



*Integrity - Service - Excellence*



# Occupational Jet Fuel Exposure and Invasive Cancer Occurrence

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**Sustaining Readiness through Healthy Communities**



# Background



- **JP-8 is the primary aircraft, vehicle and equipment fuel used in the USAF**
- **Jet fuel is the greatest source of chemical exposure for these personnel**
- **Among fuel-exposed workers**
  - **Acute adverse health effects have been well-documented**
  - **Long-term effects have not been widely studied**



# Purpose



- To conduct an exploratory study measuring the association between occupational jet fuel exposure and invasive cancer occurrence in USAF personnel
  - USAF is an ideal population for data records analysis because of the detailed information that is routinely collected
    - Automated Central Tumor Registry (ACTUR)
    - Air Force Personnel Center
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# Methodology



## Nested Case-Control Study Design

USAF personnel with  $\geq 1$  year active duty between 1 Jan 88 and 31 Dec 03

### CASES

USAF diagnosed with cancer between 1 Jan 89 and 31 Dec 03 (2,754 people)

compared to

### CONTROLS

USAF with same year of birth, race and gender as each respective case (11,016 people)

Total Sample = 13,770



# Exposure Assessment



- Categorized based on current and previous USAF occupations:
    - **High (N=45)**
      - Aircraft fuel systems workers
      - Direct and frequent fuel contact
    - **Moderate (N=428)**
      - Fuel storage and distribution systems
      - Indirect and/or intermittent fuel contact
    - **Low (N=13,297)**
      - All other occupations
      - Little or no fuel contact
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# Fuel Systems Workers





# Sample Characteristics



## Distribution of Select Sample Characteristics

<b>AGE AT DIAGNOSIS</b>	Range	18 - 61 years
	Median	37 years
<b>GENDER</b>	Female	27.1%
	Male	72.9%
<b>RACE</b>	White (Hispanic & Non-Hispanic)	84.6%
	Black	11.4%
	Other	3.2%



# Sample Characteristics



## Distribution of Jet Fuel Exposure Levels

Level of Occupational Jet Fuel Exposure	Cases %	Controls %	Total %
High	0.3	0.3	0.3
Moderate	2.7	3.2	3.1
Low	97.0	96.5	96.6



# Results



## Jet Fuel Exposure and Odds Ratio for Cancer

Level of Occupational Jet Fuel Exposure	Odds Ratio	95% CI	p-value
High	0.73	0.32-1.64	0.44
Moderate	0.84	0.65-1.09	0.19
Low	Reference	--	--
Exposed	0.83	0.65-1.06	0.14
Unexposed	Reference	--	--



# Specific Cancer Types



Cancer Type	Cases N	OR	95% CI
Acute Myeloid Leukemia	26	0.48	0.06-4.01
All Leukemias	71	0.55	0.12-2.52
Urinary Bladder	48	0.70	0.10-5.07
Breast Adenocarcinoma	217	0.49	0.11-2.17
Hodgkin's Lymphoma	135	0.44	0.10-1.91
Lung (Small & Non-Small cell)	42	0.79	0.09-7.28
Multiple Myeloma	17	1.33	0.14-12.82
Non-Hodgkin Lymphoma	145	1.00	0.33-3.03
Renal Clear Cell	49	0.83	0.21-3.32

Frequencies were too small for valid comparisons of ALL, CLL, CML, dermatofibrosarcoma, hepatocellular and nasal cancers



# Discussion - Strengths



- All data were abstracted from surveillance databases that utilized standardized reporting procedures
    - Minimizes chance of recall bias
    - All cancer cases analyzed, coded and entered by trained registrars
  - Novel study
    - Addresses gap in the literature and may be useful for future work
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# Discussion - Limitations



- Individual exposure assessment
  - Analysis of specific fuels/chemicals
  - Adjust for other cancer risk factors
  - Healthy worker effect
  - Small number of some cancer types
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# Discussion - Improvements



- Environmental Sampling
  - Biological Markers
  - Personal Surveys/Questionnaires
  - Measure a more prevalent and/or earlier onset outcome
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# Conclusion



- **No association observed between occupational jet fuel exposure and invasive cancer occurrence**
  - **Similar findings reported in other studies**
- **No red flags**



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**Questions?**