

Protecting Firefighters From Deadly Cancers

North Carolina State University



Every day, firefighters risk their lives, rushing into burning buildings or facing the deadly power of wildfires. But what comes after the fire is just as deadly, as first responders cope with the long-term effects of smoke, soot and toxic chemical exposure. Cancer now ranks as firefighters' leading cause of death, [according to the International Association of Fire Fighters \(IAFF\)](#).

“*Compared to other professions, firefighters have a 50% higher risk of developing testicular cancer, 30% higher risk for prostate cancer and 21% higher risk of non-Hodgkins lymphoma, according to the World Health Organization's International Agency for Research on Cancer.*”

North Carolina State University (NC State) experts in the Wilson College of Textiles' at the Textile Protection and Comfort Center (TPACC), located in Raleigh, NC, in conjunction with researchers at Lion Group Inc. (LION), worked together under a Department of Homeland Security (DHS) First Responders Group grant to develop a new structural turnout ensemble, the PPE outerwear for firefighters, with enhanced protection from smoke and soot infiltration, reducing the risk of harmful toxicants and carcinogens absorbing into the skin (e.g., smoke and combustion products.)

“We've focused for a long time on making sure firefighters come home safely at the end of the day,” said Bryan

Ormond, TPACC assistant professor, co-principle investigator and a main technical lead on the project. “Now we need for them to come home at the end of their careers, to be able to retire and use their pensions.”

That focus has paid off. After two years of research, NC State and LION developed a rig that not only protects against fire/thermal hazards and resistance to chemical/smoke infiltration, but also considers factors such as user comfort, heat stress, functionality, and appearance.

Through its [Office of Research Commercialization](#), in 2017 NC State entered into an exclusive license agreement to allow LION to move forward with commercialization and continues to work with LION to protect this invention through several patent filings. The office was responsible for negotiating and drafting the license and helped to protect the IP by reviewing patent filings and ensuring compliance with federal reporting of inventions.

LION now offers particulate blocking turnout gear based off this research called RedZone, certified to meet [National Fire Protection Association](#) performance standards. RedZone™ is tested, proven, and verified by [Underwriters Laboratories](#) to block particulates, and features particulate-blocking zones designed to help reduce exposure to the dangers lurking in fireground smoke.

Because the cost of outfitting a firefighter with the recommended two turnouts runs \$3,000 to \$6,000, many departments, especially volunteer units, must make every investment count and every piece of equipment last, Ormond said. He said RedZone does just that.

“While the cost of new gear is high, especially for large departments, the toll that this cancer epidemic has on individual fire departments across the country is much higher. If this advanced turnout can stop one firefighter’s family from experiencing that dreaded diagnosis, then it has been worth every penny.”

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