Optum Health Education™

Military Toxic Exposures:

Understanding the Health Impact of Burn Pits and Other Exposures

Continuing Medical Education (CME) Course

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Introduction & Relevance to Medical Practice

Course Overview

Post 9-11 deployers had significant exposures to burn pits and other sources of toxic inhalation. This presentation will help you **identify, diagnose, and manage** conditions associated with toxic exposure, including **respiratory illnesses, cardiovascular effects, and increased cancer risks**.

Learning Objectives:

1. **Describe** the exposures associated with deployment.
2. **Identify** common health conditions linked to burn pit exposure.
3. **Apply** best practices for screening, diagnosing, and managing veterans affected by burn pit exposure.
4. **Utilize** available resources, such as the PACT Act, VA specialty clinics, and community referral pathways, to ensure veterans receive appropriate care.
5. **Incorporate** recent policy changes and evidence-based recommendations into clinical practice.

Relevance to Medical Practice: Why This Matters

- With over 3.5 million U.S. military personnel deployed since the 9-11 attacks, the likelihood of encountering deployers affected by toxic inhalation is high in the primary care setting.
- Non-VA providers are often the first clinicians to see these veterans.
- Understanding military exposures is critical for proper diagnosis and care.
  - Symptoms may be subtle.
  - Presentations may be delayed.
  - Disorders may be difficult to diagnose.

3.5M+
Veterans have been exposed to burn pits

6.2M+
Veterans have received VA toxic exposure screenings

43K+
Veterans receive a new cancer diagnosis each yr.

Burn Pit and Other Inhalational Exposures:

Scope, Exposure Pathways and Toxicology

Engineers Battle Sulfur Fire

June-July 2003

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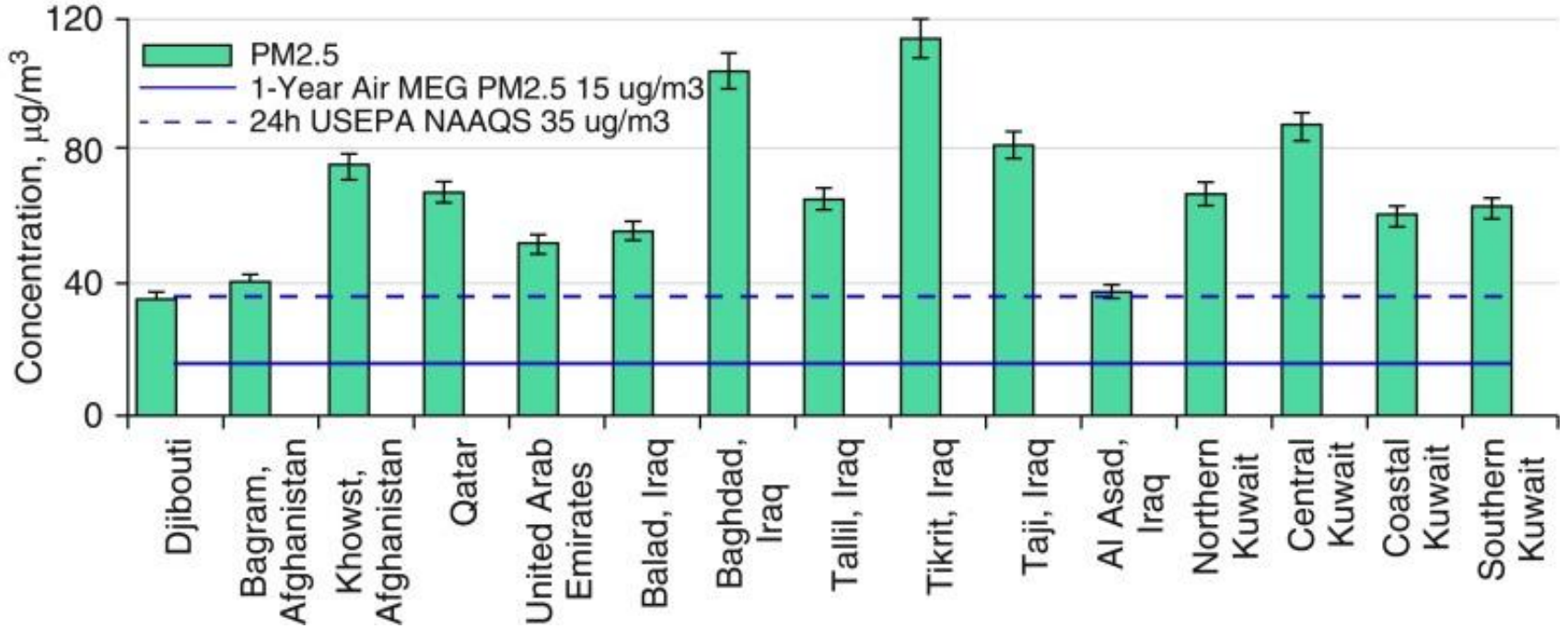
Elevated Particulate Matter ($PM_{2.5}$)

Iraq, Kuwait and Afghanistan



Garshick et al., 2019 Annals ATS
Engelbrecht et al. Inhal Toxicol 2009; 21(4): 297-326.

What are Burn Pits?

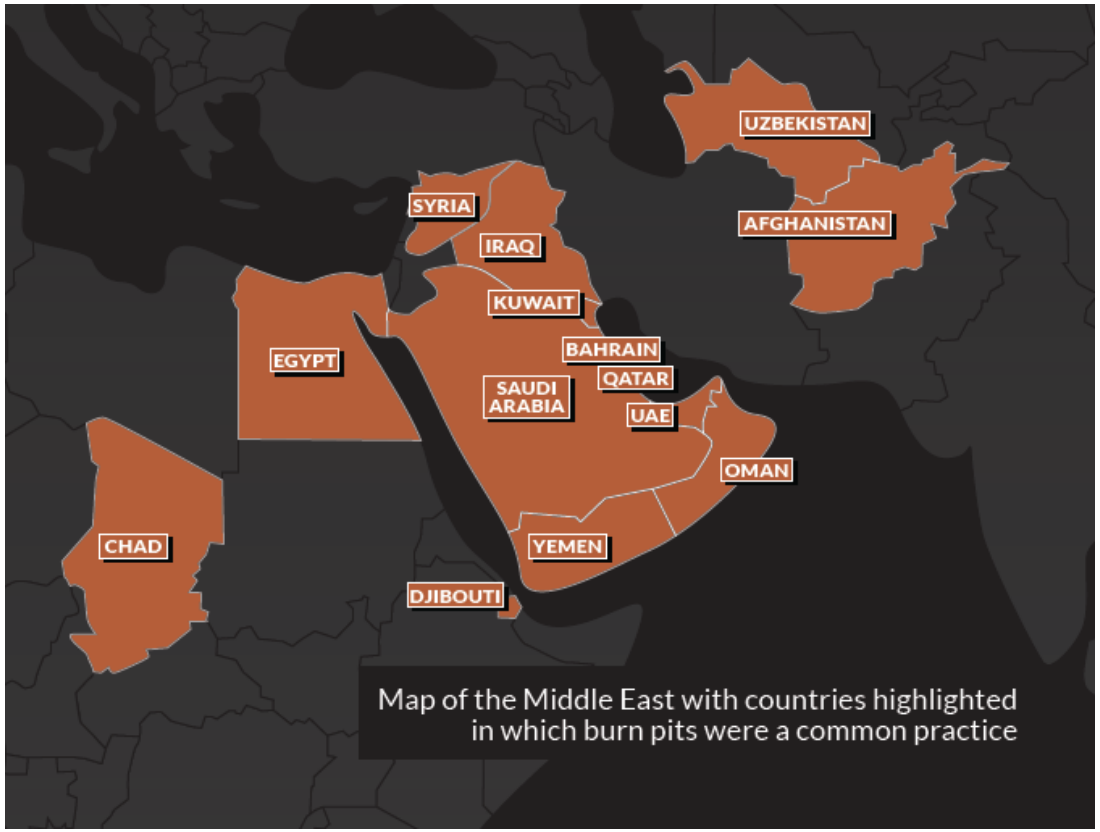
- Burn pits were large areas used for open-air combustion of all types of waste at military sites, especially in Iraq and Afghanistan.
- Commonly burned materials included plastics, electronics, fuel, human waste, paint, solvents, and unexploded ordnance.
- The practice was widespread due to a lack of infrastructure in deployed environments.
- 24 hour exposure which extended for years.

What Was in the Smoke?

- **Dioxins** – extremely toxic compounds linked to cancer, immune system damage, and developmental problems
- **Volatile Organic Compounds (VOCs)** – including **benzene**, a known carcinogen
- **Polycyclic Aromatic Hydrocarbons (PAHs)** – linked to lung, skin, and bladder cancer
- **Particulate matter (PM2.5 and PM10)** – small enough to embed deep in the lungs and bloodstream, contributing to chronic respiratory and cardiovascular issues
- **Heavy metals** – such as **lead, mercury, cadmium**, and **arsenic**
- **Carbon monoxide** – which deprives the body of oxygen and causes long-term neurological effects
- **Sulfur dioxide and nitrogen oxides** – irritants that worsen respiratory conditions like asthma and bronchitis

Who was at Risk for Inhalational Exposure?

Everyone!



Map of the Middle East with countries highlighted in which burn pits were a common practice

Uzbekistan-Karshi Khanabad Air Base “K2”

Uzbekistan–Karshi Khanabad Air Base (K2), also known as Camp Stronghold Freedom. Used by U.S. forces from 2001 to 2005 as a staging and support base for operations in Afghanistan. The site was previously a Soviet military installation and was characterized as “toxic soup.”

- Volatile Organic Compounds (VOCs)
- Particulate matter/dust
- Depleted Uranium
- Possibly enriched uranium
- Asbestos
- Lead

https://www.stronholdfreedomfoujndation.org/

Conditions Linked to K2 Deployment

2001-2005

Service Members Exposed: 15,777

- Malignant melanoma
- Leukemia
- Lymphomas
- Malignancies
- Neuro-degenerative

Health Effects of Burn Pit Exposure

Systemic Conditions

Cardiovascular Disease

- Hypertension
- Ischemic heart disease
- Stroke

Mechanism:

- Fine particulate matter (PM2.5) triggers systemic inflammation, endothelial dysfunction (damage to blood vessel lining), and promotes plaque buildup.

Neurological Conditions

- Cognitive dysfunction (“brain fog”)
- Early-onset dementia
- Parkinsonian syndromes
- Toxic brain injury (neuroinflammation)

Mechanism:

- Toxicants like benzene, heavy metals, and dioxins cross the blood-brain barrier, leading to neuroinflammation, oxidative stress, and cell death.

Cancers

- Lung
- Head and neck
- Brain (glioblastoma)
- Kidney
- Leukemias
- Lymphomas (non-Hodgkin and Hodgkin)
- Rare cancers (sinonasal, bile duct, etc.)

Mechanism:

- Many burn pit toxins (benzene, formaldehyde, dioxins) are classified as Group 1 carcinogens by the International Agency for Research on Cancer (IARC). Chronic exposure raises cumulative cancer risk.

Endocrine & Reproductive Disorders

- Hormone disruption
- Infertility (both male and female)
- Thyroid disorders

Mechanism:

- Dioxins and endocrine-disrupting chemicals interfere with hormone signaling pathways, affecting metabolism, reproduction, and growth.

Autoimmune and Chronic Inflammatory Conditions

- Sarcoidosis
- Rheumatoid arthritis
- Systemic lupus erythematosus (SLE)
- Chronic fatigue syndrome

Mechanism:

- Persistent immune activation by toxicants may lead to immune system dysregulation and increased autoimmune disease susceptibility.

https://nap.nationalacademies.org/catalog/25837
https://www.publichealth.va.gov/exposures/burnpits/health-effects.asp
https://doi.org/10.1161/CIR.0b013e3181dbece1

Presumptive Cancers Related to Military Service

- Brain and CNS
- Head and Neck
- GI and GU
- Hematologic
- Lympomas
- Breast
- Melanoma
- Pancreatic
- Reproductive
- Respiratory

Increased Malignancy with Military Service

PHASE 1-a – STUDY ON THE INCIDENCE OF CANCER DIAGNOSIS AND MORTALITY AMONG MILITARY AVIATORS AND AVIATION SUPPORT PERSONNEL

January 2023

The estimated cost of this report or study for the Department of Defense is approximately $304,000 in Fiscal Years 2021 - 2022. This includes $228,000 in expenses and $76,000 in DoD labor.

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% Increased Cancer Over US Population

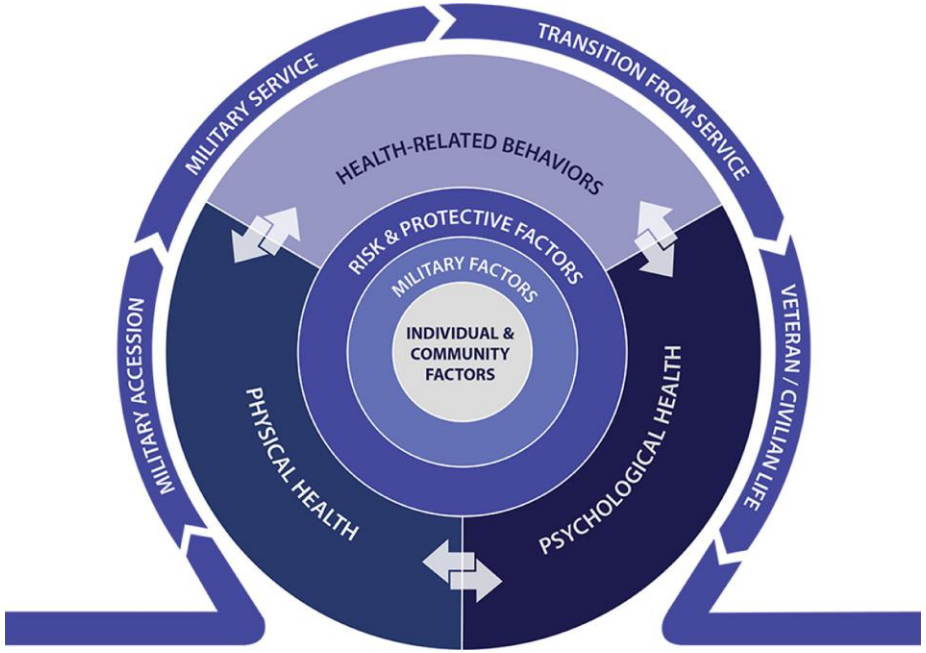
	Air Crew	Ground Crew
All sites combined	24%	3%
Melanoma	87%	9%
Thyroid	39%	15%
Prostate	16%	-
Brain/CNS	-	19%
Kidney	-	9%

The study included:

- *156,050 Air Crew with a median age of 41*
- *737,891 Ground Crew with a median age of 26*

Screening, Diagnosis and Management

Department of Defense Millennium Cohort Study



Respiratory Symptoms:

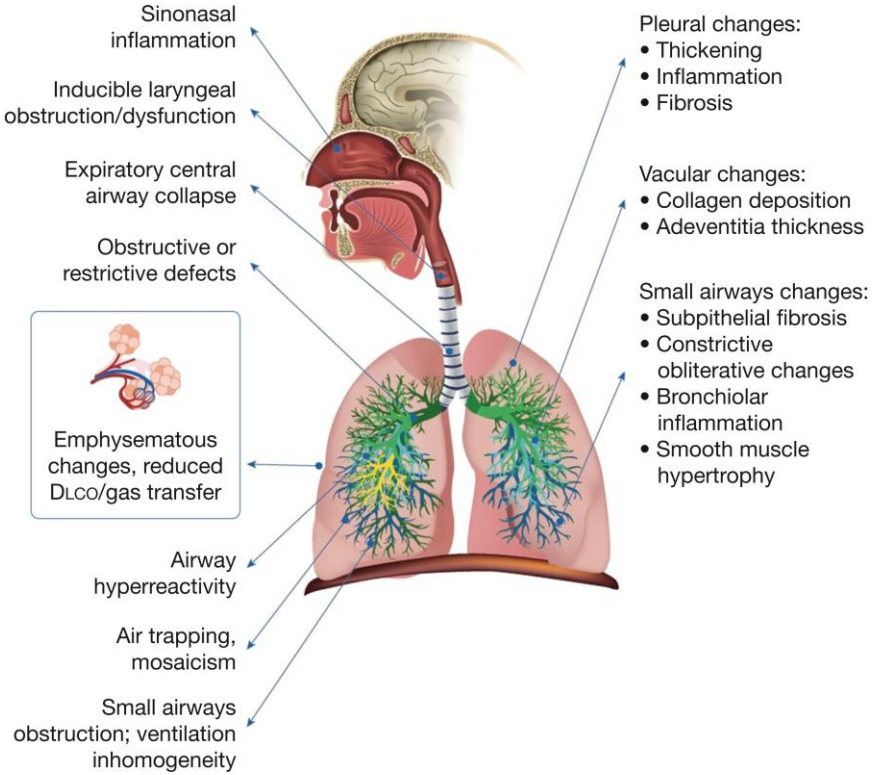
- Deployers 14%
- Non-Deployers 10%
- Increased symptoms with longer deployments

J Epidemiol 2009 J Epidemiol 2009;170:1433–1442
Annals of Epidemiology 67 (2022) 61–72

Surveys: Deployment Related Illnesses

- **69% Incidence of Respiratory Illness**
  J Trop Med Hyg 2005;73:713–719
- **19% Wheezing in Non-asthmatics**
  Mil Med 2007;172:1264–1269
- **Increased Asthma Post Deployment**
  J Occup Environ Med 2012;54:740–745
  Mil Med 2014;179:540–546
  Mil Med 2016;181:265–271
  Allergy Asthma Proc 2010;31:67–71
  J Occup Environ Med 2011;53:961–965

Surveys: Respiratory Illness Post-Deployment



- **Increased asthma, COPD and ILD**
  Mil Med 2016; 181(5):476-481
- **3.4 times lower respiratory disease + 4.8 times upper respiratory disease**
  J Occup Environ Med 2021; 63(3):262-264
- **Increased Incidence of Sarcoidosis**
  Ann Am Thorac Soc 2016; 20(6):797-806
  Sarcoidosis Vasc Diffuse Lung Dis. 2023; 40(3)

Evaluation of Military Personnel with Chronic Respiratory Symptoms

DOD STAMPEDE III Study

Sample of 380 Active Military Members

- Asthma (oscillometry) - 23%
- Airway reactivity (methacholine) - 15%
- Laryngeal Disorders - 7%
- Dynamic airway collapse - 5%
- Unexplained dyspnea - 32%

Chest 2020 Jun;157(6):1559-1567

Unexplained Shortness of Breath

- **CC:** Dyspnea on Exertion
- **HPI:** Previously Athletic/Healthy
  - Deployed to Iraq/Afghanistan
  - Unable to complete a two-mile run
  - Normal standard evaluations
  - Facing early military discharge

Pulmonary Function Testing (n=38)

FEV_1 (% pred)	**86.7** ± 13.3
FVC (% pred)	**90.3** ± 13.2
FEV_1/FVC (%)	**79.1** ± 7.6
TLC (% pred)	**96.1** ± 15.5
DLCO (% pred)	**73.4** ± 15.4

N Engl J Med 2011;365:222–230

Recognizing Symptoms: Unexplained Shortness of Breath

Pulmonary Function Testing (n=38)

	Comparison group*	Patient	*P* value
FEV_1 (% pred)	**99.1** ± 9.2	**86.7** ± 13.3	**<0.001**
FVC (% pred)	**101.6** ± 10.7	**90.3** ± 13.2	**<0.001**
FEV_1/FVC (%)	**97.4** ± 5.0	**79.1** ± 7.6	**<0.001**
TLC (% pred)	**99.6** ± 12.0	**96.1** ± 15.5	**0.230**
DLCO (% pred)	**90.6** ± 12.6	**73.4** ± 15.4	**<0.001**

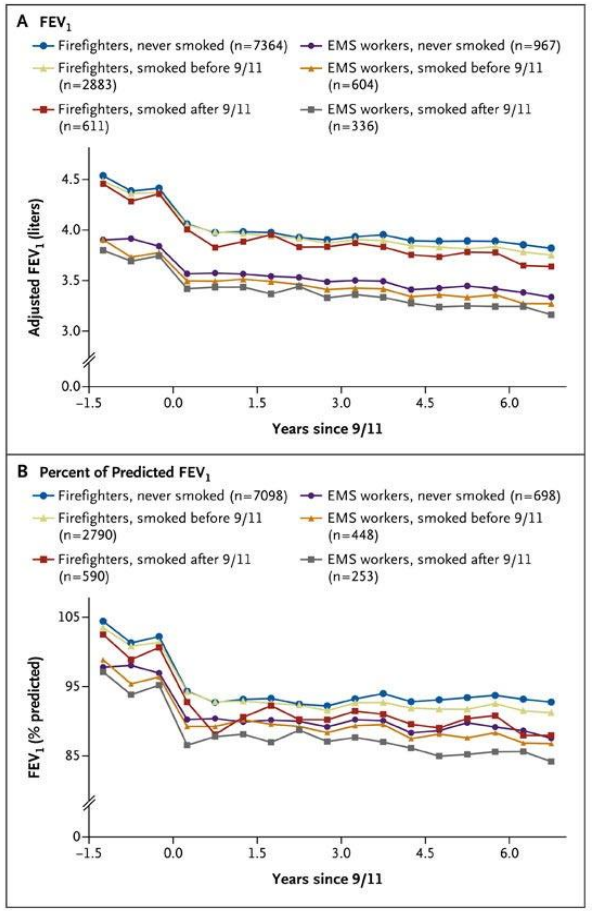
N Engl J Med 2011;365:222–230
**Mil Med* 2002;167(4):281-8

Recognizing Symptoms: Lung Function in WTC Rescue Workers

N=12,790

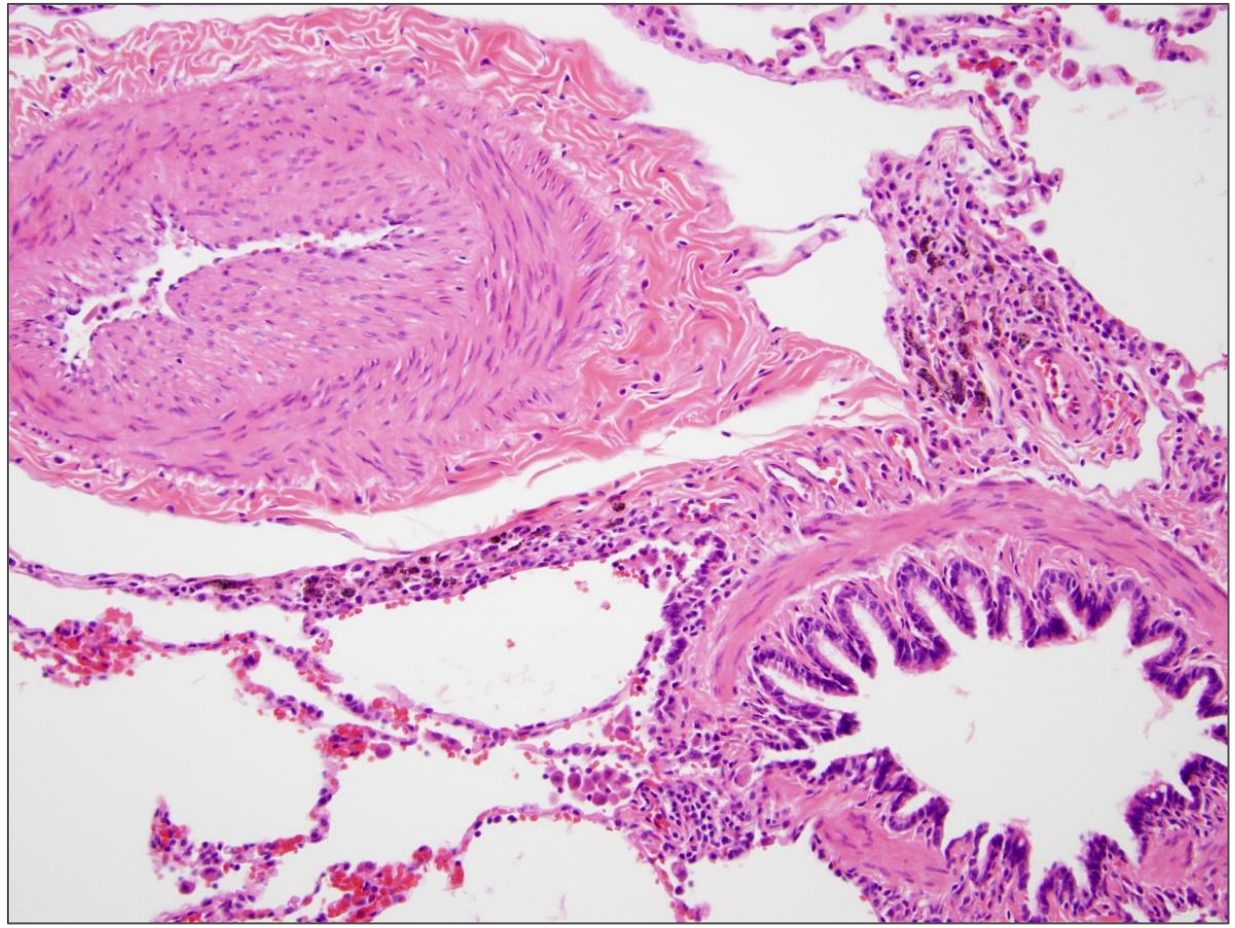
FEV_1 declined 440 cc

No improvement in 6 yrs f/u



NEJM 2010;362:1263-1272.

Pathologic Findings on Surgical Biopsy



- Pigment deposition
- Constrictive bronchiolitis
- Bronchiolar inflammation
- Vasculopathy
- Pleural thickening
- Particulates

N Engl J Med 2011;365:222–230

ORIGINAL ARTICLE

OPEN

Postdeployment Respiratory Syndrome in Soldiers With Chronic Exertional Dyspnea

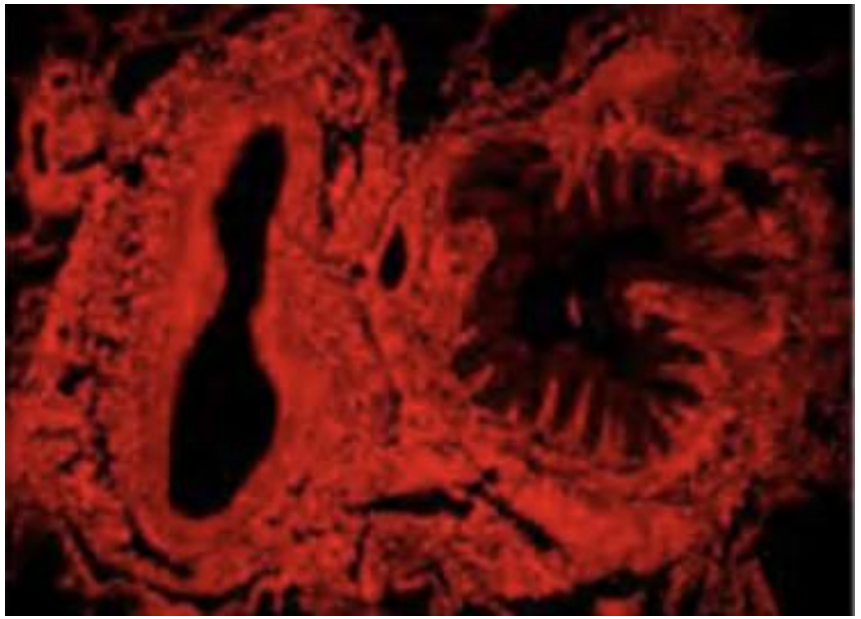
Sergey S. Gutor, MD, PhD, Bradley W. Richmond, MD, PhD,*† Rui-Hong Du, MD,* Pingsheng Wu, PhD,*‡ Kim L. Sandler, MD,§ Grant MacKinnon, MD,‖ Evan L. Brittain, MD,‖ Jae Woo Lee, MD,¶ Lorraine B. Ware, MD,*# James E. Loyd, MD,* Joyce E. Johnson, MD,# Robert F. Miller, MD,* John H. Newman, MD,* Stephen I. Rennard, MD,** Timothy S. Blackwell, MD,*† and Vasiliy V. Polosukhin, MD, PhD**

"The earlier report underestimated the nature and extent of diffuse pathologic remodeling."

Am J Surg Pathol 2021;45:1587–1596

Post Deployment Respiratory Syndrome in Soldiers with Chronic Exertional Dyspnea

- Fibrosis of small airways, vasculature and pleura
- Diffuse CD4, CD8 infiltration
- Adventitial collagen deposition
- Reduction in blood capillary density



(Am J Surg Pathol 2021;45:1587–1596)

Current Research: VA Airborne Hazards & Burn Pits Center of Excellence

A Delphi Study

[Diffuse Lung Disease Guidelines and Consensus Statements]

CHEST

Consensus Statements on Deployment-Related Respiratory Disease, Inclusive of Constrictive Bronchiolitis

A Modified Delphi Study

Check for updates

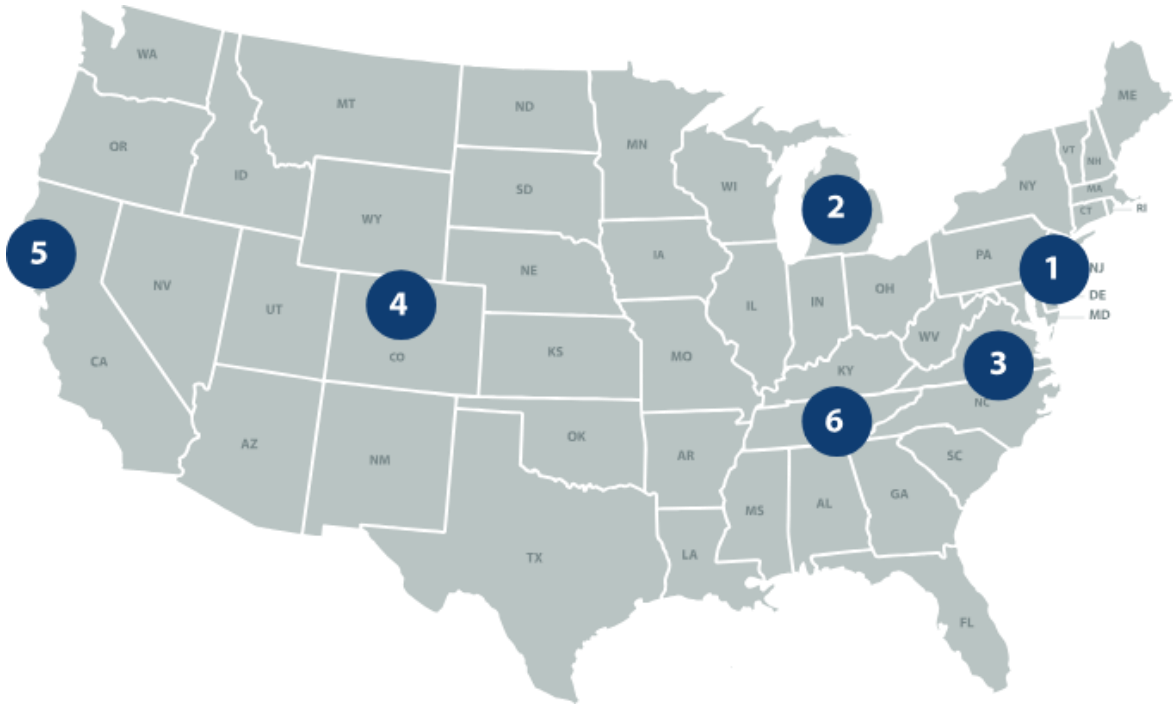
Michael J. Falvo, PhD; Anays M. Sotolongo, MD; John J. Osterholzer, MD; Michelle W. Robertson, MD; Ella A. Kazerooni, MD; Judith K. Amorosa, MD; Eric Garshick, MD; Kirk D. Jones, MD; Jeffrey R. Galvin, MD; Kathleen Kreiss, MD; Stella E. Hines, MD; Teri J. Franks, MD; Robert F. Miller, MD; Cecile S. Rose, MD; Mehrdad Arjomandi, MD; Silpa D. Krefft, MD; Michael J. Morris, MD; Vasiliy V. Polosukhin, MD; Paul D. Blanc, MD; and Jeanine M. D'Armiento, MD, PhD

- Deployment: Vapors, dust, fumes
- CB associated with deployment
- Missed with non-invasive testing
- Diffuse pathologic injury
- Non-invasive diagnostic strategy
- New term: "DRRD"

Chest 2023; 163(3):599-609

VA Post Deployment Cardiopulmonary Evaluation Network

- Established by Airborne Hazards and Burn Pits Center of Excellence (PDCEN).
- Expands and standardizes specialized clinical evaluations for Veterans with specific respiratory health issues.



USPSTF Criteria for Lung Cancer Screening

Lung Cancer Screening Criteria

- Age 50-80 AND
- At least 20 pack yrs AND
- Smoking or cessation <15 years

Misses 50% of lung cancers

Current Research: VA MAS-EXPAND

Research Questions

- Veterans have personal and service-related exposures which might increase their risk for lung cancer.
- Would modifying the LDCT inclusion criteria for Veterans beyond age and smoking history lead to better detection of lung cancer?

	Experimental Group	Control Group
Age	50-80	50-80
Smoking History	Any smoking hx AND	20 Pack year -AND- Cessation <15 years
Health History	Must have Exposure to Agent Orange Burn Pits Asbestos Radiation -OR- H/o COPD, FH lung ca tobacco related cancer	

Review

Deployment

- Is associated with multiple toxic exposures.
- Many disorders have delayed presentations.
- History is an essential component of care.
- Disorders are often missed with standard evaluations.
- Must be emphasized in disability determination

Advocacy, Resources & Policy Update

PACT Act – What it Accomplished

Expanded Health Care Eligibility

- Veterans who served in Iraq, Afghanistan with exposure to burn pits and other toxins have expanded eligibility for presumptive benefits and VA health care.

New Presumptive Conditions

- Relieves burden of proof off Veterans and their families
- 23 new presumptive conditions and multiple malignancies covered

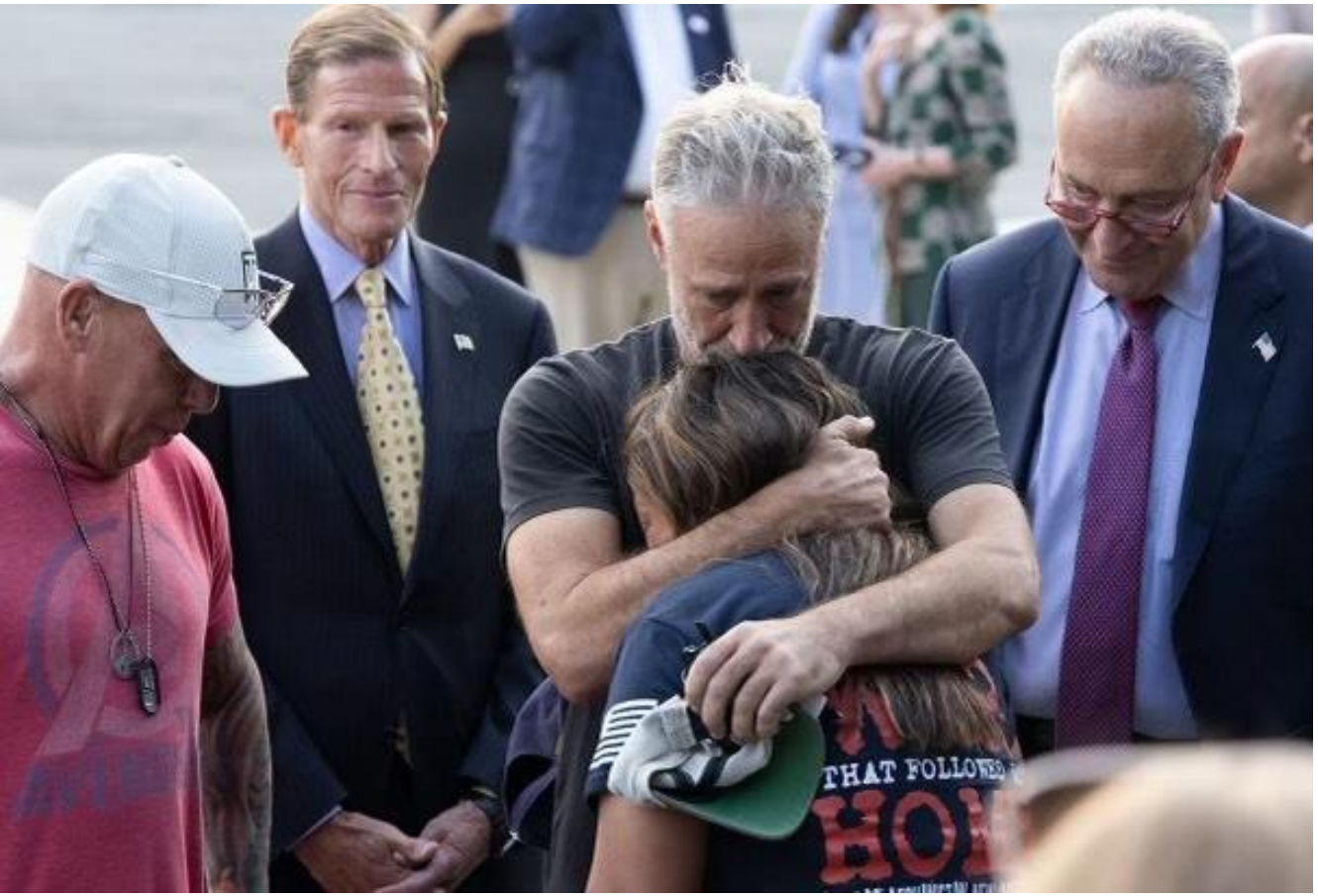
Toxic Exposure Screenings

- Requires the VA to provide toxic exposure screenings to veterans during their health care visits.

Funding and Research

- Funding for toxic exposure research and mental health care.

Burn Pits 360 & PACT Act – What it Accomplished



PACT ACT – HISTORY & ADVOCACY

- Burn Pits 360 was founded by Rosie and Captain Le Roy Torres after Le Roy returned from Iraq with severe toxic exposure-related illnesses.

- First organization to launch an *independent burn pit exposure registry*, later they advocated for the Airborne Hazards Open Burn Pit Registry which was signed in to law by President Barack Obama.

- Advocated relentlessly for over a decade alongside Jon Stewart, 9/11 firefighters and Veterans to recognize toxic exposure as a service-connected issue.

- In July of 2022 we Led national firewatch campaign, town halls, and Capitol Hill visits to spotlight the crisis.

- Mobilized thousands of veterans and families, turning lived experience into legislative momentum.

- Advocated directly with Congress, federal agencies, and the media to elevate the issue nationally.

- Central in forming coalitions that led to the passage of the PACT Act.

- Continues to serve as a hub for legislative testimony and veteran support.

PACT Act – Impact of Burn Pits 360 & the PACT Act

Veteran Outreach & Support

- **6 + million veterans** received toxic exposure screenings.
- **1 + million** PACT ACT claims approved
- **796,000 + Veterans enrolled in VA healthcare since PACT Act's passage**

Policy & Legislative Achievements

- Instrumental in passing the **Honoring Our PACT Act of 2022**—the most comprehensive toxic exposure legislation in U.S. history.
- Advocacy led to over 23 **presumptive conditions** including over 700 cancers being expanded and care access streamlined for millions.
- Continued federal engagement to monitor and shape implementation progress.

Clinical Education & Public Awareness

- Strategic partnerships delivering Miltary Toxic Exposure Guide, **accredited CME/CE activities and Clinician's toolkit** to healthcare professionals across the country.
- Elevated national awareness through media campaigns, veteran testimony, and community events.

PACT Act – POLICY UPDATE

- The Honoring Our PACT Act of 2022 was a landmark law expanding VA healthcare and benefits to veterans exposed to toxic substances.

- Burn Pits 360 played a direct role in drafting and advocating for the PACT Act's passage.

- Ongoing advocacy continues to push for: Faster claims processing and diagnosis pathways.

- Expansion of presumptive conditions.

- Long-term funding to protect veterans' earned benefits.

- Clinical pathways modeled after the World Trade Center Health Program.

Today we continue oversight of the PACT ACT and currently working with Congress to secure and protect the Toxic Exposure Fund.

PACT Act – What still needs to be addressed?

Delays in Benefits and Claims Processing:

- Veterans and their families continue to report frustration with the **claims process**, and addressing the backlog remains an urgent concern. More staffing and better technology are needed to handle the increased demand for health care and claims processing.

Expansion of Covered Conditions and Exposures:

- Many veterans are still fighting for their conditions to be recognized as service-connected, particularly for illnesses related to chronic inflammation, neurological issues, and autoimmune diseases that have emerged later in their lives.
- The PACT Act primarily focused on burn pit exposure, but many veterans were exposed to other toxic substances during their service, such as Agent Orange, depleted uranium, and radiation.

Improved Outreach and Education:

- More outreach is needed to educate veterans about the screening process, how to file claims, and the health risks of toxic exposure. Community outreach efforts and collaboration with Veterans Service Organizations (VSOs) are essential to ensuring that veterans receive the help they need.

Contractor and Civilian Protection:

- The PACT Act primarily focuses on military veterans, but contractors and civilian workers deployed to war zones are also at risk of similar toxic exposures.

Veterans Have Barriers to Accessing Care

Recognition and Diagnosis Challenges

Lack of awareness among providers, non-specific symptoms, and lack of specialized diagnostic techniques cause veterans to spend years seeking a diagnosis, facing skepticism or misattribution of symptoms.

Navigating VA and Community Systems

Complex referral processes, care authorization complexities, fragmented medical and exposure records can discourage veterans for pursuing continued evaluation and care.

Access and Availability of Expertise

Difficult referral process to specialized VA care, long wait times and community care limitations leading to under-recognition of the exposure link and lack of timely access to care.

Stigma and Cultural Barriers

Perceived bias, self-advocacy fatigue, mistrust of the system due to prior negative experiences with the VA can cause emotional exhaustion and perceived stigma that exacerbate barriers to diagnosis and care.

Financial and Logistical Barriers

Out of pocket costs, geographic challenges, and VA benefits complexities make accessing appropriate care even harder for many veterans.

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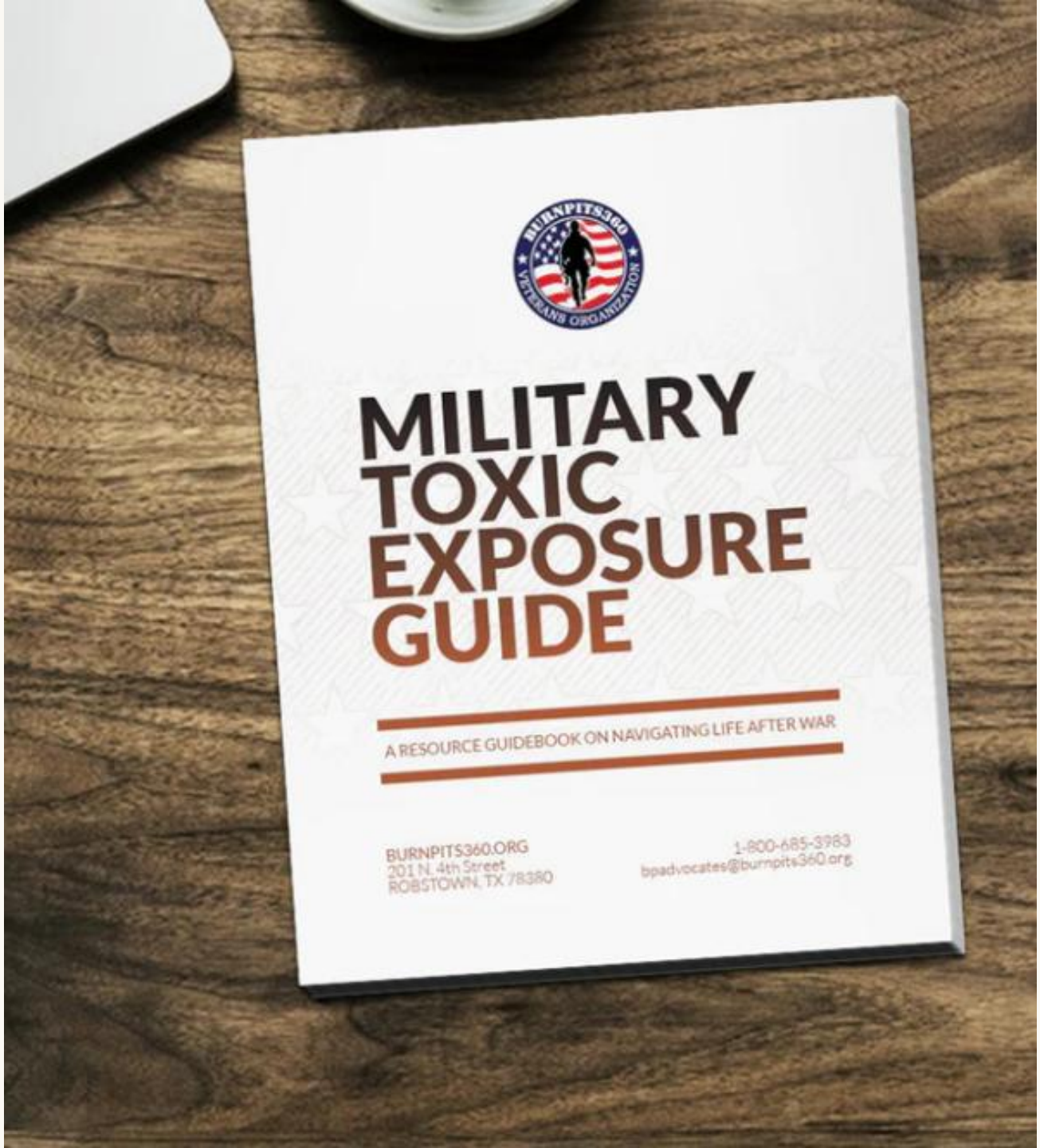
Resources

Military Toxic Exposure Guide - Digital Download

To learn more from Burn Pits 360 visit:
https://burnpits360.org



Interactive Q&A

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