

WILDLAND & WUI FIREFIGHTER CANCER RESEARCH



January 2025 Palisades Fire | Photo: CAL FIRE

THE EVIDENCE IS BUILDING

Wildland and WUI firefighters face repeated occupational exposure to carcinogens and hazardous combustion products during suppression, prescribed fire, structure defense, firing operations, mop-up and extended smoke exposure. Current research increasingly demonstrates that these exposures result in contaminants entering the body and measurable biological changes associated with cancer development.

EXPOSURE → UPTAKE → BIOLOGICAL EFFECT → CANCER MECHANISMS → CUMULATIVE RISK

THE WILDFIRE CONSERVANCY + FFCCS + UNIVERSITY OF ARIZONA

The Wildfire Conservancy collaborates with the Fire Fighter Cancer Cohort Study (FFCCS) and the University of Arizona to advance long-term research on occupational exposures and cancer risk in wildland and WUI firefighters. The FFCCS combines exposure assessment, surveys and biomarkers in blood and urine to understand what firefighters are exposed to, what enters the body, and the biological effects that may occur before disease develops.

1,326

CALIFORNIA WILDLAND FIREFIGHTERS
as of July 1, 2026

Long-term goal: 10,000 firefighters followed over 30 years

WILDLAND/WUI STUDY: Wildland firefighters have been enrolled across California, Colorado, Utah and Wyoming as of January 2026, with research focused on carcinogen exposure, biomarkers of carcinogenic effect and testing exposure-reduction strategies.

2025 LOS ANGELES FIRE RESPONSE

Firefighters responding to the 2025 Los Angeles urban conflagrations showed different levels of more than 50 serum proteins after response. Altered pathways involved metabolism and oxidative stress, immune and inflammatory responses, cellular barrier integrity and trafficking, and growth/cancer signaling.

PFAS & HEAVY METALS

Preliminary results found significant increases in PFOS and PFNA after the Los Angeles response. Heavy metals were common in post-exposure blood and urine samples; additional work is needed to determine their contribution to health and cancer risk.

MOLECULAR CHANGES AFTER ONE SEASON

Published microRNA research found that WUI firefighting altered cancer- and brain-related biological pathways after a single season, including damage to known tumor-suppressor microRNA and loss of a biological cancer-defense mechanism.

PAHs, TASKS & CONTAMINATED GEAR

Urinary biomonitoring found significant increases in PAH metabolites during wildland/WUI exposures. Indirect suppression and firing operations showed greater levels. Firefighters starting assignments with contaminated PPE experienced greater chemical exposure than those using recently laundered gear.

FROM EXPOSURE TO PREVENTION

What current research tells us—and where the work is going



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THE WILDLAND/WUI EXPOSURE ENVIRONMENT

Modern wildland/WUI incidents can expose firefighters to complex mixtures of combustion products from vegetation, structures, vehicles, treated materials, batteries, electronics and other modern fuels.

- Benzene and formaldehyde
- Polycyclic aromatic hydrocarbons (PAHs)
- Diesel exhaust and ultrafine particulate matter
- Toxic metals and crystalline silica
- Brominated flame retardants and PFAS
- Soot, smoke condensates, VOCs and aldehydes

MULTIPLE ROUTES OF EXPOSURE

Exposure can occur through inhalation, dermal absorption through contaminated PPE, direct skin contact with contaminated equipment and ash, and incidental ingestion of particulates.

40–60%

REDUCTION IN MEASURED OCCUPATIONAL EXPOSURE

Firefighters responding to the Los Angeles fires who began their shift with clean or recently laundered PPE had a 40–60% reduction in occupational exposure compared with those beginning in dirty PPE. Exposure was measured using urine samples paired with silicone wristbands. Separate wildland/WUI research also found significantly reduced chemical exposure when wildland gear was laundered before deployment.

WHY THIS MATTERS

Wildland and WUI deployments may continue for days or weeks. Repeated smoke exposure, contaminated gear and limited respiratory protection can create cumulative exposure across a firefighter's career.

CURRENT RESEARCH TO REDUCE CANCER RISK & EXPOSURES

Wildland/WUI respiratory protection • Clean Cab protocols • Particulate-barrier PPE • Decontamination and sauna interventions • Expanded study focus on women, trainers and aviation

EXPANDING THE RESEARCH

Research in women firefighters has identified metabolic changes following training-fire exposure, including pathways related to oxidative stress and cell damage. Additional work is examining reproductive reserve, sleep, inflammation and other occupational health factors.

THE BIG PICTURE

The emerging evidence shows a consistent sequence: repeated occupational exposure; measurable absorption into the body; disruption of pathways regulating inflammation, oxidative stress, immune function, metabolism and tumor suppression; and cumulative biological injury associated with lifetime cancer risk.

Every exposure matters. Reducing exposure today may help reduce cancer risk over an entire career.

Produced in collaboration with The Wildfire Conservancy, Fire Fighter Cancer Cohort Study, CAL FIRE, and CAL FIRE Local 2881
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