Managing Chronic Illness in Patients

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Health Status of Rescue Workers Improved by Sauna Detoxification

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Chemical Exposures at the World Trade Center

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Use of the Hubbard Sauna Detoxification Regimen to Improve the Health Status of New York City Rescue Workers Exposed to Toxicants

Background

On September 11, 2001, the attack and collapse of the gigantic World Trade Center towers caused an enormous release of toxic substances into a densely populated urban environment. These included asbestos, radionuclides, benzene, dioxins, polychlorinated biphenyls (PCBs), fiberglass, mercury, lead, silicon, sulfuric acid[29] – agents associated with cancer as well as severe lung pathology, neurological and cardiovascular disease, and a myriad of immune dysfunctions.

Emergency workers were exposed to unprecedented levels of these chemicals and breakdown products during the ensuing eight and one-half month rescue and cleanup effort. Daily exposures continued as firefighters, paramedics, police, clean-up crews, and other personnel continued their efforts, working long hours for over eight months after the attack. Personal Protective Equipment (PPE) was not always available or was generally ineffective in preventing the rescue workers from absorbing contaminants by inhalation, ingestion, or dermal exposure.[8]

There is no doubt that the tens of thousands of men and women who participated in the rescue and recovery operations were exposed to a wide range of toxins, many of which are known to accumulate in body tissues, with half-lives measured in years or decades.[12,28] Exposure symptoms have not abated with time; instead, a substantial number of those exposed are experiencing worsening health status involving multiple organ systems. Studies demonstrate a definite link between exposures to WTC-derived airborne pollutants and respiratory disease.[2]

The acute complaints of emergency responders were often pulmonary.[14,19,38] However, other debilitating health consequences exist. The depression, anger, and low motivation commonly reported among this population and assigned to Post-Traumatic Stress Disorder are more likely indicative of toxic encephalopathy.[16] Other major concerns include persistent pulmonary and digestive tract inflammatory syndromes, such as reactive airways dysfunction syndrome (RADS), reactive upper airways dysfunction syndrome (RUDS), gastroesophageal reflux disease (GERD), and inflammatory pulmonary parenchymal syndromes, as well as respiratory tract and non-respiratory malignancies.[5,10,47]

Sauna Detoxification

The method of detoxification developed by Mr. Hubbard is a precise protocol documented for mobilizing fat-stored toxins and enhancing their elimination while restoring metabolic balance. The protocol has long been established as safe.[45] Previous case reports,[39,51] as well as a number of non-randomized, controlled studies of exposed workers (including firefighters),[21] demonstrate that detoxification reduces body burdens of PCBs, PBBs, dioxins, various drugs, and pesticides[44,46] with concurrent symptomatic improvement.[44,20,22]

Publications over the past two decades also show that this regimen can improve memory, cognitive functions, immune parameters, and general physical condition in different study populations.[44,46]

The detoxification protocol is standardized[17] and includes the following:

• A daily regimen of physical exercise, immediately followed by forced sweating in a sauna at 140-180°F for two-and-a-half to five hours with short breaks for hydration to offset the loss of body fluids and cooling.

• Nutritional supplementation centered on gradually increasing doses of crystalline niacin (nicotinic acid) to promote lipid mobilization of stored toxicants and stimulate circulation.

• Administration of additional vitamins, minerals, electrolytes, and oils includes vitamins A, D, C, E, B complex, B1; multi-minerals including calcium, magnesium, iron, zinc, manganese, copper, and iodine; sodium and potassium; and a blend of polyunsaturated oils including soy, walnut, peanut, and safflower.

Each of these program components have biologic roles that support healing. The integrity of physiological systems – including those associated with detoxification, cellular repair, immune processes, and neural and endocrine function – depends upon nutritional and vitamin status. Of note are niacin and the use of oils as a source of essential fatty acids. The inclusion of a balanced complement of additional nutrients is aimed at maintaining supplies adequate for increased demand.

Niacin can shift the adipose-blood equilibrium of toxin concentrations by stimulating release of fatty acids from

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Figure 1: Improvement in Health-Related Quality of Life

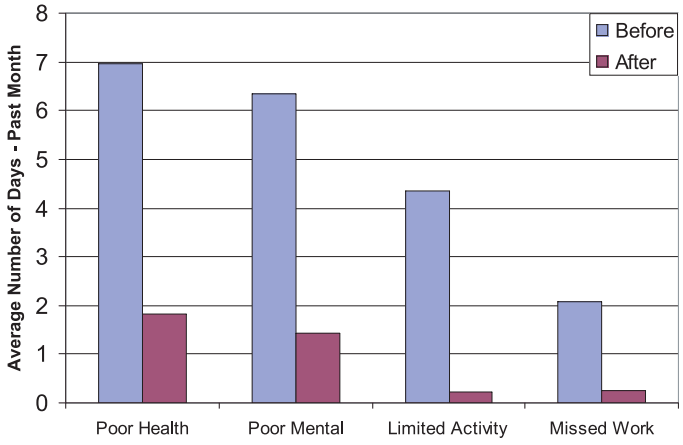


Figure 2: Change in Symptom Severity with Detoxification

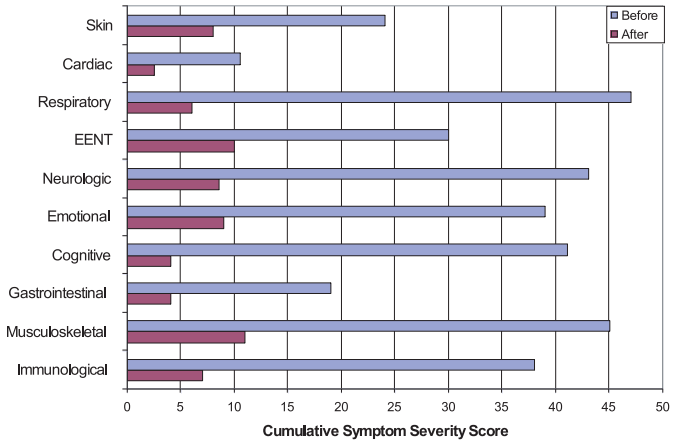


Figure 3: Change in Use of Medications with Detoxification: N = 324

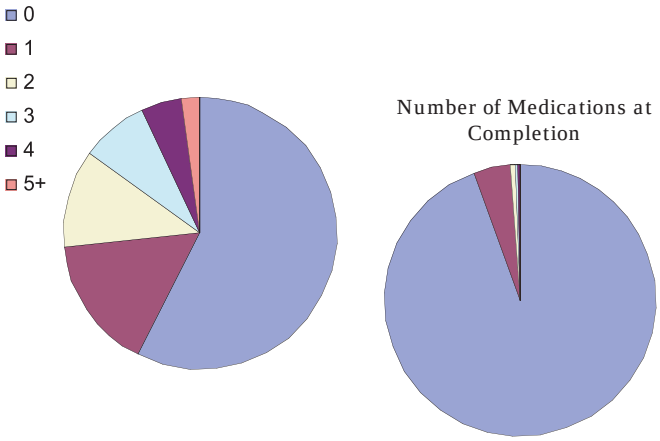


Figure 4: Change in Balance Test: N-53

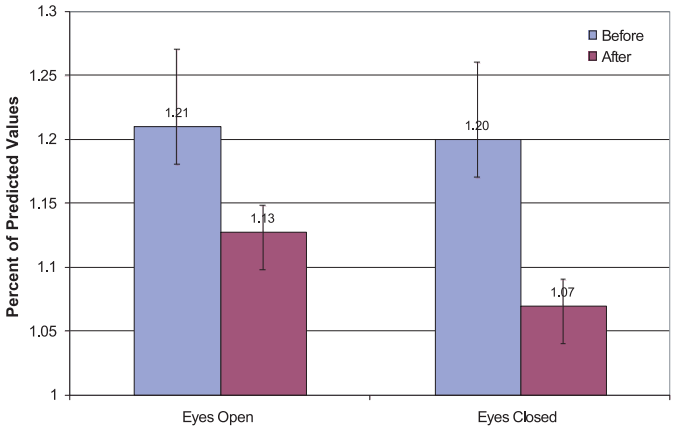


Figure 5: Change in Reaction Time with Detoxification: N=58

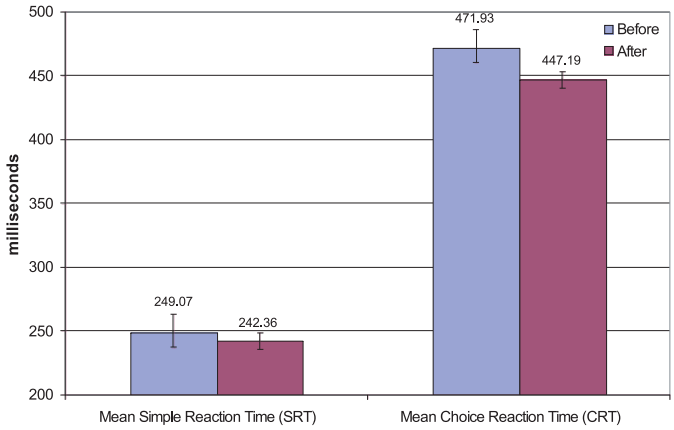
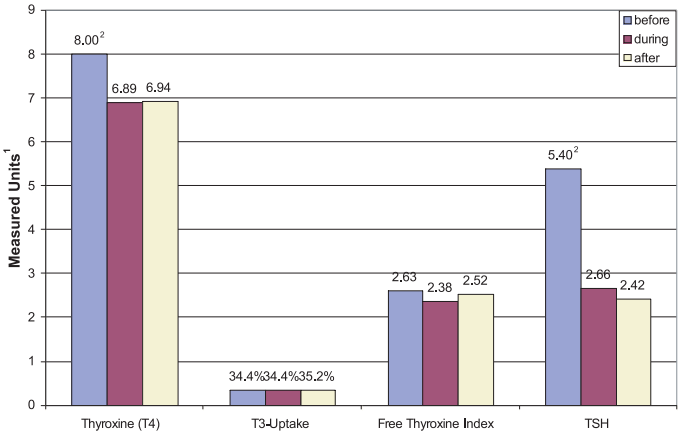


Figure 6: Average Thyroid Hormone Levels



1. Reference thyroxine (T4) levels are 4.0-12.0 ug/dL; reference T3 is 24-39%; reference free thyroxine is 1.1-4.5 ug/dL; and reference TSH is 0.27-4.2 uIU/mL
2. Statistically significant ($p < 0.05$).

PCBs.[7] Niacin raises high density cholesterol (HDL-C) more effectively than either of the common pharmacologic interventions, statin or fibrate therapy, and has been proven to reduce cardiovascular events in monotherapy studies.[4]

Niacin coenzymes are necessary for more than 500 enzymatic reactions, particularly in the form of nicotinamide adenine dinucleotide (NAD).[36] Niacin coenzymes are required for biotransformation of foreign compounds as a step in eliminating those compounds from the body.[24] They also regulate liver detoxification pathways so that the activated radicals of phase I detoxification are rapidly conjugated with glutathione or other compounds during phase II.[48] Further, marginal deficiencies in folate, vitamin B12, niacin, and zinc increase the rate of spontaneous chromosome damage.[9] Niacin coenzymes regulate DNA strand break repair.[30,54]

Inclusion of polyunsaturated oils enhances detoxification and also replaces the essential fatty acids mobilized from stores. The walnut and soy oils used in this regimen contain high levels of omega-3 fatty acids; the safflower, soy, and peanut oils are rich in omega-6 fatty acids. Polyunsaturated oils can line the intestine and prevent re-uptake of toxins that have been eliminated through large intestine pathways.[40] Oils may also have a direct effect on toxin elimination.[33,41,42]

This rehabilitative therapy is provided on a daily basis, seven days a week, and averages 33 days for completion. (The range was 23-106 days.) Body weight, pulse, and blood pressure are monitored before and after each daily session with body weight kept constant throughout. Physicians monitor individual client programs.

Rehabilitating Rescue Workers

Recognizing that they had had an unprecedented exposure, a group of firefighters and union officials felt that a program should be available to rescue workers that specifically addressed body accumulations of toxins. They contacted the Foundation for Advancements in Science and Education (FASE) for assistance in making the detoxification regimen available to exposed personnel.

An independent facility funded by private donations was set up in September 2002 in lower Manhattan, providing this therapy without charge. To date, more than 500 have completed the program in Manhattan and at a second facility established on Long Island. The great majority have been uniformed rescue workers, including firefighters, paramedics, sanitation workers, and police. A small number of individuals who lived or worked in the WTC or near the site have also completed the program.

The primary goal of this project is to restore quality of life and job fitness to those exposed to toxic materials at the WTC site. The focus to date has been to identify individuals who are not responding, or not recovering fully, after receiving medical treatments being offered to WTC exposure victims.

Outcome Measures

Individuals are referred to the project because of persistent symptoms following exposure to WTC toxins. The project's rehabilitative goal emphasizes restored quality of life ("wellness"). Additionally, the project includes ongoing tests to identify the full range of health effects associated with the WTC exposures and evaluating the efficacy of detoxification in resolving specific effects. A complete set of tests are given before and after detoxification.

To evaluate the effectiveness of this rehabilitative therapy, participants are given a structured medical examination. Participants also complete a comprehensive Health History and Symptom Survey developed specifically for this project. This survey gathers basic demographic information; employment history and relevant work exposure questions; recent symptomatology focusing on the cluster of symptoms common to environmental exposures; and the number of lost workdays. Clients also undergo intelligence quotient (IQ) testing, as well as a panel of standard laboratory tests including CBC, comprehensive metabolic panel, thyroid panel, lipid panel, ECG, and urinalysis.

The First Three Years: Review of 484 Cases

As previously noted, more than 500 men and women who were exposed to World Trade Center contaminants have completed the detoxification program. This report summarizes a recent review of medical folders from the 484 men and women who enrolled in the program between September 2002 and September 2005: 273 firefighters, 52 sanitation workers, 19 paramedics, 23 police officers, and 117 others. Of these, 63 individuals left the program prior to completion. These results indicate a range of benefits that sum up to improved quality of life and job fitness.

The number in each test sample varies to some extent. Certain tests were added or changed as the project evolved, and therefore not all tests were performed on all clients. Results are described only for those individuals who had multiple data points on that test. Emphasis has been placed on the findings of greatest interest.

A. Healthy Days and Job Fitness

Three core questions from the CDC Health-Related Quality of Life instrument are included in the structured health history and symptom survey. These quantify the number of days physical and mental health was not good, as well as how many days poor physical or mental health kept individuals from doing their usual activities, such as self-care, work, or recreation. These were completed by all clients who underwent detoxification after June 2005.

- Prior to enrollment individuals averaged 4.4 days of limited activity and 2.1 days missed work per month.
- After detoxification, these individuals reported 0.2 days of missed work or limited activities (this includes the month they underwent therapy). (See Figure 1.)

A majority of rescue workers seeking detoxification treatment are concerned that their health problems might force them to leave their jobs. The majority of these individuals are between 35 and 45 years of age (ranging from 20 to 77 years); many have young children. While forced retirement of these men would be costly to the city, the disability benefits that each individual man might expect are not sufficient to support a family. Thus, anxieties about health are compounded by financial concerns and further complicated by a determination to continue on the job without mentioning symptoms.

B. Symptom Severity

The Health History and Symptom Survey consists of 50 items on ten scales for systems commonly impacted by chemical exposure and is used to assess ➤

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changes in symptoms over the course of sauna detoxification. Responses are normalized to take into account the fact that there are different numbers of questions per category of symptoms. Improvements on all symptom scales (manifestations consistent with exposures to the range of toxicants known to be released at the WTC site) were especially strong. (See Figure 2.)

C. Need for Medication

The case review revealed that almost half the individuals were taking as many as 16 medications to relieve their exposure symptoms. At program completion, 84% of those clients no longer required medication because their exposure symptoms abated. Of the seven percent still taking medicine, use was reduced to only a single medication in most cases. As these symptoms abate, clients are able to reduce and ultimately eliminate the medications they are taking. (See Figure 3.)

These clients work in professions that require a high level of fitness. Those who had been on medications for an extended period experienced the side effects as unwelcome (if not dangerous) impediments to both their accustomed state of well-being and their job fitness.

D. Vestibular Function

Impairment of vestibular function is associated in the literature with toxic exposures.[34,35] The postural sway test is a sensitive and reliable method of measuring balance developed for field use measuring the mean speed along the path moved with eyes open and when eyes are closed.[23] Pre/post detoxification balance testing was completed on a random cohort of firefighters exposed to WTC toxins. There is a statistically significant difference ($p = 0.012$) between sway test results before and after detoxification, with the pre-detoxification measurements significantly impaired, as demonstrated by increased sway speed, compared with predicted results of reference populations (see the "zero" line in Figure 3).

Balance is crucial to firefighters. If balance is impaired, a firefighter may not be able to remain upright in a dark area. Following detoxification, the exposed firefighters have sway test values that approach those of an unexposed reference population. (See Figure 4.)

E. Reaction Time

Impairment of Choice Reaction Time (CRT) has been previously shown in firefighters exposed to PCBs.[21,32] CRT testing measures cognitive function: vigilance, discrimination, and speed of reaction (abilities that are obviously crucial to firefighters, police, or paramedics). Pre/post detoxification CRT testing was completed on a random cohort of firefighters exposed to WTC toxins.

Firefighters have faster than predicted measures of both Single Reaction Time (SRT) and CRT, as seen in the negative variance from predicted results. The improvement in CRT following detoxification is statistically significant($p<0.01$) and suggests improvement in cognitive function. (See Figure 5.)

The findings of neurologic improvement are consistent with improvements noted in earlier detoxification studies involving firefighters.[21] Following a transformer fire in Shreveport, Louisiana, 17 firefighters with a history of acute exposure to polychlorinated biphenyls, dibenzofurans, and dibenzodioxins underwent neurophysiological and neuropsychological tests. Prior to detoxification, five of the 17 had abnormal current perception threshold measurements. Following therapy, all showed improvement with two clients returning to normal range. In this same study, firefighters had improved scores on memory tests, block design, trails B, and embedded figures. These findings raised the possibility that damage heretofore thought to be permanent may in many instances be partially reversible. It is interesting that in these smaller studies, vestibular and reaction time results were not observed.

F. Intelligence Quotient

Reduced IQ can be a result of toxic exposure and has significant economic impact.[13,15] All clients completed Novis Intelligence Quotient tests before and after participating in the detoxification program. Clients complete a different version of this test on each testing occasion, therefore improved test scores are not a reflection of learning.

While there is no data on the IQ levels of exposed workers prior to exposure, the measured average increase of almost four points of IQ following detoxification is statistically significant over that measured prior to therapy ($p<0.005$) and may suggest restored cognitive function.

G. Blood Cholesterol

Lipoprotein profiles are a predictive factor for atherosclerosis and coronary heart disease.[53] Low density lipoprotein (LDL-C) carries cholesterol from the liver to the cells where it is used. If supply exceeds demand, excess LDL-C can cause harmful build-up of cholesterol along arterial walls. High density lipoprotein (HDL-C) helps reverse cholesterol transport, prevents endothelial dysfunction, and contains anti-inflammatory, anti-oxidant, and antithrombotic properties. Lipoprotein profiles can be adversely affected by chemical exposure.[3]

- Before therapy, 14% of clients had total cholesterol above 240 mg/dL with 50% above 200 mg/dL. LDL-C was above 130 mg/dL in 30% of clients, and HDL-C was below 40 mg/dL in 19.5%.
- Following therapy, over 70% had total cholesterol and LDL-C levels in the desirable range. LDL-C remained above 130 mg/dL in 11.6% of clients, and HDL-C was below 40 mg/dL in 12%.

H. Thyroid Function

Over the last decade, a growing body of research has associated a range of adverse endocrine effects with toxic exposure, including thyroid effects.[49] Exposure to toxic metals, chemical poisons, and a number of drugs can also influence the peripheral fate of thyroid hormones.[18]

- Thirty percent of all clients in this group have abnormal levels of thyroid-related hormones at the start of therapy.
- Following therapy, 66% of those who had elevated levels now have normal thyroid function with the remaining third improved.

As a group, average thyroxin levels are within the normal range, though at the high end at enrollment. A statistically significant trend exists for the lowering of thyroxin levels during the detoxification process.

Pituitary production of thyroid stimulating hormone (TSH) is an early indicator of compromised thyroid activity. When the thyroid gland becomes inefficient, as in early hypothyroidism, the TSH becomes

elevated even though the T4 and T3 may still be within the "normal" range. Average TSH levels in clients are elevated prior to enrollment and return to normal range during the regimen. (See Figure 6.)

Case Study: Captain in the US Army National Guard

A 34-year-old Captain and AUH-60 Black Hawk Pilot in the US Army National Guard was deployed to the WTC rescue effort between September 11, 2001 and March 2002. Prior to deployment, he had an excellent health history with no tobacco, alcohol, or drug history. He was hospitalized on September 16th for breathing difficulties, and his medical records indicate several subsequent hospitalizations for asthma and pneumonia requiring intubation. His mental condition deteriorated including flashbacks of the WTC incident. Additional symptoms characteristic of chemical exposures developed over time including severe stomach and chest pain, memory problems, and disturbed sleep. By December 2003, the Army had revoked his flight orders, after investing approximately $3 million in his flight training.

He was referred to the New York Rescue Workers' Project by physicians after discussing the alternate possibility of a long-term steroid regimen. At enrollment into the program, he was taking ten medications daily including Albuterol, Advair, and Nexium. Laboratory tests results including CBC, comprehensive metabolic panel, thyroid panel, lipid panel, ECG, and urinalysis were all within normal ranges. Diagnosed with WTC exposure, he elected to undergo detoxification treatment.

During treatment and coincident with improved symptoms, he gradually discontinued use of all medications. On completion of sauna detoxification, he was medically evaluated by internal medicine specialists at the Deployment Health Clinical Center, a unit at Walter Reed Army Medical Hospital. His irritable bowel syndrome, cough, and breathing difficulties were completely resolved, medical records state, "*He is now able to run five miles in 50 minutes*." Other symptoms improved, including sleep apnea and congestion; he has mild pollen allergies. Within months of treatment completion, he had passed all physical tests necessary and was deployed to Iraq in a non-flight capacity. Eighteen months following treatment, he passed all medical and mental tests to receive full flight clearance. He then directed the airspace for rescue efforts in New Orleans following the destruction of hurricane Katrina and has subsequently been promoted to the rank of Major.

Summary of Results

Review of initial test results and medical history questionnaires reveals the following:

- All clients reported improvement in subjective symptoms.
- All clients reported improved perception of health.
- Health History and Symptom Survey (selected questions) found considerable reductions in days of work missed on the start of the detoxification program, leading to reduced concerns about forced retirement.
- Due to symptom improvement, 84% of those clients requiring medications to manage symptoms related to WTC exposure were able to discontinue their use.
- Over half the clients required multiple pulmonary medications on entry to achieve near-normal pulmonary functions (measured as FVC & FEV1). On completion of detoxification, 72% of these individuals were free of pulmonary medication yet had improved pulmonary function tests (data not shown).
- There was a statistically significant improvement in thyroid function tests.
- There was a statistically significant improvement in Choice Reaction Time (CRT) and Intelligence Quotient (IQ), suggestive of improvement in cognitive function.
- Statistically significant improvement in Postural Sway Test indicated improvement in vestibular function.

Discussion

While the data presented in this paper was collected in the context of routine outcome monitoring rather than in a controlled study, the results are encouraging. The number of WTC-exposed individuals (more than 500) who have achieved the rehabilitative goals of sauna detoxification therapy – restoring quality of life and job fitness – is significant. The improvements in self-reported symptoms, an indication of a marked return to wellness, are

supported by reduced need for medication. These findings are further confirmed by objective measures.

This regimen has greatly reduced the number of work days that rescue workers miss due to illness, and has resolved anxieties that careers will be end prematurely in disability retirement. Anecdotal reports from spouses, family members, and employers describe dramatic changes in the quality of family life as a result of such improvements.

Initially, public health officials expected that the majority of the manifesting symptoms would reduce with the passage of time. This hope has not been realized. Not only are symptoms persisting after more than four years of customary treatment, rescue workers who previously had not reported significant health problems are now falling ill. Workers and residents alike have persistent, new-onset respiratory symptoms[27,37] and increased risk of asthma,[25] particularly among children.[50] A recent FDNY study indicates that all the WTC-exposed FDNY rescue workers experienced accelerated declines in lung function in the year following the attacks.[1]

In addition to rescue workers, the WTC Health Registry enrolled 14,725 residents who reported living below

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Canal Street on September 11, 2001, representing 25% of the total residential population south of Canal Street at the time, according to the 2000 US Census. Enrollment interviews between September 5, 2003 and November 20, 2004 indicate persistent respiratory and mental health symptoms in this population.[26]

Although EPA officials initially downplayed the potential hazards of WTC air and dust, subsequent government response reflects significant concern regarding the potential public impact of this unprecedented exposure event. Public funds now support six health screening programs to monitor ground zero workers.

While this work is important, it is made complicated by the nearly infinite variations in individual exposure in such incidents – including the number and type of toxic agents involved, the level of each toxin present at a specific location, the form of the toxic particle, and the route of exposure. Further, little is being done to determine what forms of treatment and rehabilitation might be appropriate in the aftermath of a toxic event of this magnitude.

This omission has precedents. Veterans returning from Vietnam and the first Gulf War, convinced that their health had been impaired by chemical exposures, have been offered little in the way of relief. Public health efforts and government funding have focused on characterizing exposures and identifying relationships between observed health effects and specific toxins.

Advising health care providers and public health agencies regarding response to terrorist incidents that might involve chemical weapons, the Centers for Disease Control (CDC) recently observed that, "Treating exposed persons by chemical syndrome rather than by specific agent probably is the most pragmatic approach to the treatment of illnesses caused by chemical exposure."[6]

There are good reasons to apply this perspective to occupational and environmental exposures, increasing the emphasis on providing relief whenever possible. Given the probability of future terrorist events or chemical accidents, proactive remedies for known effects of chemical exposure, including chronic effects that, though not life-threatening, are sufficient to destroy quality of life, must be identified and implemented.

The Hubbard method is the only such treatment being offered to New York rescue workers. The improvements attained in almost 500 cases argue for broader implementation of the program, supported by additional evaluation and research efforts. That a large percentage of those affected by 9/11 exposures are not responding to existing treatments after more than four years; that the opportunity to improve the job fitness of first responders in one of the nation's most important cities exists; and that the possibility that syndromes being treated as "post traumatic stress" are in fact the result of toxin-induced damage – all this argues strongly for and adds urgency to this initiative.

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The stunning photographs appearing with this article were taken by Mark Roddenberry, who generously donated their use. Roddenberry, a professional photographer, moved to New York in November 2000 to pursue his career. On September 11th, he was in his studio, eight blocks north of the World Trade Center. On that day and on the days that followed, Roddenberry's access to the area, his close ties to the community, and his brilliant eye allowed him to capture the devastation of the site and the American people's initial efforts to cope. Roddenberry, too, was grasping for understanding as he set out to record the overwhelming tragedy.

"Once I got to the front door, there was one split second when I almost went back," he said. "…where there was normally a steady flow of traffic, there were now 10,000 people walking, like there was a parade going north…I turned back. I couldn't do it. It just broke my heart…I remember grabbing the doorknob…it was as though a voice said. 'Hold on one second. If you do not take these pictures, you will forever regret it.'"

Thanks to Mark Roddenberry, these remarkable and tragic images will remain forever in the world's view.

An exhibit of Roddenberry's 9/11 photographs, entitled "Avenue of the Strongest," will be on display at the San Antonio (Texas) Public Library throughout the month of March. A portion of this exhibit can be viewed online at www.avenueofthestrongest.us.