Jordan. They carried him out of the collapse zone to a boat on the Hudson and sent him to a Jersey City, New Jersey hospital, where he was put into a medically induced coma and eventually transferred to Montefiore Medical Center. 9/11 would be Capt. Fuentes' last day on the job. In the months that followed, he underwent numerous surgeries and procedures. He's still recovering 20 years later, struggling with lung disease, chronic sinusitis, post-concussion syndrome and memory loss. "With help from the WTC Health Program, we're keeping everything at bay," says Capt. Fuentes. "I have to credit [the WTC Health Program] for the quality of life that I have now."

Capt. Fuentes has every right to be bitter about the day that cost him so much, but he sees only the good that came of it. He says, "what I witnessed that day was incredible, the way people responded and not just the firefighters, but also the civilians. I can't say enough about the City of New York and the country. Who's got it better than me? I survived. I got to see my wife and family and my grandson."

The Spotlight profiles in this report are adapted from an article by Gary Goldenberg that first appeared in EINSTEIN *magazine, a publication of Albert Einstein College of Medicine. Please visit https://magazine.einsteinmed.org/winter-spring-2021/ones-who-ran-toward-danger/ to read the full article.*

More FDNY Rescue/Recovery Worker Spotlights can be found on pages 12, 22 and 42.

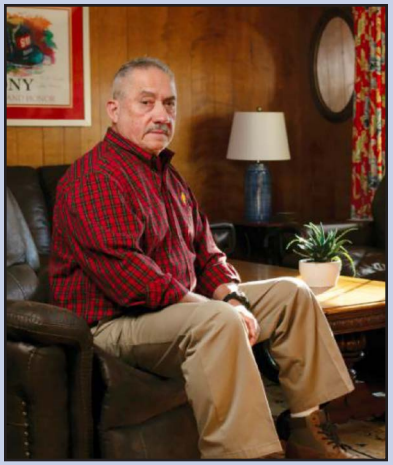


Photo by Albert Einstein College of Medicine/Jörg Meyer

"With help from the WTC Health Program, we're keeping everything at bay. I have to credit [the WTC Health Program] for the quality of life that I have now."


FDNY

SECTION 5:
HEALTH-RELATED QUALITY OF LIFE

81%
Percent of members who rated health as good, very good or excellent

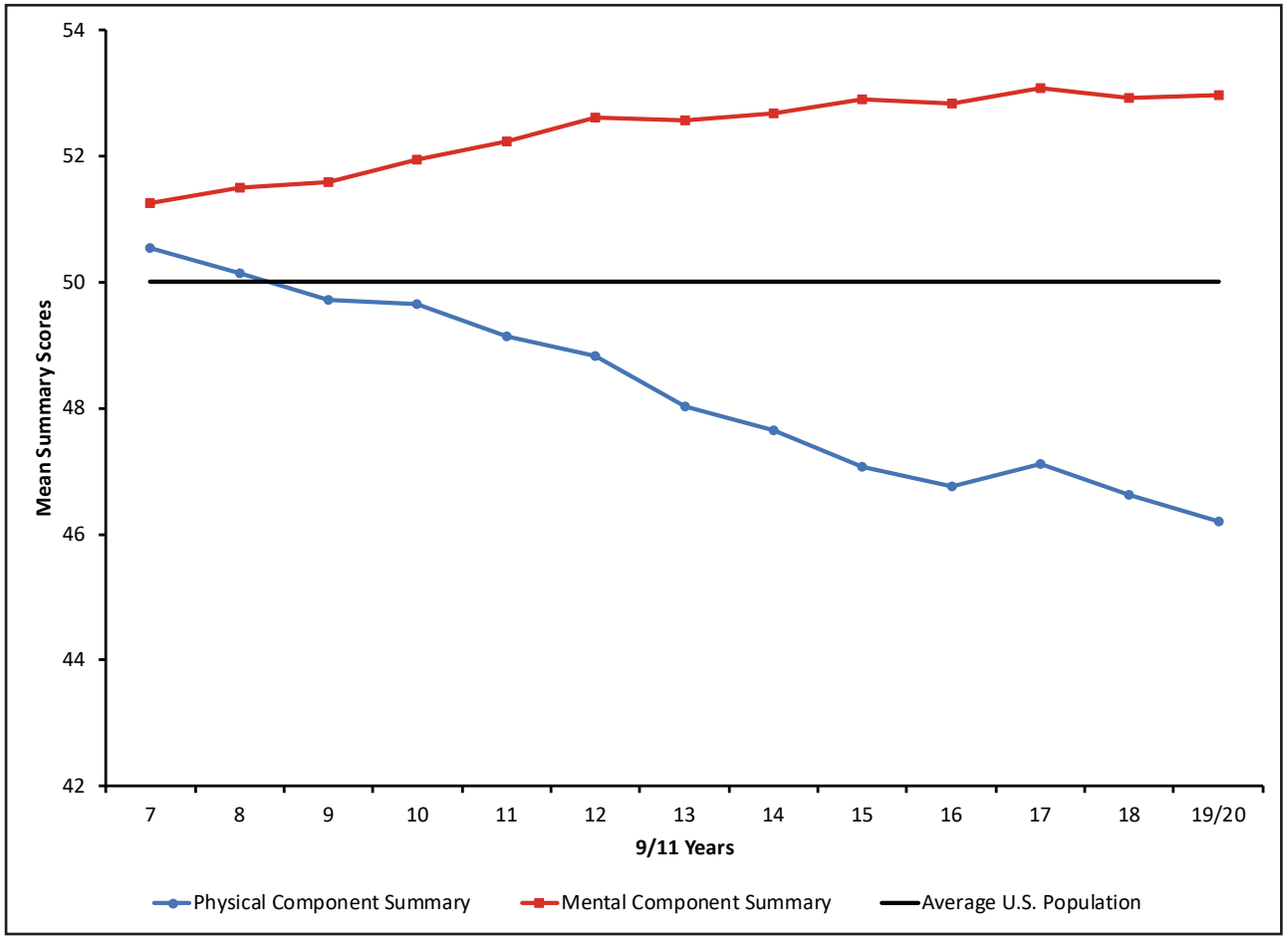
53%
Percent of members reporting improvement in self-related health status

100%
Percent of members satisfied with FDNY WTC healthcare providers, nurses and office staff

99.7%
Percent of members reporting general satisfaction with FDNY WTC Health Program

The health and quality of life for our FDNY WTC-exposed rescue/recovery workers are our highest priority. Increasingly, healthcare experts have recognized that health-related quality of life is an important outcome. The Centers for Disease Control and Prevention (CDC) has defined health-related quality of life as an individual's perceptions of their physical and mental health. To track members' perceptions of their health status, we added a validated health-related quality of life questionnaire, the Short-Form 12 (SF-12), to our monitoring exams in 2008 and introduced an updated version (SF-12, version 2) in 2015. The SF-12 provides two summary scores: physical component and mental health component. For both components, higher scores indicate better perceived health-related quality of life. A score of 50 corresponds to the norm of the general U.S. population.

Health-Related Quality of Life Assessments Among FDNY WTC-Exposed Rescue/Recovery Workers



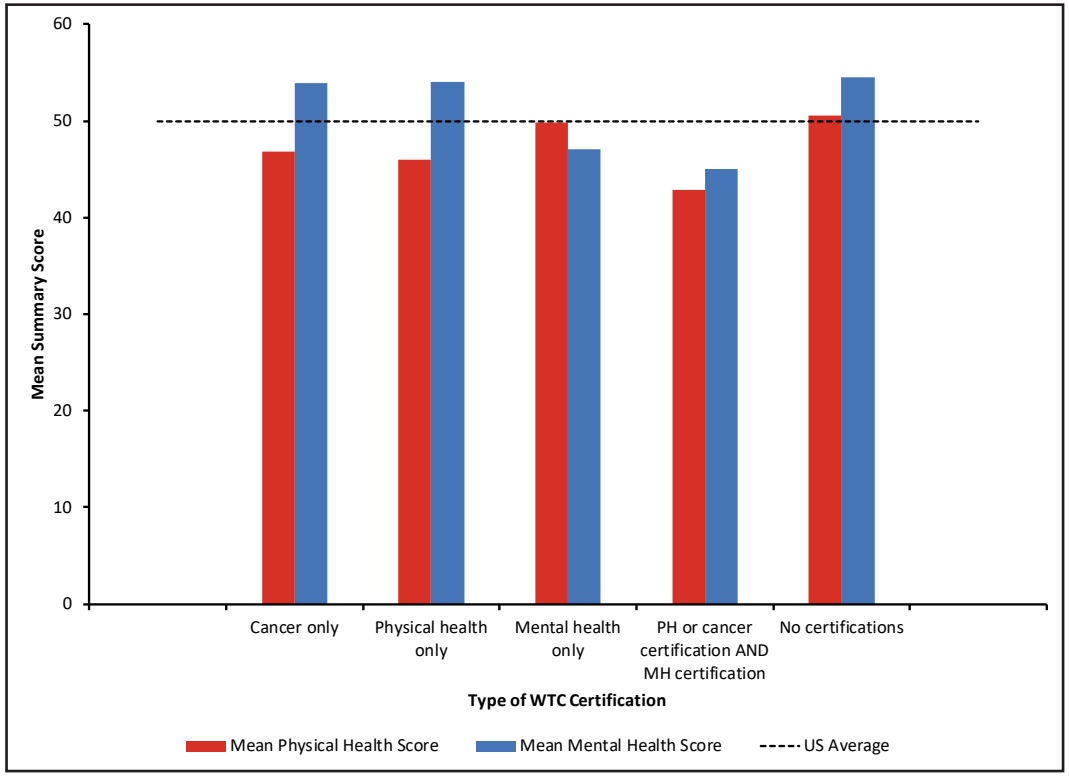
Compared to the average U.S. population, FDNY WTC-exposed rescue/recovery workers (firefighters and EMS providers) report a higher ("better") mental health quality of life but a lower ("worse") physical health quality of life.

Over time, mental health-related quality of life improved, while physical health-related quality of life declined.

FDNY WTC-exposed rescue/ recovery workers with certified WTC-related physical health or cancer conditions have lower ("worse") physical health quality of life scores than the average general U.S. population.

FDNY WTC-exposed rescue/ recovery workers with certified WTC-related mental health conditions have lower ("worse") mental health quality of life scores compared with the average general U.S. population.

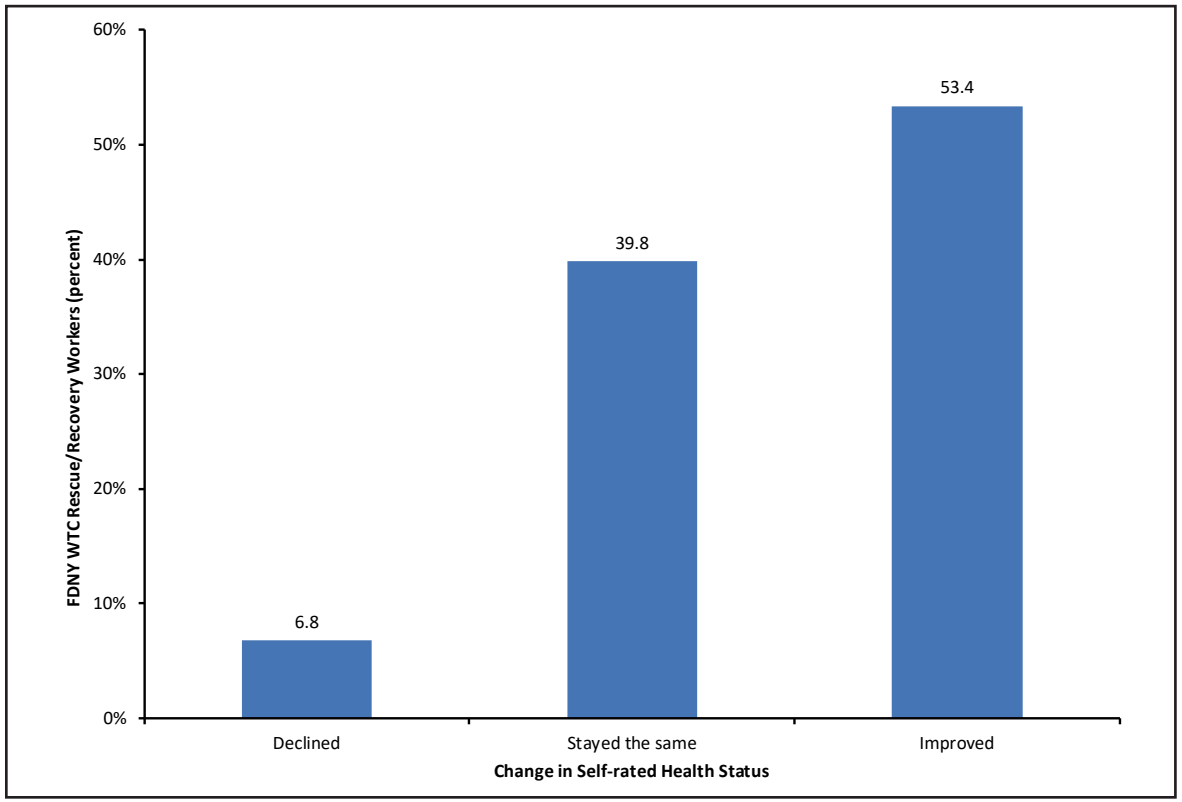
Health-Related Quality of Life by WTC Certifications



We examined health-related quality of life measurements for those certified with WTC-related conditions. Conditions covered by the WTC Health Program include physical health conditions such as airway and digestive disorders (asthma, rhinosinusitis and gastroesophageal reflux disease), most cancers and mental health conditions such as major depressive disorder, post-traumatic stress disorder (PTSD) and substance abuse. The higher the quality of life measurement score, the better the member feels about their quality of life. WTC-exposed rescue/recovery workers with certified conditions scored lower than the average score among the U.S. general population (score of 50). Those with no certified conditions scored above the U.S. general population in both physical and mental health scores.

WTC-exposed members diagnosed with both physical and mental health conditions have the lowest average health quality of life scores, well below the average. This highlights the importance of offering our members treatment approaches that combine their physical condition's standard of care with mental health counseling services.

Current Health Status Among FDNY WTC-Exposed Rescue/ Recovery Workers Who Initially Reported Serious Health Concerns



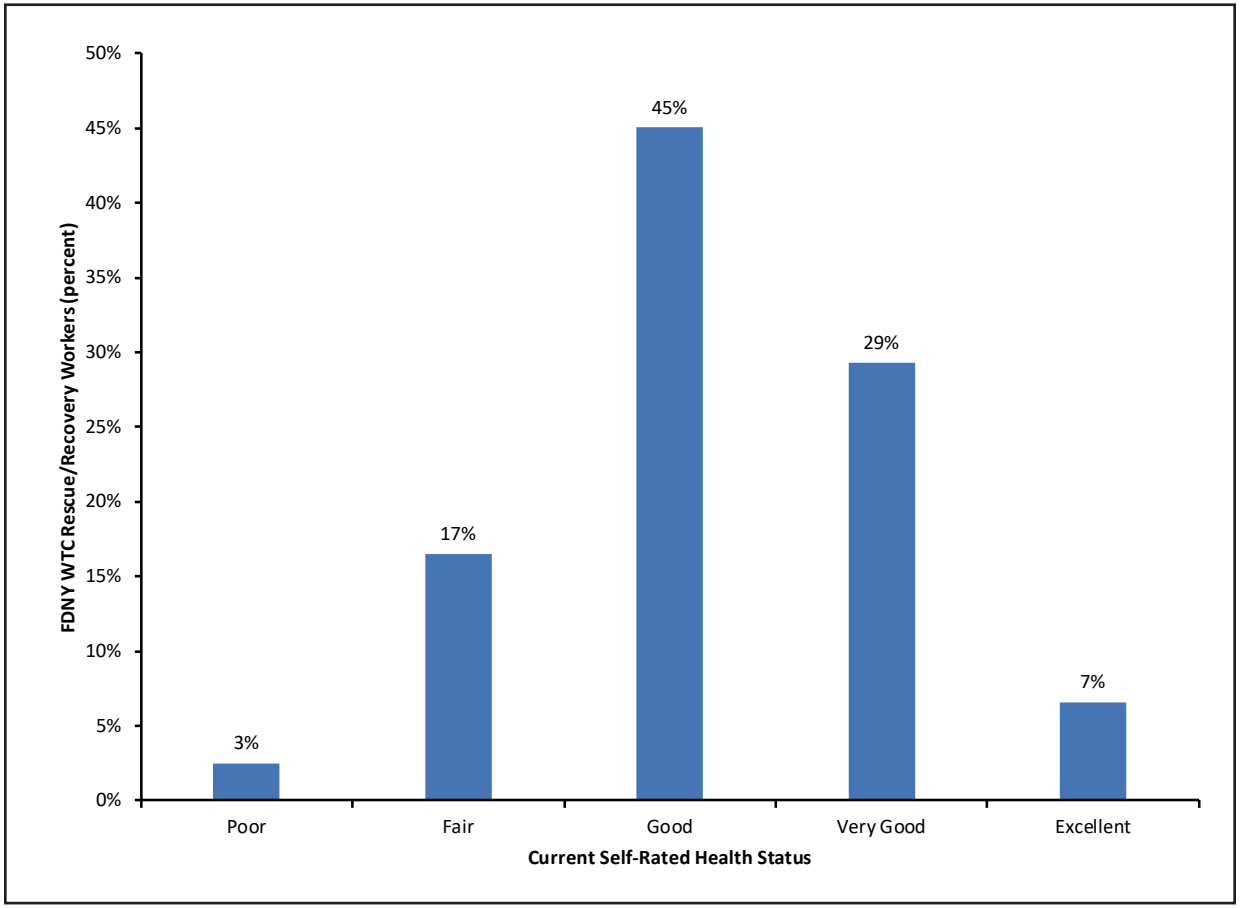
Among those who previously rated their general health as fair or poor, slightly more than half of FDNY WTC-exposed rescue/recovery workers report an improved self-rated health status.

In their first post-9/11 questionnaire, FDNY members were asked to report their health concerns arising from work at the WTC disaster site. Nearly 93% of respondents—8,430 individuals—believed that their WTC exposures caused or would cause future health problems or cause loved ones to be concerned about their health.

At the medical monitoring exam, we also ask our members to rate their general health status on a Likert scale: excellent, very good, good, fair or poor. On their initial exam, about 2,200 respondents self-reported their overall health as either fair or poor. Among these same respondents, we examined their most recent survey, taken approximately 20 years after 9/11. As shown in the figure, 53% reported an improvement, and 40% remained the same. It is encouraging to see more than half of our members report an improvement in general health despite long-term effects of WTC-exposure and aging.

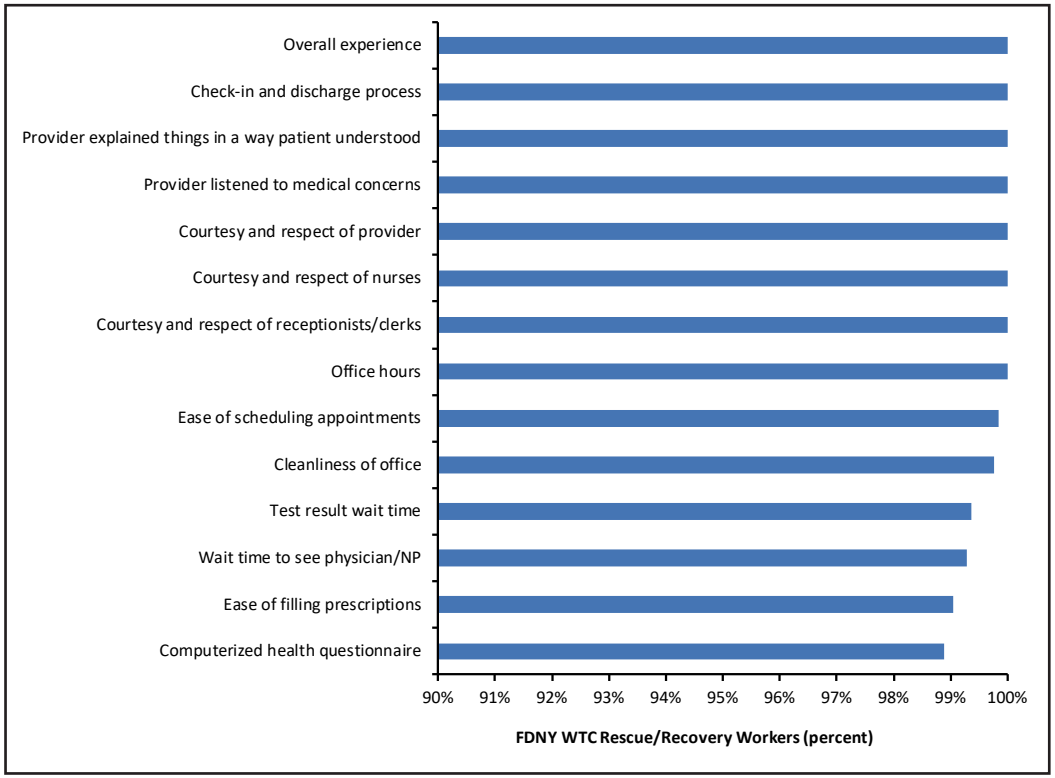
More than 81% of members rated their current health as good, very good or excellent on their most recent health WTC medical monitoring questionnaires. This was true even for those who reported serious health concerns during or shortly after their rescue/recovery work at the WTC disaster site.

Current Self-Rated Health Status



Twenty years later, more than 81% of FDNY members rate their current health as good, very good or excellent. Our members state that the FDNY WTC Health Program, providing regular monitoring evaluations and free medical treatment (including medications), has largely contributed to these current positive perceptions of health status.

Current Health Status Among FDNY WTC-Exposed Rescue/ Recovery Workers Who Initially Reported Serious Health Concerns

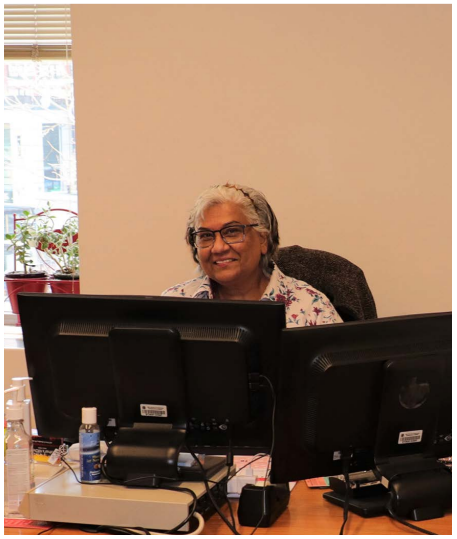


99.7% of members reported general satisfaction with FDNY WTC Health Program.

At the WTC Health Program annual monitoring exam, members complete a satisfaction survey to assess their opinion of the WTC Health Program's quality of care. The survey uses a Likert scale, where "5" indicates highest satisfaction and "1" indicates lowest satisfaction. The figure above contains the responses from 1,251 members who completed the member satisfaction surveys collected from January 1, 2020 to June 30, 2020.

The survey includes questions broken into 14 categories covering many components of the visit, including overall experience, ease of scheduling appointments, wait times, staff/provider courtesy, provider experience and cleanliness. 98% of the members surveyed indicated satisfaction with a score of 3 or greater. In fact, for 10 out of the 14 categories, all members surveyed were satisfied. For overall satisfaction, 99.7% of members responded that they were satisfied with the program, which surpassed our benchmark of 95%. High satisfaction with the quality of care provided by FDNY WTC Health Program highlights the capability of the medical team and the program as a whole to provide effective care.

FDNY WTC HEALTH PROGRAM STAFF

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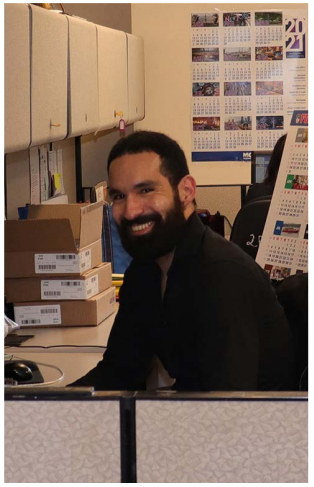


FDNY Citywide Map
With Division Boundaries

SECTION 6:
APPENDIX

APPENDIX A

APPENDIX B

Appendix A – References

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Appendix B – Health Quizzes and Wellness Tips

COVID-19 Health Quiz

In 2020, the world experienced one of the most severe pandemics in the past century. Symptoms and patterns of COVID-19 are still being studied, but researchers know that anyone can have mild to severe symptoms, though **severe symptoms are more often seen in older adults and those with underlying medical conditions.**

The CDC recommends watching for these symptoms, which may appear **2-14 days after exposure** to the virus:

- ☐ Fever or chills
- ☐ Cough
- ☐ Shortness of breath or difficulty breathing
- ☐ Fatigue
- ☐ Muscle or body aches
- ☐ Headache
- ☐ New loss of taste or smell
- ☐ Sore throat
- ☐ Congestion or runny nose
- ☐ Nausea or vomiting
- ☐ Diarrhea

The following are considered **emergency warning signs** and warrant **immediate medical attention**:

- ✓ Trouble breathing
- ✓ Persistent pain or pressure in the chest
- ✓ New confusion
- ✓ Inability to wake or stay awake
- ✓ Bluish lips or face

The checklist above is not a formal diagnostic tool. It is simply a list of symptoms associated with COVID-19. If you are concerned that you may have been exposed to or contracted COVID-19, please contact your doctor, the Bureau of Health Service or the FDNY WTC Health Program at 718-999-1858 to make an appointment.

The COVID-19 pandemic has had a major effect on all aspects of everyday life, not just physical health. These times may feel stressful and/or overwhelming and may cause emotional distress for children and adults. It is natural to feel anxiety, stress and grief during the pandemic. Below are suggestions from the CDC to help you and others around you manage stress:

1. Take breaks from watching, reading or listening to news stories if feeling overwhelmed.
2. Take care of your body: take deep breaths, stretch, exercise, get plenty of sleep, eat well-balanced meals.
3. Take care of your mind: do activities/hobbies you enjoy, connect with others about how you're feeling.

Remember that you are not alone. **The Counseling Services Unit (CSU) is here to provide free and confidential support.** A mental health condition is not required. Call **212-570-1693** for more information or to schedule a telehealth appointment.

Personal Physical Health Quiz

We remain concerned about your health as WTC responders.

These health quizzes are for your personal use and may be able to help you identify WTC-related illness. We hope this information will facilitate your decision

on whether self-referral to the FDNY WTC Health Program or your own physician is necessary.

Have you experienced any upper respiratory conditions?

NOT COUNTING WHEN YOU HAVE A COLD, please put a check in the box next to any problems you have had in THE PAST FOUR WEEKS OR REPEATEDLY IN THE PAST 12 MONTHS.

- ❑ Nose irritation, soreness or burning
- ❑ Runny nose or postnasal drip
- ❑ Frequent nosebleeds
- ❑ Nasal or sinus congestion
- ❑ Sinus or face pain or pressure
- ❑ Frequent headaches

Have you experienced any gastrointestinal conditions?

Please put a check in the box next to any problems you have had in THE PAST FOUR WEEKS OR REPEATEDLY IN THE PAST 12 MONTHS.

- ❑ Difficulty swallowing (feels like food gets stuck)
- ❑ Coughing after you lie down or eat
- ❑ Frequent nausea (at least two times/week)
- ❑ Frequent sour or acid taste in the mouth (at least two times/week)
- ❑ Frequent acid reflux/regurgitation into mouth (at least two times/week)
- ❑ Frequent heartburn/indigestion (at least two times/week)

Have you experienced any lower respiratory conditions?

NOT COUNTING WHEN YOU HAVE A COLD, please put a check in the box next to any problems you have had in THE PAST FOUR WEEKS OR REPEATEDLY IN THE PAST 12 MONTHS.

- ❑ Wheezing or whistling in your chest
- ❑ Difficulty taking in a full breath
- ❑ Shortness of breath
- ❑ Frequent or usual cough (at least four times/day, four days/week, four consecutive weeks/year)
- ❑ Have you experienced any of the above symptoms when exposed to irritants or chemicals or change in temperatures?

Please put a check in the box next to anything that has provoked your lower respiratory symptoms in THE PAST FOUR WEEKS OR REPEATEDLY IN THE PAST 12 MONTHS.

- ❑ Exercise or physical activity
- ❑ Strong odors
- ❑ Dust
- ❑ Allergens
- ❑ Temperature or humidity extremes
- ❑ Smoke or fumes

The checklist above is not a formal diagnostic tool. It is simply a list of symptoms associated with WTC-related illnesses. If you put a check in the box next to any of these problems and have them on a consistent or frequent basis, and you were present at one of the WTC sites, you may have a WTC-related illness. Only a healthcare professional can formally diagnose this condition. Please contact your doctor or call the FDNY-WTC Medical Monitoring and Treatment Program at 718-999-1858 to make a treatment appointment.

During the past two weeks, have you been bothered by any of the following problems? Please put a check in the box next to any problems you have.

- ❑ Little interest or pleasure in doing things
- ❑ Feeling down, depressed or hopeless
- ❑ Sleep difficulties

❑ Fatigue or lack of energy
❑ Change in appetite
❑ Feeling worthless or that you are a failure
❑ Difficulty concentrating
❑ Lack of motivation
❑ Feeling restless or fidgety
❑ Suicidal thoughts

Do these symptoms affect your ability to function, either at home or work?
❑ Yes or ❑ No

The checklist above is not a formal diagnostic tool. It is simply a list of symptoms associated with depression. If you put a check in the box next to MORE THAN ONE of these problems, you may have depression. Only a healthcare professional can formally diagnose this condition. Please contact your doctor or the FDNY Counseling Services Unit at 212-570-1693 to find out what treatment options are available. A list of CSU locations and phone numbers can be found on page 41. If you put a check in the box next to suicidal thoughts, you should call your doctor or the FDNY counseling unit 24-hour phone line immediately at 212-570-1693.

Have you lived through a scary and dangerous life-threatening event? Please put a check in the box next to any problems you have had in THE PAST MONTH.
❑ I feel like the terrible event is happening all over again. This feeling often comes without warning.
❑ I have nightmares and scary memories of the event.
❑ I stay away from places that remind me of the event.
❑ I jump and feel very upset when something happens without warning.
❑ I have a hard time trusting or feeling close to other people.
❑ I get mad very easily.
❑ I feel guilty because others died and I lived.
❑ I have trouble sleeping, and my muscles are tense.

Do these symptoms affect your ability to function, either at home or work?
❑ Yes or ❑ No

The checklist above is not a formal diagnostic tool. It is simply a list of symptoms associated with post-traumatic stress disorder (PTSD). If you put a check in the box to MORE THAN ONE of these problems, you may have PTSD. Only a healthcare professional can formally diagnose this condition. Please contact your doctor or the FDNY Counseling Services Unit to find out what treatment options are available. A list of CSU locations and phone numbers can be found on page 41.

Wellness Tips

WHAT YOU CAN DO TO FOSTER THE HEALING PROCESS

We are all concerned about WTC-related respiratory and mental health diseases. Cancer and heart disease are also concerns for all rescue workers, and many of us are concerned that WTC exposures will have a further negative impact. Although none of us can take back our past exposures, there are many steps we can take to reduce our risk for developing illness in the future. Wellness involves the health of the whole person. The body must be kept strong, fit and well-nourished so it's able to resist disease and overcome injury. This is a team effort combining

mind, body and spirit. Wellness is more than just not being sick—it's a positive state of health. Wellness means taking responsibility for your own health by doing the following.

1. ***Learn how to stay healthy.***
   - Participate in the FDNY WTC annual medical examination, which now includes age- and gender-appropriate cancer screening tests.
   - Respond to your body's warning signs, and visit your healthcare provider—before something serious happens.
   - Get an annual influenza vaccination.
   - Get a pneumococcal vaccination, especially recommended for those with cardiopulmonary diseases.

2. ***Practice good health habits, and give up harmful ones.***
   - Quit smoking now! Eliminate exposure to secondhand smoke. For help quitting, please call the FDNY Tobacco Cessation Program at 718-999-1942. It is free and confidential.
   - Avoid alcohol abuse and drug use.
   - Avoid occupational or recreational exposures that are known to exacerbate illness. Always wear your respirator when entering a hazardous environment.
   - Get enough exercise. Adults need at least 30 minutes of physical activity on most days of the week.
   - Practice safe sex with a loved one.
   - Eat right. Make smart choices from each food group every day.

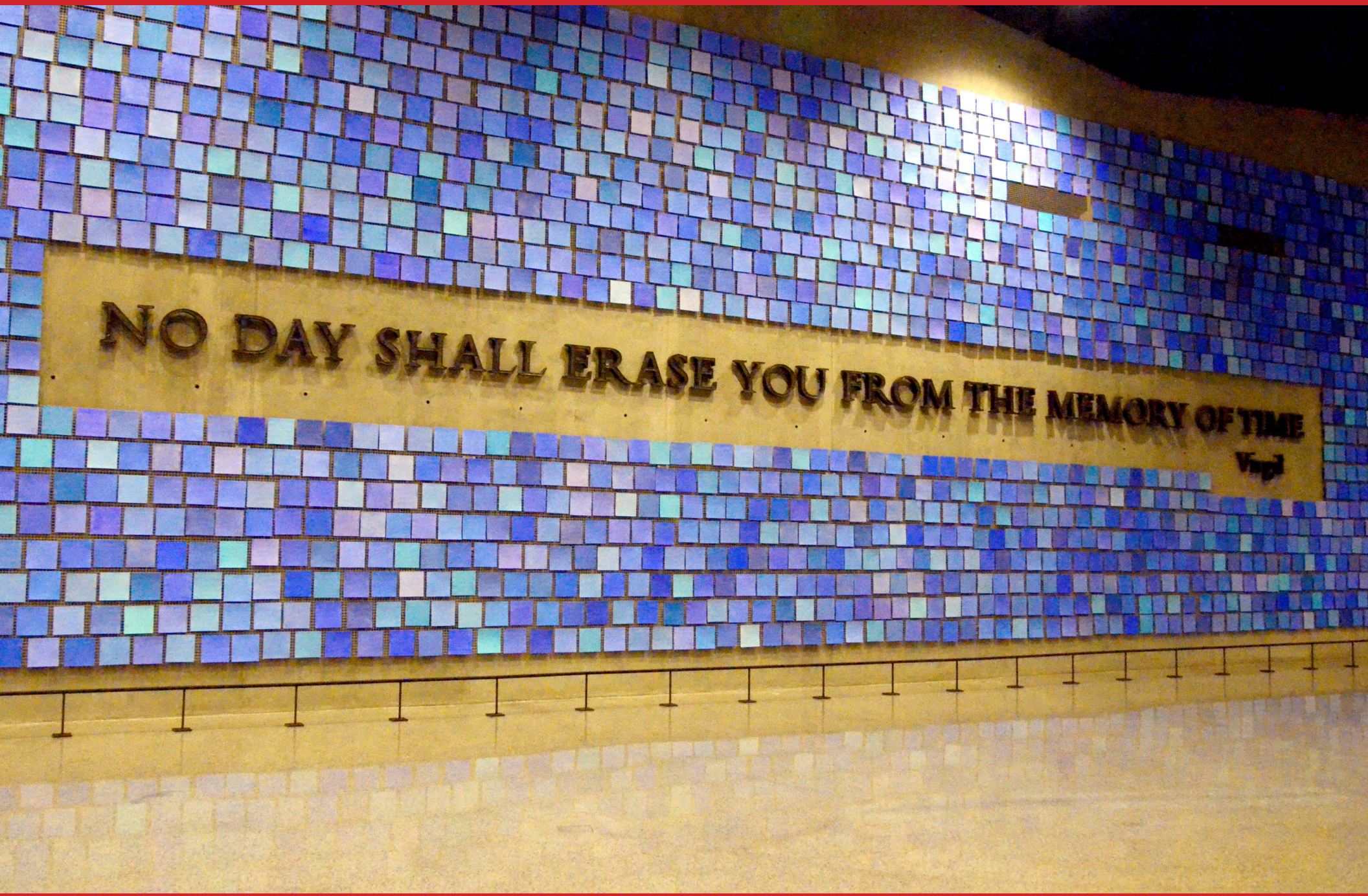
If you have gastroesophageal reflux disease (GERD), diet modification (avoiding acidic foods including most juices, red sauce, juices, caffeine, soda, alcohol and chocolate), not eating for several hours before lying down and weight control are integral to the management of this disease.

3. ***Learn how to manage stress.***
   - Try to relax. Go to a movie or a ball game, or participate in religious, social or other activities that might make you feel better.
   - Improve your environment. Small changes around your home or office will help you feel in control.
   - Plan your work to make efficient use of your time and energy.
   - Be realistic. Set practical goals for yourself.
   - Try to be with other people and confide in someone. It is usually better than being alone and secretive.
   - Seek professional help. Don't ignore symptoms of stress.

Focus on your own wellness. You can be healthier, feel better, look better and live longer!

In 2008, we co-authored—with the other WTC Clinical Centers of Excellence and the New York City Department of Health and Mental Hygiene—the *Clinical Guidelines for Adults Exposed to the World Trade Center Disaster*. This can help your primary care physicians become familiar with what we have learned about identifying, evaluating and treating WTC-exposed individuals.

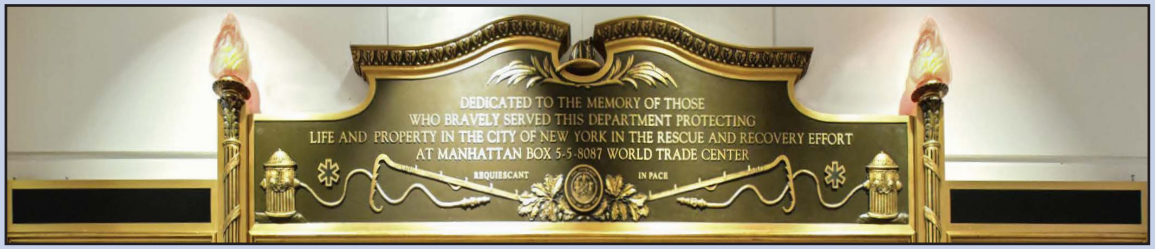
These published guidelines show clinicians how to determine a patient's exposure history and identify many health problems that may have been caused or made worse by WTC exposure. It also offers algorithms to help clinicians diagnose, treat and manage WTC-related conditions.


NO DAY SHALL ERASE YOU FROM THE MEMORY OF TIME
Virgil

New York City Fire Department Members
Who Made The Supreme Sacrifice
In The Performance of Duty
At The World Trade Center
September 11, 2001
Manhattan Box 5-5-8087

First Deputy Commissioner William M. Feehan
Office of Fire Commissioner
Chief of Department Peter J. Ganci, Jr., COD
Assistant Chief Gerard A. Barbara, Operations
Assistant Chief Donald J. Burns, Operations
Deputy Chief Dennis A. Cross, Battalion 57
Deputy Chief Raymond M. Downey, SOC
Deputy Chief Edward F. Geraghty, Battalion 9
Department Chaplain Mychal F. Judge, OFM
Deputy Chief Charles L. Kasper, SOC
Deputy Chief Joseph R. Marchbanks, Jr., Battalion 12
Deputy Chief Orio J. Palmer, Battalion 7
Deputy Chief John M. Paolillo, SOC
Battalion Chief James M. Amato, Squad Co. 1
Battalion Chief Thomas P. DeAngelis, Battalion 8
Battalion Chief Dennis L. Devlin, Division 3
Battalion Chief John J. Fanning, Haz-Mat Operations
Battalion Chief Thomas J. Farino, Engine Co. 26
Battalion Chief Joseph D. Farrelly, Engine Co. 4
Battalion Chief Joseph Grzelak, Battalion 48
Battalion Chief Thomas T. Haskell, Jr., Ladder Co. 132
Battalion Chief Brian C. Hickey, Rescue Co. 4
Battalion Chief William J. McGovern, Battalion 2
Battalion Chief Louis J. Modafferi, Rescue Co. 5
Battalion Chief John M. Moran, SOC
Battalion Chief Richard A. Prunty, Battalion 2
Battalion Chief Matthew L. Ryan, Battalion 4
Battalion Chief Fred C. Scheffold, Battalion 12
Battalion Chief Lawrence T. Stack, Safety Battalion 1
Battalion Chief John P. Williamson, Battalion 6
Captain Daniel J. Brethel, Ladder Co. 24
Captain Patrick J. Brown, Ladder Co. 3
Captain Vincent E. Brunton, Ladder Co. 105
Captain William F. Burke, Jr., Engine Co. 21
Captain Frank J. Callahan, Ladder Co. 35
Captain Martin J. Egan, Jr., Ladder Co. 118
Captain Michael A. Esposito, Squad Co. 1
Captain John R. Fischer, Ladder Co. 20
Captain Vincent F. Giammona, Ladder Co. 5
Captain Terence S. Hatton, Rescue Co. 1
Captain Walter G. Hynes, Ladder Co. 13
Captain Frederick J. III, Jr., Ladder Co. 2
Captain William E. McGinn, Squad Co. 18
Captain Thomas C. Moody, Engine Co. 310
Captain Daniel O'Callaghan, Ladder Co. 4
Captain William S. O'Keefe, Engine Co. 154
Captain Vernon A. Richard, Ladder Co. 7
Captain Timothy M. Stackpole, Ladder Co. 103
Captain Patrick J. Waters, Haz-Mat Co. 1
Captain David T. Wooley, Ladder Co. 4
Lieutenant Joseph Agnello, Ladder Co. 118
Lieutenant Brian G. Ahearn, Engine Co. 230
Lieutenant Gregg Atlas, Engine Co. 10
Lieutenant Steven J. Bates, Engine Co. 235
Lieutenant Carl J. Bedigian, Engine Co. 214
Lieutenant John A. Crisci, Haz-Mat Co. 1
Lieutenant Edward A. D'Atri, Squad Co. 1
Lieutenant Manuel Del Valle, Jr., Engine Co. 5
Lieutenant Andrew J. Desperito, Engine Co. 1
Lieutenant Kevin W. Donnelly, Ladder Co. 3
Lieutenant Kevin C. Dowdell, Rescue Co. 4
Lieutenant Michael N. Fodor, Ladder Co. 21
Lieutenant David J. Fontana, Squad Co. 1
Lieutenant Andrew A. Fredericks, Squad Co. 18
Lieutenant Peter L. Freund, Engine Co. 55
Lieutenant Charles W. Garbarini, Ladder Co. 61
Lieutenant Ronnie E. Gies, Squad Co. 288
Lieutenant John F. Ginley, Engine Co. 40
Lieutenant Geoffrey E. Guja, Engine Co. 82
Lieutenant Joseph P. Gullickson, Ladder Co. 101
Lieutenant David Halderman, Squad Co. 18
Lieutenant Vincent G. Halloran, Ladder Co. 8
Lieutenant Harvey L. Harrell, Rescue Co. 5
Lieutenant Stephen G. Harrell, Ladder Co. 157
Lieutenant Michael K. Healey, Squad Co. 41
Lieutenant Timothy B. Higgins, Squad Co. 252
Lieutenant Anthony M. Jovic, Ladder Co. 34
Lieutenant Thomas R. Kelly, Ladder Co. 105
Lieutenant Ronald T. Kerwin, Squad Co. 288
Lieutenant Joseph G. Leavey, Ladder Co. 15
Lieutenant Michael F. Lynch, Ladder Co. 4
Lieutenant Patrick J. Lyons, Squad Co. 252
Lieutenant Charles J. Margiotta, Ladder Co. 85
Lieutenant Peter C. Martin, Rescue Co. 2
Lieutenant Paul R. Martini, Engine Co. 201
Lieutenant Paul T. Mitchell, Ladder Co. 110
Lieutenant Dennis Mojica, Rescue Co. 1
Lieutenant Raymond E. Murphy, Ladder Co. 16
Lieutenant Robert B. Nagel, Engine Co. 58
Lieutenant John P. Napolitano, Rescue Co. 2
Lieutenant Thomas G. O'Hagan, Engine Co. 52
Lieutenant Glenn C. Perry, Ladder Co. 34
Lieutenant Philip S. Petti, Ladder Co. 148
Lieutenant Kevin J. Pfeifer, Engine Co. 33
Lieutenant Kenneth J. Phelan, Engine Co. 217
Lieutenant Michael T. Quilty, Ladder Co. 11
Lieutenant Ricardo J. Quinn, EMS Battalion 57
Lieutenant Robert M. Regan, Ladder Co. 118
Lieutenant Michael T. Russo, Squad Co. 1
Lieutenant Christopher P. Sullivan, Ladder Co. 111
Lieutenant Robert F. Wallace, Engine Co. 205
Lieutenant Jeffrey P. Walz, Ladder Co. 9
Lieutenant Michael P. Warchola, Ladder Co. 5
Lieutenant Glenn E. Wilkinson, Engine Co. 238
Fire Marshal Ronald P. Bucca, Manhattan Base
Fire Marshal Andre G. Fletcher, Rescue Co. 5
Fire Marshal Vincent D. Kane, Engine Co. 22
Fire Marshal Kenneth B. Kumpel, Ladder Co. 25
Fire Marshal Paul J. Pansini, Engine Co. 10
Firefighter Eric T. Allen, Squad Co. 18
Firefighter Richard D. Allen, Ladder Co. 15
Firefighter Calixto Anaya, Jr., Engine Co. 4
Firefighter Joseph J. Angelini, Sr., Rescue Co. 1
Firefighter Joseph J. Angelini, Jr., Ladder Co. 4
Firefighter Faustino Apostol, Jr., Battalion 2
Firefighter David G. Arce, Engine Co. 33
Firefighter Louis Arena, Ladder Co. 5
Firefighter Carl F. Asaro, Battalion 9
Firefighter Gerald T. Atwood, Ladder Co. 21
Firefighter Gerard Baptiste, Ladder Co. 9
Firefighter Matthew E. Barnes, Ladder Co. 25
Firefighter Arthur T. Barry, Ladder Co. 15
Firefighter Stephen E. Belson, Ladder Co. 24
Firefighter John P. Bergin, Rescue Co. 5
Firefighter Paul M. Beyer, Engine Co. 6
Firefighter Peter A. Bielfeld, Ladder Co. 42
Firefighter Brian E. Bilcher, Engine Co. 33
Firefighter Carl V. Bini, Rescue Co. 5
Firefighter Christopher J. Blackwell, Rescue Co. 3
Firefighter Michael L. Bocchino, Battalion 48
Firefighter Frank J. Bonomo, Engine Co. 230
Firefighter Gary R. Box, Squad Co. 1
Firefighter Michael Boyle, Engine Co. 33
Firefighter Kevin H. Bracken, Engine Co. 40
Firefighter Michael E. Brennan, Ladder Co. 4
Firefighter Peter Brennan, Squad Co. 288
Firefighter Andrew C. Brunn, Ladder Co. 5
Firefighter Gregory J. Buck, Engine Co. 201
Firefighter John P. Burnside, Ladder Co. 20
Firefighter Thomas M. Butler, Squad Co. 1
Firefighter Patrick D. Byrne, Ladder Co. 101
Firefighter George C. Cain, Ladder Co. 7
Firefighter Salvatore B. Calabro, Ladder Co. 101
Firefighter Michael F. Cammarata, Ladder Co. 11
Firefighter Brian Cannizzaro, Ladder Co. 101
Firefighter Dennis M. Carey, Haz-Mat Co. 1
Firefighter Michael S. Carlo, Engine Co. 230
Firefighter Michael T. Carroll, Ladder Co. 3
Firefighter Peter J. Carroll, Squad Co. 1
Firefighter Thomas A. Casoria, Engine Co. 22
Firefighter Michael J. Cawley, Ladder Co. 136
Firefighter Vernon P. Cherry, Ladder Co. 118
Firefighter Nicholas P. Chiofalo, Engine Co. 235
Firefighter John G. Chipura, Engine Co. 219
Firefighter Michael J. Clarke, Ladder Co. 2
Firefighter Steven Coakley, Engine Co. 217
Firefighter Tarel Coleman, Squad Co. 252
Firefighter John M. Collins, Ladder Co. 25
Firefighter Robert J. Cordice, Engine Co. 152
Firefighter Ruben D. Correa, Engine Co. 74
Firefighter James R. Coyle, Ladder Co. 3
Firefighter Robert J. Crawford, Safety Battalion 1
Firefighter Thomas P. Cullen, III, Squad Co. 41
Firefighter Robert Curatolo, Ladder Co. 16
Firefighter Michael D. D'Auria, Engine Co. 40
Firefighter Scott M. Davidson, Ladder Co. 118
Firefighter Edward J. Day, Ladder Co. 11
Firefighter Martin N. DeMeo, Haz-Mat Co. 1
Firefighter David P. DeRubbio, Engine Co. 226
Firefighter Gerard P. Dewan, Ladder Co. 3
Firefighter George DiPasquale, Ladder Co. 2
Firefighter Gerard J. Duffy, Ladder Co. 21
Firefighter Michael J. Elferis, Engine Co. 22
Firefighter Francis Esposito, Engine Co. 235
Firefighter Robert E. Evans, Engine Co. 33
Firefighter Terrence P. Farrell, Rescue Co. 4
Firefighter Lee S. Fehling, Engine Co. 235
Firefighter Alan D. Feinberg, Battalion 9
Firefighter Michael C. Fiore, Rescue Co. 5
Firefighter John J. Florio, Engine Co. 214
Firefighter Thomas J. Foley, Rescue Co. 3
Firefighter Robert J. Foti, Ladder Co. 7
Firefighter Thomas Gambino, Jr., Rescue Co. 3
Firefighter Thomas A. Gardner, Haz-Mat Co. 1
Firefighter Matthew D. Garvey, Squad Co. 1
Firefighter Bruce H. Gary, Engine Co. 40
Firefighter Gary P. Geidel, Rescue Co. 1
Firefighter Denis P. Germain, Ladder Co. 2
Firefighter James A. Giberson, Ladder Co. 35
Firefighter Paul J. Gill, Engine Co. 54
Firefighter Jeffrey J. Giordano, Ladder Co. 3
Firefighter John J. Giordano, Engine Co. 37
Firefighter Keith A. Glascoe, Ladder Co. 21
Firefighter James M. Gray, Ladder Co. 20
Firefighter Jose A. Guadalupe, Engine Co. 54
Firefighter Robert W. Hamilton, Squad Co. 41
Firefighter Sean S. Hanley, Ladder Co. 20
Firefighter Thomas P. Hannafin, Ladder Co. 5
Firefighter Dana R. Hannon, Engine Co. 26
Firefighter Daniel E. Harlin, Ladder Co. 2
Firefighter Timothy S. Haskell, Squad Co. 18
Firefighter Michael H. Haub, Ladder Co. 4
Firefighter John F. Heffernan, Ladder Co. 11
Firefighter Ronnie L. Henderson, Engine Co. 279
Firefighter Joseph P. Henry, Ladder Co. 21
Firefighter William L. Henry, Rescue Co. 1
Firefighter Thomas J. Hetzel, Ladder Co. 13
Firefighter Jonathan R. Hohmann, Haz-Mat Co. 1
Firefighter Thomas P. Holohan, Engine Co. 6
Firefighter Joseph G. Hunter, Squad Co. 288
Firefighter Jonathan L. Ielpi, Squad Co. 288
Firefighter William R. Johnston, Engine Co. 6
Firefighter Andrew B. Jordan, Ladder Co. 132
Firefighter Karl H. Joseph, Engine Co. 207
Firefighter Angel L. Juarbe, Jr., Ladder Co. 12
Firefighter Paul H. Keating, Ladder Co. 5
Firefighter Richard J. Kelly, Jr., Ladder Co. 11
Firefighter Thomas W. Kelly, Ladder Co. 15
Firefighter Thomas J. Kennedy, Ladder Co. 101
Firefighter Michael V. Kiefer, Ladder Co. 132
Firefighter Robert C. King, Jr., Engine Co. 33
Firefighter Scott M. Kopytko, Ladder Co. 15
Firefighter William E. Krukowski, Ladder Co. 21
Firefighter Thomas J. Kuveikis, Squad Co. 252
Firefighter David J. LaForge, Ladder Co. 20
Firefighter William D. Lake, Rescue Co. 2
Firefighter Robert T. Lane, Engine Co. 55
Firefighter Peter J. Langone, Squad Co. 252
Firefighter Scott A. Larsen, Ladder Co. 15
Firefighter Neil J. Leavy, Engine Co. 217
Firefighter Daniel F. Libretti, Rescue Co. 2
Paramedic Carlos R. Lillo, EMS Battalion 49
Firefighter Robert T. Linnane, Ladder Co. 20
Firefighter Michael F. Lynch, Engine Co. 40
Firefighter Michael J. Lyons, Squad Co. 41
Firefighter Joseph Maffeo, Ladder Co. 101
Firefighter William J. Mahoney, Rescue Co. 4
Firefighter Joseph E. Maloney, Ladder Co. 3
Firefighter Kenneth J. Marino, Rescue Co. 1
Firefighter John D. Marshall, Engine Co. 23
Firefighter Joseph A. Mascali, Rescue Co. 5
Firefighter Keithroy M. Maynard, Engine Co. 33
Firefighter Brian G. McAleese, Engine Co. 226
Firefighter John K. McAvoy, Ladder Co. 3
Firefighter Thomas J. McCann, Engine Co. 65
Firefighter Dennis P. McHugh, Ladder Co. 13
Firefighter Robert D. McMahon, Ladder Co. 20
Firefighter Robert W. McPadden, Engine Co. 23
Firefighter Terence A. McShane, Ladder Co. 101
Firefighter Timothy P. McSweeney, Ladder Co. 3
Firefighter Martin E. McWilliams, Engine Co. 22
Firefighter Raymond M. Meisenheimer, Rescue Co. 3
Firefighter Charles R. Mendez, Ladder Co. 7
Firefighter Steve J. Mercado, Engine Co. 40
Firefighter Douglas C. Miller, Rescue Co. 5
Firefighter Henry A. Miller, Jr., Ladder Co. 105
Firefighter Robert J. Minara, Ladder Co. 25
Firefighter Thomas Mingione, Ladder Co. 132
Firefighter Manuel Mojica, Squad Co. 18
Firefighter Carl E. Molinaro, Ladder Co. 2
Firefighter Michael G. Montesi, Rescue Co. 1
Firefighter Vincent S. Morello, Ladder Co. 35
Firefighter Christopher M. Mozzillo, Engine Co. 55
Firefighter Richard T. Muldowney, Jr., Ladder Co. 7
Firefighter Michael D. Mullan, Ladder Co. 12
Firefighter Dennis M. Mulligan, Ladder Co. 2
Firefighter Peter A. Nelson, Rescue Co. 4
Firefighter Gerard T. Nevins, Rescue Co. 1
Firefighter Dennis P. O'Berg, Ladder Co. 105
Firefighter Douglas E. Oelschlager, Ladder Co. 7
Firefighter Joseph J. Ogren, Ladder Co. 3
Firefighter Samuel P. Oitice, Ladder Co. 4
Firefighter Patrick J. O'Keefe, Rescue Co. 1
Firefighter Eric T. Olsen, Ladder Co. 15
Firefighter Jeffrey J. Olsen, Engine Co. 10
Firefighter Steven J. Olson, Ladder Co. 3
Firefighter Kevin M. O'Rourke, Rescue Co. 2
Firefighter Michael J. Otten, Ladder Co. 35
Firefighter Jeffrey A. Palazzo, Rescue Co. 5
Firefighter Frank Palombo, Ladder Co. 105
Firefighter James N. Pappageorge, Engine Co. 23
Firefighter Robert E. Parro, Engine Co. 8
Firefighter Durrell V. Pearsall, Rescue Co. 4
Firefighter Christopher J. Pickford, Engine Co. 201
Firefighter Shawn E. Powell, Engine Co. 207
Firefighter Vincent A. Princiotta, Ladder Co. 7
Firefighter Kevin M. Prior, Squad Co. 252
Firefighter Lincoln Quappe, Rescue Co. 2
Firefighter Leonard J. Ragaglia, Engine Co. 54
Firefighter Michael P. Ragusa, Engine Co. 279
Firefighter Edward J. Rall, Rescue Co. 2
Firefighter Adam D. Rand, Squad Co. 288
Firefighter Donald J. Regan, Rescue Co. 3
Firefighter Christian Regenhard, Ladder Co. 131
Firefighter Kevin O. Reilly, Engine Co. 207
Firefighter James C. Riches, Engine Co. 4
Firefighter Joseph R. Rivelli, Jr., Ladder Co. 25
Firefighter Michael E. Roberts, Engine Co. 214
Firefighter Michael E. Roberts, Ladder Co. 35
Firefighter Anthony Rodriguez, Engine Co. 279
Firefighter Matthew S. Rogan, Ladder Co. 11
Firefighter Nicholas P. Rossomando, Rescue Co. 5
Firefighter Paul G. Ruback, Ladder Co. 25
Firefighter Stephen Russell, Engine Co. 55
Firefighter Thomas E. Sabella, Ladder Co. 13
Firefighter Christopher A. Santora, Engine Co. 54
Firefighter John A. Santore, Ladder Co. 5
Firefighter Gregory T. Saucedo, Ladder Co. 5
Firefighter Dennis Scauso, Haz-Mat Co. 1
Firefighter John A. Schardt, Engine Co. 201
Firefighter Thomas G. Schoales, Engine Co. 4
Firefighter Gerard P. Schrang, Rescue Co. 3
Firefighter Gregory R. Sikorsky, Squad Co. 41
Firefighter Stephen G. Siller, Squad Co. 1
Firefighter Stanley S. Smagala, Jr., Engine Co. 226
Firefighter Kevin J. Smith, Haz-Mat Co. 1
Firefighter Leon Smith, Jr., Ladder Co. 118
Firefighter Robert W. Spear, Jr., Engine Co. 26
Firefighter Joseph P. Spor, Rescue Co. 3
Firefighter Gregory M. Stajk, Ladder Co. 13
Firefighter Jeffrey Stark, Engine Co. 230
Firefighter Benjamin Suarez, Ladder Co. 21
Firefighter Daniel T. Suhr, Engine Co. 216
Firefighter Brian E. Sweeney, Rescue Co. 1
Firefighter Sean P. Tallon, Ladder Co. 10
Firefighter Allan Tarasiewicz, Rescue Co. 5
Firefighter Paul A. Tegtmeier, Engine Co. 4
Firefighter John P. Tierney, Ladder Co. 9
Firefighter John J. Tipping, II, Ladder Co. 4
Firefighter Hector L. Tirado, Jr., Engine Co. 23
Firefighter Richard B. Van Hine, Squad Co. 41
Firefighter Peter A. Vega, Ladder Co. 118
Firefighter Lawrence G. Veling, Engine Co. 235
Firefighter John T. Vigiano, II, Ladder Co. 132
Firefighter Sergio G. Villanueva, Ladder Co. 132
Firefighter Lawrence J. Virgilio, Squad Co. 18
Firefighter Kenneth T. Watson, Engine Co. 214
Firefighter Michael T. Weinberg, Engine Co. 1
Firefighter David M. Weiss, Rescue Co. 1
Firefighter Timothy M. Welty, Squad Co. 288
Firefighter Eugene M. Whelan, Engine Co. 230
Firefighter Edward J. White, Engine Co. 230
Firefighter Mark P. Whitford, Engine Co. 23
Firefighter Raymond R. York, Engine Co. 285

FDNY members who became ill and lost their lives after performance of duty in the WTC rescue/recovery effort as of August 6, 2021.



Firefighter Gary E. Celentani, Engine 233
Firefighter Robert W. Dillon, Engine 153
Firefighter Vanclive A. Johnson, Ladder 135
Firefighter Russell C. Brinkworth, Ladder 135
Firefighter Edward V. Tietjen, Ladder 48
Firefighter Walter Voight, Ladder 144
Battalion Chief Kevin R. Byrnes, Battalion 7
Firefighter Stephen M. Johnson, Ladder 25
Lieutenant Richard M. Burke, Engine 97
Firefighter Michael Sofia, Engine 165
Firefighter Joseph T. Callahan, Engine 245
Firefighter Joseph P. Costello, Battalion 58
Firefighter William R. O'Connor, Ladder 84
Lieutenant Reinaldo Natal, Field Communications Unit
Paramedic Deborah Reeve, EMS Station 20
Lieutenant Cruz Antonio Fernandez, Ladder 111
Fire Marshal William Wilson, Jr., Manhattan Base
Lieutenant Thomas J. Hodges, Engine 313
Firefighter Robert J. Wieber, Engine 262
Lieutenant Joseph P. Colleluori, Jr., Engine 324
Firefighter Michael J. Shagi, Engine 74
Firefighter William R. St. George,
Battalion Special Operations Command
Firefighter Raymond W. Hauber, Engine 284
EMS Lieutenant Brian Ellicott, EMS Dispatch
Firefighter William E. Moreau, Engine 166
Lieutenant John P. Murray, Engine 165
Firefighter Sean M. McCarthy, Engine 280
Firefighter Bruce M. Foss, Ladder 108
Firefighter Jacques W. Paultre, Engine 50
Firefighter Martin C. Simmons, Ladder 111
Firefighter Kevin M. Delano, Sr., Ladder 142
Lieutenant Vincent J. Tancredi, II, Ladder 47
Paramedic Clyde F. Sealey, BHS
Firefighter Timothy G. Lockwood, Engine 275
Firefighter Anthony Alese, Engine 9
Firefighter Edward F. Reilly, Jr., Ladder 160
Firefighter John F. McNamara, Engine 234
Lieutenant Thomas G. Roberts, Ladder 40
Captain Kevin J. Cassidy, Engine 320
Firefighter Joan R. Daley, Engine 63
Firefighter Richard A. Manetta, Ladder 156
Lieutenant Peter J. Farrenkopf, Marine 6
Battalion Chief John J. Vaughan, Battalion 3
Firefighter Robert A. Ford, Engine 284
Paramedic Carene A. Brown, EMS BOT
Firefighter James J. Ryan, Ladder 167
Lieutenant Robert M. Hess, Ladder 76
EMT Freddie Rosario, EMS Station 4
Lieutenant Harry Wanamaker, Jr., Marine 1
Supervisor Communications/ Electrician
Philip J. Berger, Outside Plant Operations
Firefighter Vincent J. Albanese, Ladder 38
Firefighter Robert J. Ventriglia, Engine 207
Firefighter John P. Sullivan, Jr., Ladder 34
Firefighter Roy W. Chelsen, Engine 28
Firefighter William H. Quick, Ladder 134
Lieutenant Andrew M. Borgese, Engine 326
Firefighter John F. O'Neill, Ladder 52
Firefighter Willie T. Franklin, Jr., Engine 65
Lieutenant Randy J. Wiebicke, Ladder 1
Firefighter Brian C. Malloy, Ladder 80
Lieutenant John A. Garcia, Ladder 5
Firefighter Anthony J. Nuccio, Ladder 175
Fire Marshal Steven C. Mosiello,
Chief of Department's Office
Firefighter Carl Capobianco, Ladder 87
Captain Emilio R. Longo, Ladder 110
Firefighter Raymond Ragucci, Engine 5
Deputy Chief William J. Guido, Marine Division
Captain Sheldon Barocas, Engine 251
Firefighter Virginia A. Spinelli, Engine 329
Deputy Assistant Chief EMS John S. McFarland,
EMS Operations
Lieutenant Robert J. Stegmeier, Ladder 127
Lieutenant Mark W. McKay, Ladder 45
Firefighter Owen T. Carlock, Ladder 122
EMT Anthony J. Ficara, Station 43
Lieutenant Patrick J. Sullivan, Ladder 58
Firefighter Michael F. Mongelli, Battalion 39
Firefighter Lawrence J. Sullivan, Rescue 5
Firefighter Michael G. Behette, Ladder 172
Battalion Chief Thomas R. Van Doran, Battalion 3
Battalion Chief Richard E. McGuire, Battalion 51
EMT Joseph V. Schiumo, Station 20
Paramedic Ruben I. Berrios, Station 20
Firefighter Walter Torres, Engine 328
Battalion Chief John K. Corcoran, Battalion 52
Firefighter Andrew D. Dal Cortivo, Engine 227
Lieutenant Martin T. Fullam, Ladder 87
Firefighter Charles L. Jones III, Ladder 165
Battalion Chief Richard D. Arazosa, Battalion 19
Supervising Fire Marshal Emil K. Harnischfeger,
Bureau of Fire Investigation
EMS Lieutenant Douglas Mulholland, Station 35
Captain Peter J. Casey, Engine 212
Paramedic Rudolph T. Havelka,
EMS Bureau of Training
EMT Francis A. Charles, EMS Station 58
Paramedic John W. Wyatt, Jr., EMS Station 22
EMT Luis de Peña, EMS Station 13
Firefighter Adolfo Otaño, Engine 202
EMS Lieutenant Michael F. Cavanagh,
EMS Station 16
Deputy Chief Inspector James W. Mandelkow,
Bureau of Fire Prevention
Lieutenant Thomas J. Greaney, Ladder 175
Firefighter Keith E. Atlas, Engine 35
Auto Mechanic Raffaele E. Scarpitti, Shops
EMS Lieutenant Walter J. Nelson, Jr., Station 31
Lieutenant John J. Halpin, Ladder 33
EMS Captain William C. Olsen, EMS Station 23
Lieutenant Steven B. Reisman, Engine 307
Firefighter Ronald R. Brenneisen, Ladder 43
Lieutenant John K. Gremse, Engine 302
Firefighter Daniel E. Heglund, Rescue 4
Firefighter Robert E. Leaver, Division 3
Lieutenant Howard J. Bischoff, Ladder 149
Firefighter Cornell L. Horne, Ladder 176
EMS Lieutenant Thomas Giammarino,
EMS Station 31
Firefighter Eugene J. McCarey, Ladder 36
Firefighter James J. Marshall, Ladder 78
Firefighter Charles S. Szoke, Ladder 21
Firefighter Richard E. Nogan, Ladder 113
Battalion Chief John J. Cassidy, Battalion 40
Captain John R. Graziano, Ladder 78
Firefighter Gregory A. Chevalley, Ladder 176
Battalion Chief George D. Eysser, Battalion 35
Firefighter James M. Hicks, Engine 7
Captain John Gallagher, Engine 251
Lieutenant Keith M. Loughlin, Ladder 109
Captain Thomas J. Thompson, Engine 306
EMS Lt. Harold E. McNeil Sr., Station 31
Lieutenant Gary J. Gates, Field Comm. Unit
Firefighter Dennis J. Heedles Sr., Engine 151
Firefighter Nicholas J. DeMasi, Engine 259
Firefighter Thomas A. Lynn, Engine 5
Battalion Chief James N. Costello, Battalion 4
Firefighter Frank D. Fontaino, Engine 155
Firefighter Michael P. Smith, Ladder 58
Firefighter Thomas J. Kelly, Ladder 19
EMT Norman Valle, Station 20
Firefighter Joseph A. Morstatt, Ladder 45
Lieutenant Robert G. Alford, Engine 231
Firefighter Thomas Farrell, Ladder 41
Firefighter Robert W. Johnson, Engine 81
Fire Marshal Gregorio Morales, Bronx Base
Firefighter William E. Woodlon, Engine 21
Lieutenant Ronald D. Biller, Engine 151
Captain Vincent R. Ungaro, Engine 235
Firefighter Paul F. Santoro, Engine259
Firefighter Robert M. Gless, Engine 329
Firefighter John A. Dunn, Engine 230
Firefighter Harry L. Davis, Squad 18
Lieutenant Raymond W. Alexander, Engine 70
Firefighter Joseph P. O'Toole, Ladder 41
Firefighter Kevin A. Rooney, Engine 42
Firefighter Brian J. Masterson, Marine 9
Firefighter Robert F. DiGiovanni, Ladder 144
EMS Lieutenant Edith E. Torres,
Bur. of Communications/EMD
Firefighter Robert E. Newman, Ladder 18
EMT Rose M. Scott, Bureau of Communications
Lieutenant Steven Sorger, Engine 6
EMS Lieutenant Mario Bastidas, Station 58
Firefighter Roy E. Smith, Engine 156
Firefighter James J. Lanza, Ladder 43
Paramedic Mark A. Harris, Station 23
Firefighter Raymond J. Pfeifer, Engine 40
Lieutenant William J. Kelly, Ladder 116
Firefighter William J. Gormley, Ladder 174
Firefighter John B. O'Brien, Engine 329
Firefighter Michael L. Duffy, Ladder 174
Marine Engineer Robert W. Alexander, Marine 1
BC Joseph D. McKeon, Battalion 46
Firefighter Michael R. O'Hanlon, Engine 68
Doctor Michael G. Guttenberg, OMA
Firefighter Robert M. Tilearcio, Engine 266
Lieutenant Edward J. McDonagh, Engine 37
Lieutenant Joseph R. Stach, Jr., Ladder 6
Firefighter Raymond R. Phillips, Jr, Rescue 3
Firefighter Ronald P. Svec, Ladder Company 82
Lieutenant Edward T. Meehan, Ladder 22
Captain Victor C. Valva, Engine 167
Deputy Chief Joeddy Friszell, EMS Division 3
Firefighter Paul R. Tokarski, Ladder 164
Pilot Thomas P. Phelan, Marine 9
Firefighter Keith R. Young, Ladder 158
Marine Engineer John L. Buhler, Marine 6
Firefighter George F. Froehlich, Ladder 87
Firefighter Brent G. Crobak, Engine 251
Firefighter James J. Hurson, Engine 318
Firefighter Robert J. Lembo, Ladder 144
Assistant Chief Ronald R. Spadafora,
Bureau of Fire Prevention
Firefighter Charles Williams, Ladder 111
Battalion Chief Robert P. Miuccio, Battalion 22
Firefighter Michael T. McDonald, Ladder 128
Firefighter Jimmy Martinez, Engine 157
Firefighter Dennis G. Heaney, Ladder 157
Firefighter John R. Elges, Ladder 134
EMT Felipe A. Torre, Bureau of Training
Paramedic Martha Stewart, Station 8
EMT Joseph A. Rodriguez, Station 58
Firefighter Daniel C. Bove, Engine 251
Captain John S. Moschella, Engine 26
Firefighter Richard H. Meehan, Battalion 06
Lieutenant Timothy P. O'Neill, Ladder 5
Firefighter Kevin E. Lennon, Ladder 175
Captain Robert E. Collis, Engine 304
Lieutenant John T. Moran, Ladder 41
Firefighter Joseph Walsh, Ladder 32
Firefighter Lloyd W. Stuart, Engine 3
Firefighter Kevin J. Nolan, Engine 79
Firefighter Richard N. Driscoll, Engine 91
Auto Mechanic James J. Sottile, Shops
Firefighter Robert B. Fitzgibbon, Engine 47
Firefighter Walter E. McKee, Battalion 39
Firefighter John W. Boyle, Rescue 1
Firefighter Joseph R. Losinno, Engine 302
Firefighter Roger Espinal, Engine 320
Firefighter Richard J. Tanagretta, Rescue 5
Firefighter Andrew S. Gargiulo, Engine 160
Lieutenant Richard G. Estreicher, Engine 248
Firefighter Clifford R. DiMuro, Ladder 137
Captain Dennis M. Gilhooly, Engine 67
Firefighter Brian W. Casse, Engine 294
Firefighter Michael L. Feldman, Ladder 161
Firefighter Richard B. Jones, Ladder 25
Lieutenant Paul W. Deo, Jr., Engine 317
Firefighter Joseph A. Hatzelman, Engine 218
Firefighter Daniel R. Foley, Rescue 3
Battalion Chief Dennis J. Moynihan, Battalion 18
Lieutenant Donald Franz, Engine 329
Firefighter Anthony R. Iraci, Engine 155
Firefighter John H. Marr, Engine 34
Firefighter Paul J. Greco, Squad 270
Lieutenant Kevin C. Dunn, Engine 251
Firefighter Anthony J. Catapano, Engine 202
Firefighter Paul A. McManaman, Squad 252
Assoc. Electrical Inspector Michael Kavolius,
Bureau of Fire Prevention
Firefighter John P. Fogarty, Ladder 3
Firefighter Timothy J. Burke, Rescue 5
EMT Rene Sanchez,
Bureau of Investigations and Trials
Lieutenant John P. Poulos, Engine 266
Firefighter William Hodgens, Engine 160
Fire Marshal Robert J. Kelly, ADMBFI
Firefighter Thomas G. Manley, Ladder 113
Firefighter Ronald P. Stortz, Ladder 107
Lieutenant Gerard C. McGibbon, Engine 217
EMS Lt Paige A. Humphries, Staton16
Firefighter Dennis A. Farrell, Ladder 59
Firefighter George H. Wilton, Jr., Ladder 84
Firefighter Joseph M. Boyle, Engine 38
Captain Frank A. Portelle, Division 6
Firefighter Joseph K. Daly, Engine 218
Firefighter James D. Shaughnessy, Battalion 11
Lieutenant James J. Winters, Engine 278
Captain John J. Galvin, Division 8
Firefighter Sean D. Kenny, Engine 155
Firefighter Thomas G. Oelkers, Ladder 44
Firefighter Anthony Malfi, Ladder 168
Firefighter Wayne T. Goehring, Engine 311
Paramedic Stephenson McCoy, Station 22