

Texas Firefighter Cancer Study Update

Houston City Council
Public Safety Committee

October 13, 2026



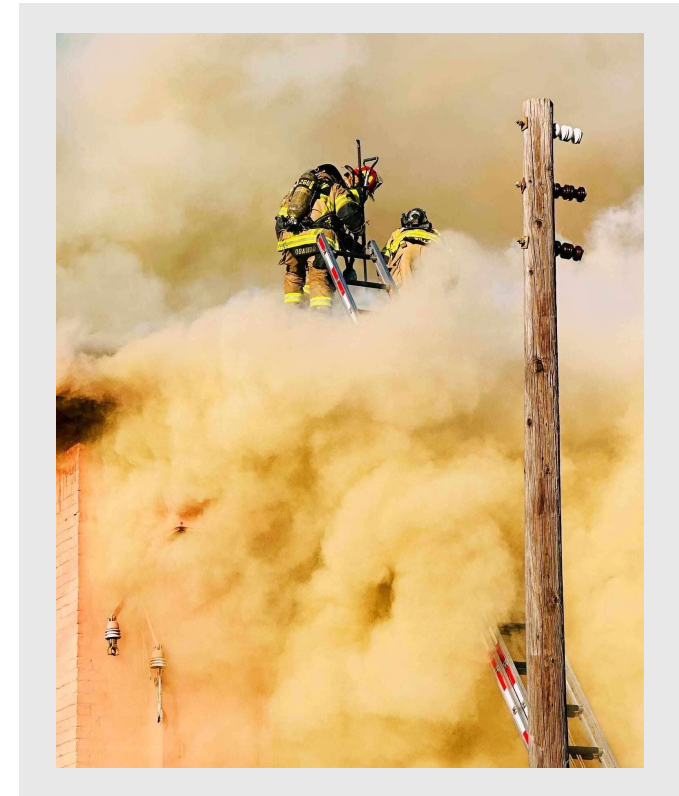
UTHealth
The University of Texas
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Why this matters to Houston firefighters

- Firefighters face harmful exposures in the work they do.
- Texas accounts for the highest rate of workers compensation cancer claims among all IAFF members.
- Cancer accounts for 2/3 of the names added to the IAFF Line-of-duty memorial each year.
- Cancer affects active firefighters, retirees and their families.
- Houston firefighters and their brothers and sisters from all over Texas are helping build the evidence.
- The aim is better prevention through new policies and work protocols and earlier detection for better outcomes.



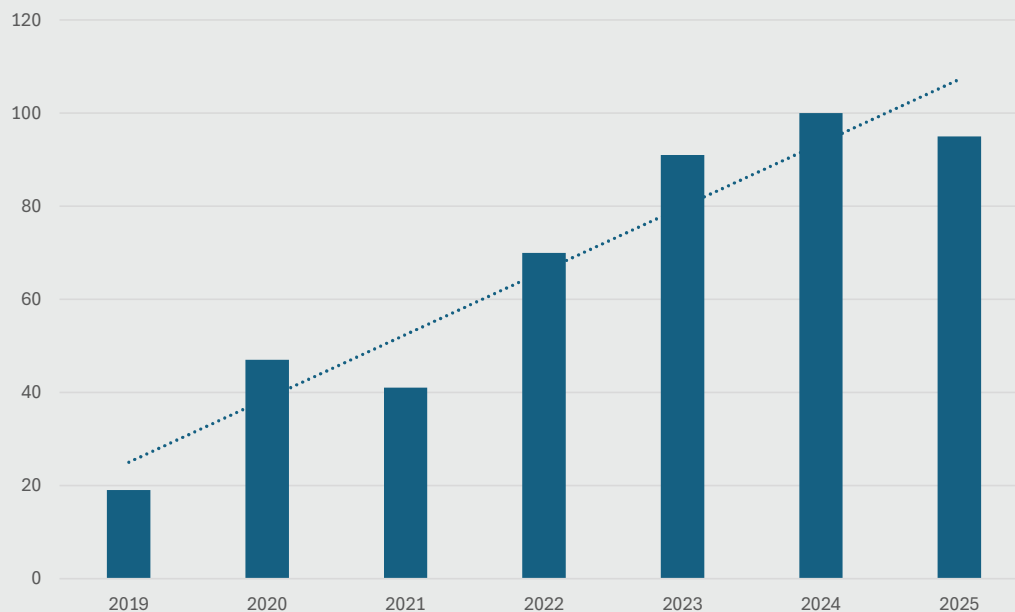
How the study came together

\$5 million

State funding over two years

- HPFFA worked with UTHHealth Houston and TSAFF on the funding request.
- Legislative support launched a statewide research effort that has grown beyond Houston to include hundreds of firefighters from as far south as the Rio Grande Valley, north to Dallas/Ft. Worth, west to El Paso and all points in between.

Texas firefighters diagnosed with cancer



+9%

Higher cancer incidence
among firefighters than the
general population.
NIOSH pooled cohort.

+14%

Higher cancer mortality
among firefighters than the
general population.
NIOSH pooled cohort.

A percentage is a population statement.
It does not tell us which firefighter, in
which department, doing which task.
That is the question the study exists to
answer.

THE QUESTION

How do firefighting exposures translate into cancer and how do we intervene?

Firefighters carry an elevated burden of occupational cancer. Yet the field still lacks an integrated picture: which exposures matter most, what cancer biomarker changes they cause, and how to translate that into earlier detection and prevention.

UNIFYING FRAMEWORK

Firefighter cancer risk as a multi-stage process — measured end to end in a single cohort.



STUDY ARCHITECTURE

Three projects, one scientific framework

Each project has a distinct protocol; together they trace cancer risk from carcinogen exposure to clinical outcome.

01



Carcinogenic Exposure Assessment

Quantitative measurement of occupational exposure to fire-related carcinogens — and the molecular biomarkers they leave behind.

Cadets | Active-duty | Retirees

02



Occupational Cancer Epidemiology

Evaluation of cancer incidence by linking occupational histories and demographics with the Texas Cancer Registry.

Texas Cancer Registry linkage

03



Cancer Screening Promotion

Firefighter-specific screening integrated with annual medical exams, using molecular tools for risk stratification and early detection.

Annual occupational medical exam

Project 1 Year 1 by the Numbers



780+

participants enrolled



14

partner fire departments



13,260+

biospecimen samples collected



10,920+

questionnaire &
exposure data points



79%

average retention
at first follow-up



386+

stakeholder meetings

100% of our two-year goal

700 participants reached in just one year

780+ enrolled

Original goal: 700

Next: 1,000



Project 2 Progress & Accomplishments

Completed / underway

- ✓ Study designed & protocol finalized (UTHealth CPHS-approved: HSC-SPH-25-0841)
- ✓ TCFP roster secured by TCR; SFFMA partnership established to extend cohort to volunteer/part-time firefighters
- ✓ DSHS IRB confidential-data request & linkage attachment prepared and submitted
- ✓ Scoping review of firefighter cancer literature underway (manuscript in progress)
- ✓ Analytic framework, variable dictionary, and TCR data dictionary (1995–2022) mapped

Current status

IRB

DSHS IRB — modifications requested; point-by-point response in preparation (due 11/10/26)

Awaiting

IRB approval → TCR executes linkage → coded dataset released to team

Project 3 Progress and Accomplishments

14

Interviews completed

35+

Firefighters participated



Study approval received



Protocols, interview guide, and
survey developed



Over 35 firefighters participated
across 14 interviews



Qualitative data analysis in
progress



Multiple conference abstracts
submitted (APHA, SBM, TFCSS)



ACS grant submitted
(June 2026)

2026 in Review: Scholarly Activity

1

Publications

3 published in peer-reviewed journals ·
5 submitted and under review · 2 drafted,
including the TFCS protocol paper

2

\$1.2 million CPRIT award

Fireground decontamination research,
beginning summer 2026

3

4 federal research grants submitted

National Cancer Institute, National Institute of
Environmental Health Sciences, National Institute
of Neurological Disorders and Stroke, American
Cancer Society



TYPE Original Research
PUBLISHED 23 June 2026
DOI 10.3389/fmicb.2026.1832151

Check for updates

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RECEIVED 16 March 2026
ACCEPTED 20 May 2026
PUBLISHED 23 June 2026

CITATION
Grunsted P, Xu C, Janitz A, Reese J,
Campbell J, Santiago-Rodriguez TM,
Cregien SJ, Petrosino JF and Hwang J
(2026) Nasal cavity microbial makeup
and the influence on psychiatric
symptoms following fire
exposure in firefighters.
Front. Microbiomes 5:1832151.
doi: 10.3389/fmicb.2026.1832151

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Nasal cavity microbial makeup and the influence on psychiatric symptoms following fire exposure in firefighters

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Background: Firefighters experience high levels of occupational stress and
trauma, increasing their risk of depression, anxiety, and post-traumatic stress
disorder (PTSD). Although microbial communities may influence brain function
and behavior through neural pathways, the nasal microbiome remains
understudied. This study examined associations between nasal microbiome
characteristics and psychiatric symptoms among firefighters.

Methods: We conducted a cross-sectional study of 34 firefighters recruited from
Texas fire stations. Participants completed validated questionnaires assessing
depression, anxiety, and PTSD. Nasal swabs were collected before and after fire
suppression and 16S rRNA sequencing was used to characterize microbial
communities. Alpha and beta diversity, relative abundance, and differential
microbial associations with psychiatric outcomes were assessed using logistic,
linear, and linear mixed regression methods.

Results: Sixteen participants (47%) met criteria for depression, six (18%) for anxiety,
and four (12%) for PTSD. Alpha diversity was significantly lower in individuals with
anxiety (adjusted $p = 0.04$) while there were no differences in beta diversity or
differences in either diversity for PTSD or depression. Increased abundance of the
genus *Ruminococcus* was associated with increased odds of anxiety, while
Hydrothermalis was associated with PTSD. Depression scores were positively
associated with several genera including *Aerococcus* (1.22; 95%CI: 0.43–2.02) and
Dermaibacter (1.50; 95% CI: 0.37–2.63). Fire suppression was associated with
increased *Enhydrobacter* (2.08; 95% CI: 0.80 to 3.46) and decreased
Hymenobacter (–1.25; 95% CI: –2.22 to –0.27) abundance.

Conclusions: This study identifies preliminary links between nasal microbiome
composition and psychiatric symptoms in firefighters and suggests that fire
suppression may alter nasal microbial communities.

KEYWORDS
firefighter, mental health, microbiome, nasal, psychiatric



This article is submitted to *Frontiers in Environmental Health*, a specialty of *Frontiers in Public Health*.

Fire-Smoke Induced Protein Alterations in Firefighters' Body Fluids Identify Prognostic Pan-cancer Biomarkers

Jooyeon Hwang¹, Zenghui Peng, Amit Singh, Chao Xu, Robert J. Agnew, Xin Xu, Zhibo Yang,
and Naph Alshai

10.3389/fpubh.2026.00002

Check for updates

Article Recommendations

Supporting Information

ACCESS | Metrics & More | Article Recommendations | Supporting Information

ABSTRACT: Firefighters are routinely exposed to complex mixtures of
toxicants during fire suppression, and growing evidence links these
exposures to elevated cancer risk. Proteomic profiling provides a sensitive
means to detect early molecular alterations associated with such
occupational hazards. In this study, we performed a comparative label-
free proteomic analysis of paired serum ($n = 42$) and urine ($n = 30$)
samples collected from firefighters at baseline and within 24 h post-fire
exposures. We identified and quantified 160 proteins across serum and
urine in over 100,000 total protein abundance data points and
differences between pre- and post-exposure samples in both biofluids,
including exposure-related protein changes. Volcano plot analysis
further revealed multiple significantly altered proteins in both biofluids,
wherein the same proteins showed a broader range of differential
expression. Proteins altered in at least 70% of samples were subjected to pathway enrichment analysis, identifying associations with
several diseases, including small-cell lung cancer. Protein-protein interaction analysis revealed highly interconnected cancer-related
networks involving LAMC1, LAMC2, VWF, and RRM1. These findings suggest urine is a sensitive matrix for detecting acute exposure
effects, while serum provides complementary systemic information. Integrating both biofluids with NPSA LMS-guided surveillance
may enhance occupational health monitoring and support early cancer detection and prevention in firefighters.

KEYWORDS: biomarkers, cancer, firefighters, proteomics, stress, urine

Fire Technology (2026) 62:118
https://doi.org/10.1007/s10698-026-01945-9

Firefighter Severe Injury Incidence: An Analysis of National Fire Incident Reporting System (NFIRS) Data from 2010 to 2019

Paul Grunsted¹, Chao Xu², Jooyeon Hwang²

Received: 20 November 2025 / Revised: 10 April 2026 / Accepted: 8 June 2026 /
Published online: 27 June 2026
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Abstract
We aimed to identify variables associated with increased risk of severe injuries leading to
lost work time among U.S. firefighters. We analyzed deidentified data from the National
Fire Incident Reporting System (NFIRS) from 2010 to 2019 to evaluate associations between
injury-related variables and severe injury occurrence. Chi-square tests and multiple
logistic regression analyses were used to assess relationships between specified variables
and severe injuries. Cause of injury, firefighter career status, and activity at the time of injury
were consistently associated with severe injuries across the ten-year period. In 2010,
career firefighters were 1.85 times more likely to sustain a severe injury than volunteer
firefighters after adjustment (95% CI: 1.51–2.26, $p < 0.0001$). Injuries caused by falls or
trips were 1.57 times more likely to be severe than those caused by being struck by an
object (95% CI: 1.26–1.96, $p < 0.0001$). The magnitude of these associations remained
similar over the study period. Firefighter career status, injury cause, and activity at the
time of incident emerged as consistent predictors of severe injury. Increasing awareness
of these risk factors may inform targeted protective measures and reduce severe injuries
among firefighters.

Year 2 Priorities · Sep 2026 – Aug 2027



Retain & follow up

Complete 6-month visits and targeted re-engagement at lower-retention sites



Analyze & share

Biomarker assays, first exposure–biomarker analyses, and disseminations



Core analyses

Cohort construction, overall & site-specific SIRs, SMRs, data-quality review



Qualitative analyses

Finalize determinants of screening behavior and identify leadership and culture themes for program design

Long-Term Direction & Impact



Early detection

Biomarker-based risk signals that flag change before disease develops



Prevention

Evidence to guide exposure reduction, decontamination, and protective practices



Policy & practice

Data that informs department practices, screening, and state health policy



Lasting resource

A statewide longitudinal cohort and biobank for future firefighter research

Protecting the health of those who protect Texas.

Building on this investment

Secure funding. Seek additional state support in 2027.

Strengthen protections. Turn research into stronger firefighter protections.

Sustain participation. Support firefighters and research partnerships.

Guide decisions. Use findings to inform training, equipment and health policy.



Houston's role

Support coordination. Work with us and our study partners.

Join us in Austin. Help secure additional state funding in 2027.

Sustain participation. Support firefighter enrollment and follow-up.

Use the evidence. Let findings guide firefighter health decisions.

Stay informed. Invite us back for updates on study progress.

We fought with our partners to get this started. We intend to see it through, and we welcome the city's partnership in that effort.



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School of Public Health

Questions