Workgroup Summary

Firefighter Cancer

Overarching Goal:

Establish a comprehensive firefighter cancer strategy that invests in research, provides access to cancer screening for firefighters, and reduces and eliminates PFAS exposure.

Issue:

Firefighters have a 9% higher risk of developing cancer and a 14% higher risk of dying from cancer compared to the general public.[10] Approximately 70% of fatalities honored by IAFF in recent years have been occupationally related cancer deaths.[11]

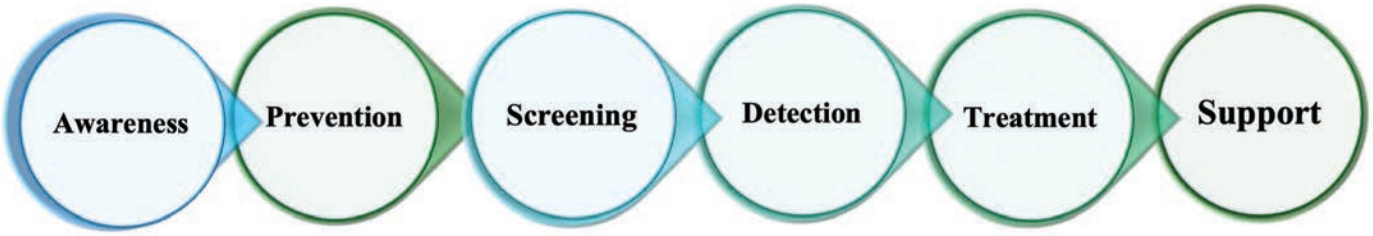
Occupational cancer in the fire service has moved from anecdotal discussions to a prominent place in health and safety considerations to protect firefighters adequately and consistently. An increase in research led by dedicated subject matter experts has, over the last two decades, more closely linked the hazards of the occupation with an increased risk of cancer in firefighters and others working in this hazardous environment.

Recently, the World Health Organization's International Agency for Research on Cancer (IARC) declared a firefighter's occupational exposure at the highest level, as a "Group 1 threat carcinogenic to humans."[12] Based on the epidemiological evidence, the IARC Working Group concluded that there is a causal relationship for mesothelioma and bladder cancer in firefighters. Additional credible positive associations were identified for colon cancer, prostate cancer, testicular cancer, melanoma, and non-Hodgkin's lymphoma. This finding, the result of years of research, is a game-changing opportunity to further consolidate hard-won gains in research and knowledge into profound impacts. In 2010, the National Institute for Occupational Safety and Health (NIOSH) launched a multi-year study that found firefighters have excess cancer risk compared to the general population for multiple cancers, including testicular, brain, prostate and colon cancers, as well as mesothelioma, multiple myeloma and leukemia.[13]

Departments large and small, career and volunteer, structural and wildland, are taking steps to reduce this risk and educate their members, however, more help is needed. Much of the research on occupational cancer isn't making it to the street firefighter in language they can understand. Current firefighter cancer research efforts are not fully coordinated and the specific exposures and mechanisms leading to the increased cancer rates are not known. Existing cancer screening recommendations do not take into account that firefighting is a significant risk factor for cancer. Per- and polyfluoroalkyl substances (PFAS), carcinogenic forever chemicals that degrade very slowly, are found in a firefighter's blood, their firehouses, some firefighting foams, and most concerning, bunker gear -- the very gear meant to protect firefighters. Although more research is needed, the next-generation PFAS-free bunker gear and PPE might remove this risk.

Accomplishments:

- Development of a linear model to guide the Firefighter Cancer Workgroup on national strategic planning:



- Developed cancer awareness campaigns across the nation through collaborations among fire service organizations, firefighters, clinicians, and cancer researchers.
    a. In February 2024, the First Responder Center for Excellence for Reducing Occupational Illness, Injuries, and Deaths (FRCE) hosted the Firefighter Occupational Cancer Alliance meeting in Charlotte, NC. Several national leaders and organizations participated in the meeting, and multiple workgroups were developed to align the priorities of cancer awareness and prevention.
    b. A Firefighter Cancer Workgroup member attended several scientific conferences arranged by American Association of Cancer Research (AACR) to:
        1. Bring awareness on cancer incidence among firefighters to thousands cancer researchers.
        2. Engage cancer researchers worldwide in addressing cancer prevalence in firefighters. This has already resulted on several international collaborations.
    3. Develop collaborations for early cancer detections.
    4. Identify advancements in cancer prevention and treatments.
    5. Identify advancements in cancer screening and potentials for AI and minimally invasive screening tests.
    6. Identify funding opportunities for cancer related research.
        c. The Firefighter Cancer Support Network (FCSN) in collaboration with International Association of Fire Fighters (IAFF) have produced several educational materials, including Train the Trainer, and delivered them nationally to over 700 firefighters.
- Captured occupational exposures among firefighters to better understand the exposure pathways.
    a. As of September 23rd, 2024, over 16,400 firefighters have consented to participate in the NFR.
    b. 14 fire departments have been recognized as Gold Helmet Departments by NIOSH for enrolling 50% of their active firefighters OR more than 300 of their active firefighters in the National Firefighter Registry for Cancer.
    c. Applications (NCSA) on developing a brief/debrief application to improve better post-incident conversations and analysis of the actions taken and identification of areas of improvement, encompassing both volunteer and career firefighters.
- Developed online/open access educational and training materials for exposure reduction and cancer prevention. Some examples include:
    a. The Illinois Fire Service Institute (IFSI) has developed a data-driven, online Chemical Exposure and Cardiovascular Risk Reduction course, which will also be available on the International Firefighter Cancer Symposium (IFCS) website for greater distribution. https://www.fsi.illinois.edu/content/courses/programs/description.cfm?course_id=1420
    b. Through IFSI Exposure Reduction Program, funded by the Illinois State Fire Marshal, more than 12,400 firefighters now have access to the Preliminary Exposure Reduction equipment across 335 fire departments in the state of Illinois (as of August 30, 2024).
    c. The National Fallen Firefighters Foundation collaborated with the National Carbon Monoxide Awareness Association to produce an online training module on the hazards of carbon monoxide and the associated ramifications, including links between carbon monoxide exposure and cancer.
- Initiated cancer screening efforts and methodologies for early cancer detection/ prevention. Some examples include:
    a. The Fire Fighter Cancer Cohort Study (FFCCS) provides a national framework to collect and integrate firefighter epidemiologic surveys, biomarkers, and exposure data focused on carcinogenic exposures, health effects, and prevention in partnership with the fire service.

1. Over 6000 firefighter participants across 31 states and from over 275 different fire departments (as of September 15, 2024).
2. Recently published findings in a peer-reviewed journal looking at the contribution of both years of firefighting and serum PFAS levels on epigenetic changes in prostate cancer genes. https://onlinelibrary.wiley.com/doi/10.1002/em.22589

a. The Illinois Fire Service Institute (IFSI) has purchased a mobile laboratory specifically devoted to collection of biological samples from firefighters in the state of Illinois, where scientists can meet firefighters where they are.

b. The Firefighter Cancer Support Network (FCSN) in collaboration with American Academy of Dermatology (AAD) have developed a "Firefighter Skin Checks Program" and have amassed the equipment and skills needed to create national program to screen firefighters for skin cancer. So far over 2500 firefighters have been screened

c. New Hampshire Senate Bill 352, signed by Governor Chris Sununu in July 2024, appropriated $5 million to fund early detection cancer screenings for active and retired firefighters in New Hampshire.

- Engaged cancer advocacy groups to support firefighters and their families. Some examples include:

a. To support firefighters and their families as they navigate difficult times during cancer treatment, Illinois Fire Service Institute (IFSI) has reached out to Triage Cancer, a nonprofit organization that provides free education on the legal and practical issues that may impact individuals diagnosed with cancer and their caregivers, through events, materials, and resources.

b. On May 16, 2024, the Senate Judiciary Committee unanimously approved S. 930, the Honoring Our Fallen Heroes Act. The legislation expands the Public Safety Officers' Benefits (PSOB) program to cover certain occupational cancers. The national fire service organizations are working with our Congressional allies to identify vehicles for passage before the end of the 118th Congress.

c. On August 27-29, 2024, the National Fallen Firefighters Foundation (NFFF) hosted the Firefighter Life Safety Summit in St. Louis, MO. The Summit marked the 20th anniversary of the landmark event that launched the 16 Firefighter Life Safety Initiatives. Over the past two decades, these initiatives have been a catalyst for numerous safety improvements in the fire service. This year's Summit celebrated those wins and worked to determine the important work that still needs to be done.

d. The Governor of Florida, Ron DeSantis, signed a bill in May 2024 to support firefighters battling cancer – ensuring they get leave time and employee retention benefits equivalent to those provided for other injuries or illnesses incurred in the line of duty.

- University-affiliated labs and organizations across the country are taking specific and nuanced looks into firefighter cancer.

a. Integrating engineering and biological sciences to reduce exposure by means of artificial intelligence (AI), virtual reality, and machine learning. (i.e., IFSI collaboration with Department of Computer Science, National Center for Supercomputing Applications).

b. Engaging physicians at early stages of their career to the health and safety challenges firefighters face (i.e., IFSI collaboration with first-ever, Engineering-Based Medical School).

c. University of Florida Cancer Center working on prevention, detection and treatment of firefighter cancer.

d. University of Arizona collaboration with other academic and government institutions to conduct firefighter cancer research at large scale (i.e., the FFCCS).

Recommendations:

Overall

- Develop a national-level comprehensive firefighter cancer strategy. A national strategy should include an awareness campaign, policy examples, chief officer support, and company officer training.
- Invest in research to expand our understanding of the mechanisms between occupational exposures and cancer, why firefighters are at heightened risk from some cancers, and better understand the cancer risks of our understudied populations, including women and minorities.
- Incorporate cancer mitigation strategies into training on operational strategies and tactics.
- It is imperative that the primary care community understand the risk factors. for cancer among firefighters.

Converting Research to Plain Language

Convert research to plain language so fire service members have a better understanding of the risks and steps they can take to reduce their occupational exposure to carcinogens. Plain language materials make it easier for everyone to understand and use health information. Examples of such materials include infographics that are available in multiple languages; research summaries that have minimal technical jargon; short videos with worker testimonials; webinars; and misinformation alerts.

- Identify the appropriate organization (perhaps the Firefighter Cancer Support Network) to coordinate the championing of efforts to translate firefighter cancer research into practice and disseminate information through existing organizational channels.
- Identify relatable fire service stories and personnel to share brief but hard-hitting and candid messages about cancer prevention, early detection, treatment management, and evidence-based recommendations in easily accessible formats (e.g., video, pictures).
- Form a coalition comprised of the First Responder Center for Excellence (FRCE), Firefighter Cancer Support Network (FCSN), National Fallen Firefighters Foundation (NFFF), International Association of Fire Fighters (IAFF), International Association of Fire Chiefs (IAFC), National Volunteer Fire Council (NVFC), Fire Department Safety Officers Association (FDSOA), and International Association of Arson Investigators (IAAI) research groups to produce “one voice” of plain language actionable devices (e.g., infographs, plain talk messaging).
- Create actionable approaches for translating research to practical actions for all layers of the fire service through engagement with a diverse range of stakeholders.
- Use technology to facilitate the translation of research into practice. This can include the development of mobile applications, online resources, and other tools that make it easier for firefighters and fire departments to access and implement evidence-based strategies.
- Explore what prevention messages have been successful in motivating engagement in other national marketing campaigns.
- Develop and secure funding for a targeted, co-branded marketing campaign to educate the fire service on current and emerging science related to the optimization of health for firefighters.

Firefighter Cancer Screening

Promote the advantages of and access to cancer screenings for all fire service members so indicators of cancer can be discovered at the earliest possible exam, improving survivability.

- Seek and secure cancer screenings for all members of the fire service exposed to carcinogens and options for cancer screening for the families of the firefighters.
- Convene an advisory panel of experts to develop and regularly revise recommendations for screenings based on emerging literature.

- Support research on the sensitivity and specificity of screening approaches currently being used by the fire service.
- Provide resources for recruiting fire service centric healthcare providers and cancer researchers. Continue partnerships and foster relationships within the research community that promotes cancer screenings for firefighters.
- Develop an algorithm of screening recommendations by age, years of service, and other health risk factors.
- Determine the potential for funding cancer screenings through existing sources within the federal government (e.g. DHS) and disseminate possibilities to the fire service.
- Develop a roadmap for negotiating more aggressive cancer screening coverage with health insurance providers and disseminate the methodology nationally.
- Leverage National Firefighter Registry (NFR) data to understand patterns of developing cancer nationally.
- Leverage the data collected by payees of state cancer presumption legislation to identify trends in diagnosis.
- Capitalize on forthcoming IARC monograph to identify cancers at highest likelihood of diagnosis.
- Encourage the National Firefighter Registry (NFR) to conduct a regular survey of cancer screenings and outcomes to developed cancers.
- Encourage other studies to integrate cancer screenings as a data collection component to further the understanding of the utility of various screening approaches.
- Encourage all departments to provide annual medical exams to their personnel in accordance with NFPA 1582.
- Build a relationship with the national medical associations (e.g. American Medical Association) to educate providers on cancer development and treatment approaches for fire & EMS.
- Prioritize outreach and training to healthcare providers in occupational health settings, primary care, and specialties.
- Provide resources to develop a comprehensive approach to recruit, engage and support healthcare providers who work with firefighters.

PFAS and Toxicants

Increase funding for more research on the effects of PFAS and other toxicants on fire service member health outcomes.

Policy Level

- The USFA should support development of a central clearinghouse for firefighter PFAS exposure information.
- Fire service organizations and researchers should develop recommendations for serum PFAS screening programs in firefighters.
- The USFA should support efforts that engage firefighters in conducting scientific research focusing on PFAS and other toxicants screening.
- The USFA should support development of a consortium that fosters collaborative efforts among fire service organizations and research scientist in academic settings focusing on PFAS and other toxicant exposure and their effects on physiological disruptions holistically (e.g., cancer, liver toxicity, hormone disruption, mental health, resiliency, etc.).
- The USFA should support cross sectional and longitudinal academic research efforts focusing on identifying the biomarkers of effect due to PFAS and other toxicant exposures.

- The USFA should support the academic research efforts focusing on the effects of PFAS exposure and other toxicants on other health related issues in addition to cancer.
- The USFA should support research efforts that include engagements of health care providers as well as State and local representatives (education and outreach with higher impact).

Scientific Research

- Connect data sets to elucidate exposure in firefighter histories (e.g., military exposures, Environmental Working Group (EWG) contamination maps).
- Compare PFAS screening tests to facilitate combining results from different labs
- Carry out cross sectional and longitudinal analysis of changes in firefighter serum PFAS

Environment

- Identify additional sources of PFAS in the firefighting work environment (burning sofa, carpet, household items, dust, water, etc.).
- Quantify the presence of each PFAS.
- Identify the type of PFAS in different sources.

Exposure

- Identify exposure pathways in firefighters.
- Quantify transdermal exposure vs. inhalation vs. ingestion.

Effect

- Identify and elucidate biological mechanisms resulting from PFAS exposures (Genomic, Epigenomic, miRNA, Exposome, Oxidative stress assays, Chronic inflammation Markers, Telomere length, Immune functional assays, Metabolomic assays, Cell Proliferation assays).
- Expand list of biomarkers of effect studied in firefighters.
- Explore expansion of and new analytic methods to elucidate biological mechanisms that increases cancer risk in firefighters e.g. untargeted approaches, metabolomics, immune effects, mutational frequency, clonal expansion, long read sequencing, use of epi-genetic clocks as a risk factor.

PFAS Reduction and Elimination Interventions

- Biomedical/clinical intervention.
- Environmental Intervention (water treatment, landfill, etc.).

Products of Combustion — Environment

- Expand list of environmental analytics studied on the fire ground.
- Explore expansion of and new analytic methods to further characterize environmental contaminants e.g., untargeted approaches, NMR-MS.

Products of Combustion — Exposure

- Expand list of biomarkers of exposure studied in firefighters.
- Explore expansion of and new analytic methods to better characterize firefighters' exposures e.g. untargeted approaches, PHE-T to measure exposure and CYP/EPHX pathway.

Products of Combustion — Effect

- Expand list of biomarkers of effect studied in firefighters.
- Explore expansion of and new analytic methods to elucidate biological mechanisms that increases cancer risk in firefighters e.g., untargeted approaches, metabolomics, immune effects, mutational frequency, clonal expansion, long read sequencing, use of epi-genetic clocks as a risk factor.

Bunker Gear

- Develop new standards for PFAS-free bunker gear and PPE.
- Develop, evaluate, and manufacture next-generation PFAS-free bunker gear and PPE as quickly as possible.
- Secure funding for and invest in well-fitting, PFAS-free bunker gear and PPE for every firefighter.
- Find a safe way to dispose of existing contaminated bunker gear and PPE so that we are not spreading PFAS contamination into the environment.

Human Factors

Study, identify, and provide strategies that consider human factors elements impacting fire service member response to cancer prevention — this includes considering complex organizational factors surrounding fire department processes and procedures, including leadership and communication around cancer prevention, and how these processes intersect with and influence individual firefighter practices.

- Secure funding to develop and deliver cancer prevention messaging that is based on human factors.
- Increase training and messaging that focuses on how human factors influence firefighters' views of cancer prevention messaging.
- Revisit USFA programming to ensure cancer prevention messaging considers the role human factors play in how members of the fire service receive, process, and implement cancer prevention messages.
- Policy recommendations relative to improving human factors must be defined by current research.
- Human factor research and guidance should occur prior to tool/equipment/research (invest in people before we invest in things).
- Ensure currently known and vetted Human Factors information is widely disseminated, across a variety of platforms, at low or no cost.
- Seek Congressional funding to support research that considers the relationship between human factors and occupational firefighter cancer. Funding should include studying the particular the role of the company officer and how firefighters process cancer prevention messaging.
- Cancer-related research studies should include human factors components that identify barriers and potential solutions at the individual and fire company level.
- Cancer-related research studies should incorporate human factors components in interventions that help the fire service execute evidence-based practices at the individual and fire company level.

Developing High Priority Research Programs

Develop new or support existing nationally focused research programs to prioritize and address the most threatening cancer risks to fire service members.

- Develop a National Fire & EMS Cancer Research and Prevention Program. Centralize data integration, leveraging existing efforts. Develop strategies to enhance national laboratory coordination along with standardized collection protocols.
- Support consistent and ongoing funding for the National Firefighter Registry (NFR), the Firefighter Cancer Cohort Study (FFCCS), and other programs trying to understand cancer and reduce exposures and adverse health effects at a national level.
- The USFA should work with federal funding agencies to establish a center to fund the Firefighter Cancer Cohort Study (FFCCS) and other national firefighter research initiatives and provide a mechanism for coordination among these studies and state funded initiatives. Within this center, funding and coordination should be provided to assist research studies or public health

surveillance programs aimed at evaluating the effects of high-risk exposures such as large industrial fires and other manmade and natural disasters.

- Support the development and deployment of a national strategy for responding to large scale natural and manmade disasters to collect real time biological samples, and survey data to understand the short- and long-term impacts of major events that leverages fire service infrastructure and support and integrates research into standard response protocols within the national incident management structure.
- The USFA should develop a robust data collection system for identifying responders at an emergency incident and make the data available for research or public health surveillance. Such data is instrumental to understanding firefighters' unique exposures and evaluating how they relate to disease outcomes. Improve the nationwide system for identifying responders at emergency incidents, leveraging existing technology (e.g., computer aided dispatch, mobile devices, etc.) to remove some of the reporting burden on departments.
- Create a mechanism for providing data to the fire and EMS community, public health and medical communities, and other stakeholders in near real time. Coordination should be between all national data stewards to modernize data dissemination in an efficient and relevant way. Provide report back of biomarkers of exposure and effect (e.g., serum PFAS, DNA methylation) including dashboard, summary stats, education of fire service and link to incident level information/ data, as is being carried out in the Firefighter Cancer Cohort Study (FFCCS). Use these reporting mechanisms to encourage implementation and utilization of empirically supported risk mitigation. The USFA can support and coordinate existing exposure and biological effect report-back programs.
- Support efforts to understand the intersection of other health outcomes with cancer (e.g., reproductive health) and, in doing so, leverage existing health outcome data sources (e.g., Medicaid/Medicare, stroke registry, NDI, NDBPS, FFCCS). Increase coordination and data sharing across systems that monitor health outcomes Congress should consider expanding the scope of the National Firefighter Registry (NFR) to include other health effects beyond cancer that may have similar risk factors.
- Research or public health surveillance programs should leverage fire service organizations to support community-engaged research that is focused on firefighters and other first responders. Leverage the fire service for data collection protocols — such as regional response teams — which can act as a force multiplier for research and discovery. Cultivate and support firefighter research champions, providing the necessary background, training, clearances, etc. for them to assist with specific research or support activities.

Presumptive Laws & Public Safety Officer Benefit (PSOB)

Campaign for uniform national occupational cancer presumption and expansion of the Public Safety Officer Benefit (PSOB) Program to include occupational cancer for all fire service members.

- The Public Safety Officers' Benefits (PSOB) program should be expanded to cover line-of-duty deaths and permanent disabilities that occur as a result of occupational cancer.
- A publicly available and consistently updated database of state cancer presumption laws should be made available to the fire service and hosted online. The database should include statutory references to improve ability to access reliable information.
- Model state cancer presumption legislation should be developed and shared with state and local fire service advocates with the goal of achieving uniform and universal coverage in all 50 states with coverage for all firefighters (career and volunteer). The 'uniformity' should be considered a 'floor' or starting point rather than a maximum. The model legislation should include a toolkit with resources for advocacy campaigns to enact the legislation.
- A continuous and ongoing process should occur to ensure coverage evolves as science is developed and/or new exposures are identified.