Chapter 2
On the Receiving End: Being a Firefighter

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There is no doubt that the issue of occupational cancer and firefighting has gained attention around the world and it is not going away. Firefighters everywhere are fighting fires that contain carcinogenic chemicals in the smoke and they are dying of cancer because of these exposures. There is no way we can eliminate this danger from firefighting and as our society becomes more and more reliant on plastics and chemicals this danger will be increasing.

There are many examples of an all-encompassing single incident that can be so intense and produce so many toxins that it can be shown to have a connection to occupational health ailments. One glaring example of this is the most traumatic and one of the greatest tragedies for our union and the fire service, that being 9/11. On that day on September 11, 2001, we lost 343 firefighters at the scene and later hundreds of firefighters and other workers were diagnosed with and some have died as a result of occupational health issues. These were related to the work they did on the pile for weeks and months in the aftermath, in the cleanup and recovery operations related to that disaster. It is such a cruel fact that the tragedy of occupational disease is still taking good people away from us.

We must always remember that when a fire crew pulls up to a fire and is about to go in to attack that fire, they do not know what is in the building they are going to enter. The firefighters do not know what fluids, chemicals or other hazardous materials are being stored in that building. Firefighters know that cancer causing agents are the by-products of normal house fires but there may be other materials involved that firefighters do not know about. Many times firefighters will never know what chemicals they were exposed to and as such the dangers firefighters face from carcinogens are likely underestimated. Firefighters never know the level of exposure that we have put ourselves through in the duration of our careers as fire fighters.

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As a side note, in almost every jurisdiction in North America, every profession except firefighting has some provision for workers so that they do not have to accept unsafe work, called “the right to refuse”. This is true for almost all professions and although firefighters may have this right on paper, in actual practice firefighters do not have this right. If fire fighters refused unsafe work, we would never go into a fire. All fires are dangerous. If firefighters do not respond to fires, emergencies, or disasters, who would?

Firefighting has become more dangerous and firefighters still do not have gear that can protect firefighters from all of the hazards of the job.

**Toxic Hazards on the Job**

There is no such thing as a harmless, minor fire. At every fire firefighters attend to, firefighters come into contact with deadly carcinogens and every fire gives off harmful chemicals such as benzene, soot (PAH’s), formaldehyde, diesel particulates and an assortment of other deadly gases. Over time, this contact with carcinogens causes occupational cancer in firefighters. It is not one fire that kills us, it is the hundreds of fires that firefighters attend to over the course of our careers.

Even though firefighting gear has become more advanced and has improved our safety two fold in the last few years, the toxicity of fires has arguably increased five times or more when compared to what it was 10 years ago. We believe that this is due to the increased use of plastics and fire retardants.

It is an undeniable fact in today’s society that dozens of new plastics are coming onto the market every year. Building construction throughout the world has gone from wood based to composite construction, which uses more plastics and glues, in order to combat the rising cost and scarcity of wood products.

When firefighters attend a house fire firefighters know that the house is filled with things that are largely made of plastic, glue, resin, and other combustible materials and when these materials burn they release a toxic cocktail of cancer causing agents. This is largely the result of the “plastic society” in which we all now live. The houses and buildings firefighters go into are composed of large amounts of plastic, glue and resin that are being used as alternatives to wood. Electronics are also a part of our society and when these electronics burn the wiring, the components and plastic housings release deadly toxic smoke.

One aspect of the job that is so dangerous to firefighters is likely the most ironic. For years firefighting organizations and fire departments promoted the use of fire retardants as a way to minimize the impact of residential fires. What is ironic is that these fire retardants actually have little impact in delaying fire but are one of the most dangerous parts of modern day fires. Fire retardants have been promoted by chemical companies as a way to minimize the effect of fires but firefighters are just now learning that there is no scientific basis for the effectiveness of flame retardants. However, there is a scientific basis to indicate that these chemicals are making fires more toxic and are likely responsible for many of the high rates of cancer in fire
fighters. Further to the ironic nature of this issue, fire fighter organizations were convinced by the chemical companies to assist in the promotion of these useless but extremely toxic chemicals. The entire sad story has been documented in a three-part expose in the *Chicago Tribune*, with additional investigative reporting in the same newspaper [1–4].

The first thing to understand about the cancer risk to fire fighters is how fire fighters come into contact with these cancer causing elements. Firefighters do not just come into contact with cancer causing smoke and soot while they are fighting the fire. They encounter it when they are entering and leaving the building and even after the fire is extinguished, the danger is still there.

There are three main ways in which the chemicals that are released during a fire go into the fire fighter’s body and these are ingestion, inhalation, and skin absorption. Ingestion is the minor part, although some chemicals might be swallowed, especially if a firefighter does not wash hands before eating. Much more important are inhalation of airborne particles and gases and absorption through the skin. Inhalation has been recognized for as long as people have been worried about the health of firefighters, but skin absorption has only recently come to be appreciated as important.

It is generally accepted that there will be a myriad of chemicals in a house fire and firefighters must always remember the synergetic effect of chemical mixtures and toxicity. One chemical plus another chemical is not two chemicals in regards to the hazard level. Rather one chemical plus one chemical might result in three or five times the level of carcinogenic exposure, depending on the chemicals involved and how they interact with each other. The creation of a whole that is greater than the sum of its parts is called the synergy effect and with every chemical that is added to the mix it gets more dangerous. When firefighters see the different colors in the smoke firefighters just look at each other and say, “There is some bad crap in there”.

**Turnout Gear Gives Limited Protection**

The world’s fire services have not invented firefighting protective equipment or clothing that will completely prevent exposure to cancer-causing agents.

Firefighters have very strong guidelines for structural firefighting protective clothing as detailed in The National Fire Protection Associations (NFPA) guidelines and code 1851 (NFPA 1851 [5] Standard, 1971 [6] and 2014). Firefighters have some of the best protective gear in the world and firefighters have some of the highest standards possible for the care and maintenance of our clothing, but turnout gear is designed to protect firefighters from ambient heat. With turnout gear firefighters are able to withstand upwards of 1000 degrees Celsius and even higher temperatures for short periods of time.

Turnout gear does not protect firefighters from chemical exposure to occupational carcinogens. Our firefighting gear has to be able to breathe when firefighters fight fires so that the heat buildup in the clothing is able to dissipate. If this buildup
of heat inside our gear was not able to escape then heat stress would kill us. In order for the gear to protect us from ambient heat it must be able to breathe; it has to release the heat out of our gear or firefighters would have catastrophic heat-related injuries and deaths from heat stroke. If the material can breathe and let heat out then it will also let air in. It allows the atmosphere from the fire passes through the gear to our skin; air that contains cancer-causing toxins.

If our gear breathes then it allows deadly carcinogens to come through our gear and they ultimately end up on our skin and are then absorbed into the body. If our gear and our clothing has the ability to breathe it allows carcinogens from the fire environment to pass through the material to our skin.

Every fire fighter who has ever fought a fire has taken a shower 3 days later and noticed that the water is still black as it runs down the drain. This is after multiple showers both in the time immediately after the fire and in the following days. This deposited soot contains and is representative of the deposition of chemical carcinogens on the skin, where they can be absorbed into the body.

These deadly chemicals are then absorbed through the largest organ of our body, our skin, just as airborne chemicals and particles are absorbed through the lung. The body then attempts to process these deadly chemicals and remove them from the blood, urine and vital organs. It is no coincidence that some of our strongest connections to cancer are through these filters of the body such as the bladder, kidney and the blood itself, as well as the brain and testes, that have some of the highest proportionate blood supply in the body.

The rate of skin absorption in a fire fighter’s body increases as skin temperature increases. Our skin temperature begins to increase almost as soon as firefighters put on the gear and the psychological and physical demands of firefighting further increase the skin temperature and therefore the rate of absorption. The areas where firefighters have the highest rates of absorption are found around the jaw, the neck and the crotch. These are all areas where our gear is most susceptible to carcinogenic penetration, due to openings.

Fire fighters have very good respiratory protection in the form of SCBA (Self Contained Breathing Apparatus), which allow us to function in a hostile environment with heat in excess of hundreds of degrees Celsius. Nevertheless, firefighters breathe in toxic smoke as firefighters put our gear on and then again when firefighters take it off as contaminated gear. After a fire, firefighters are filthy and our gear is covered with soot containing toxic chemicals. This is unavoidable because as firefighters take the gear off it is off-gassing the carcinogens that are in the soot which is now embedded in our clothing. Firefighters breathe that in as firefighters touch our gear and our faces and inevitably ingest this material as well. On a positive note both ingestion and inhalation can be minimized by proper SCBA procedures and adherence to the rules of using breathing apparatus not only during the knockdown phase of the fire but also during the other phases such as salvage, overhaul and fire investigation.

The bottom line is that firefighters have little protection from contact with the deadly carcinogens created in a fire and this contact, over time, leads to exposure sufficient to cause occupational cancers.
Firefighters know the flaws of our firefighting clothing and, around the world, firefighters are working with manufacturers to try to invent clothing and materials that can protect firefighters from both ambient heat and toxins. The clothing needs to have the ability to breathe and yet create a barrier to the harmful by-products of fire.

Until the time comes that firefighters have such gear it must be clearly stated that firefighters are going into fires around the world every day and every time they step into that fire environment they are one step closer to contracting occupational cancer.

**Diesel Exhaust**

The International Agency for Research on Cancer (IARC) is the world authority on what causes cancer. Diesel particulates are an IARC Group 1 carcinogen, meaning that it is known to cause cancer in human beings—that means us [7]. An important way to minimize carcinogen exposure is proper diesel extraction systems in all fire halls. However, for years Canadian fire halls had no diesel particulate removal systems. I remember from early in my career in Winnipeg, every spring firefighters would do a major cleaning of the fire halls and everything was coated with thick, black soot from the diesel particulates. It was on our apparatus floor, in the alarm room and in our living quarters. Firefighters were literally being exposed to carcinogens both at fires and in the fire halls.

I will never forget what happened one day when the television set in the fire hall stopped working. A person came in to repair it, took the back cover off and gasped to see all of the components covered with a black tar-like substance. That was diesel particulates. I always said that if diesel particulates do that to the inside of a television what are they doing to the insides of a firefighter?

**The Family Bond**

Firefighting is known to be one of the most closely-knit professions in the world. We truly are a family! We watch over each other at work, we watch over each other away from the job and above all when one of us is in times of trouble or is killed due to the work we do, we always look after the family. This tradition goes back hundreds of years. I believe this bond was the result of the horrific consequences of our job of fighting fire. The sheer depth of destruction and terror has a uniting effect upon all of us, brothers and now sisters in arms.

Firefighters in North America and Australia successfully deal with the need for proper financial support and coverage for firefighters stricken with occupational cancer through presumptive legislation [8].
We have been able to have Acts of presumptive legislation passed in the majority of jurisdictions in North America through politics and science, but the people who put a personal face to our work have been the firefighters and their family members who have had to deal with this issue personally.

I could literally write a book about the many spokespersons who have assisted us in convincing the politicians to pass proper protective laws for firefighters who have been diagnosed with occupational disease. From Ross Lindley in Australia to Joe Adamkowski in Thunder Bay, Ontario to George Hemming in Alberta, to the many spokespersons in Manitoba including an army of widows who would not take no for an answer such as Angel Stoyko, Lynn Davidson, Janet Sabourin, Nancy Klassen, Debbie Woodman and Gerry Schedler as well as Janet Reed from Western Australia. Janet bravely told her story to the Australian Senate Inquiry that led to presumptive legislation in Australia [8]. One of my great friends in the union movement, Robert Hall from British Columbia, was not only a spokesperson but also a labour leader who assisted in having his province pass presumptive legislation. However, there is one person whose story best explains why we owe these spokespersons so much and that is Rick Stoyko. Firefighters from all over the world have him to thank for their presumptive legislation. I think it is important for me to tell his story as it best exemplifies the firefighters who put themselves out there in public, not for their own benefit but for the benefit of their fellow firefighters and their families.

We Laugh Not to Cry

One aspect of life as a firefighter that must be understood in order to understand us is the importance of humour in a firefighter’s life. As you read this you will see that there is sometimes a type of dark humor. There is a reason for this! Humour can be one of the most effective ways in which to deal with stress and shock. It is a way to share feelings with fellow brothers and sisters.

I remember watching an episode of “Rescue Me” when the firefighters were around the table and talking about “ass cancer”. It was as tragic as it was funny, but it was reality and that conversation could have taken place in any fire hall in the country. In my opinion, if we didn’t have humour as a coping mechanism our rates of post traumatic stress disorder (PTSD) and other issues would be much higher.

Firefighters deal with death almost daily; we deal with death in ways that members of the public never experience, death not only as a result of fires but also from heart attacks, strokes, MVAs, murders, suicides and the list goes on. These deaths are not confined to any age, as we deal with the deaths of the very young to the very old. We also deal with death as a profession as dozens of firefighters die every year in North America. There are large multiple line-of-duty deaths such as our “fallen 19” from Prescott, Arizona, and the recent incidents of firefighter deaths in Texas, but we also have single firefighter line-of-duty deaths almost daily. Throughout North America firefighters die of occupational cancer at an alarming rate. I have been to too many firefighter line of duty death funerals and one thing that I have said
to my loved ones is, at my funeral do not play the bagpipe rendition of Amazing Grace. I have come to hate that song!

What comes out of all this death? The humor of the job. We joke a lot about things that are not funny because if we cried we could not do our job.

References

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