

The Association of Military Environmental Exposures Scores with the Neurobehavioral Symptom Inventory (NSI) in Veterans

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INTRODUCTION: The assessment of the range and complexity of environmental exposures of veterans has become increasingly important. Questions remain regarding the numbers and combinations of exposures associated with various clinical outcomes. The aim of this research was to determine the associations and epidemiological parameters of military exposures with neurobehavioral symptoms of veterans seen at the California War Related Illness and Injury Study Center (WRIISC).

METHODS:

The study population was 313 Veterans who were seen at the California WRIISC and consented for research. Descriptive and multivariate statistics were performed using SAS.

Table 1. Demographics Age, Gender, and Race

Sex	Frequency	Percent	Mean Age	Age Range
Female	45	14.38	44.79	29-64
Male	268	85.62	47.25	24-78

Race	Frequency	Percent
American Indian or Alaskan Native	13	4.3
Asian	12	4.3
Black or African America	8	2.87
Native Hawaiian or Pacific Islander	1	3.15
White	247	74.79
Unknown	12	3.72
Other	20	6.88

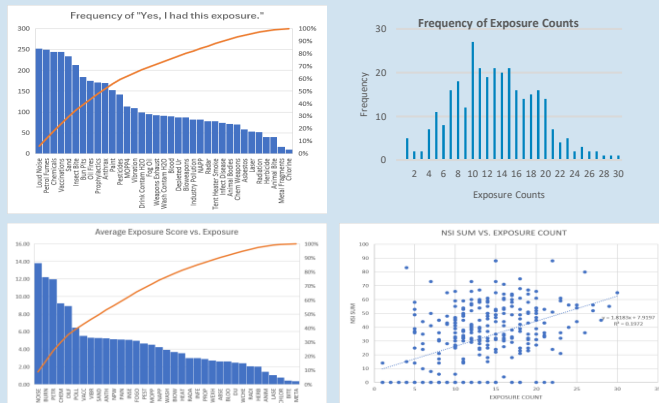
Pre-ODS/S	9	4.76
ODS/S	97	51.32
Post ODS/S	83	43.92

Exposures: Veterans were assessed for 35 different exposures to questions from the WRIISC clinical intake packet that recorded subjective ratings (1-4 points) of the using the frequency, intensity, and concern for each exposure. Exposure score was the arithmetic product of self-reported frequency, intensity, and concern ratings.

Exposure score = frequency x intensity x concern (range:1-64)

Neurobehavioral Symptom Inventory (NSI): A neurobehavioral evaluation instrument composed of 22 items, rated on a five-point scale from 0 to 4. Example items include feeling dizzy, loss of balance, and headaches.

Results: Exposures and Their Association with NSI



Exposure Types Showed Variable Association with Individual NSI Items

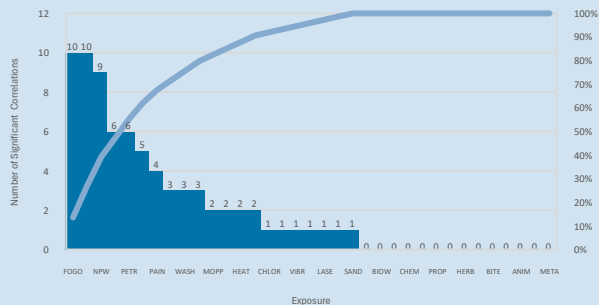


Table 2. Mean Exposure Scores Varied by Combat Era

	Combat Era			
	Pre-ODS	ODS/S	Post-ODS/S	p-value
Herbicides	20.22	1.87	1.98	<.0001
MOPP Gear	2.00	9.16	4.27	0.005
Chemical Nerve Agents	0.00	9.97	2.61	<.0001
Antidotes (PB or NAPP)	4.44	9.52	4.71	0.0026
Fog oils	2.67	5.46	14.24	0.0007
Industrial Air Pollution	0.00	0.77	2.75	0.036
LASER	0.00	0.77	2.75	0.036
Weapons exhaust, enclosed space	2.22	2.15	5.78	0.0095
Prophylactic Meds	2.67	2.05	7.11	0.0028
RADAR	4.33	2.30	5.96	0.026
Sand/dust	2.89	6.46	10.53	0.04
Burn pits	6.89	13.14	22.59	0.0001
Oil Well Fires	2.33	16.41	9.33	0.0004
Vaccinations	5.33	5.80	10.13	0.041

Table 3. Statistically Significant Differences Between Male and Female Exposure Scores

Chlorine Gas					
Sex	N	Mean	Standard Deviation	Standard Error	Pr > t
Male	47	2.7021	10.1444	1.4797	0.0044
Female	266	0.4586	3.2867	0.2016	
Bioweapons					
Sex	N	Mean	Standard Deviation	Standard Error	Pr > t
Male	47	6.5532	13.1956	1.9233	0.029
Female	266	3.188	6.952	0.5489	
Chemical Weapons					
Sex	N	Mean	Standard Deviation	Standard Error	Pr > t
Male	47	4.363	9.8927	1.4377	0.0394
Female	266	2.0451	6.557	0.402	
Anthrax Vaccine					
Sex	N	Mean	Standard Deviation	Standard Error	Pr > t
Male	47	7.8723	12.4754	1.8197	0.0089
Female	266	4.797	9.8147	0.6018	
Infectious Disease					
Sex	N	Mean	Standard Deviation	Standard Error	Pr > t
Male	47	5.2138	12.2899	1.7927	0.0092
Female	266	2.6050	7.9193	0.4835	

Conclusion:

- These results demonstrate:
 - exposures scores varied with the highest being noise, burn pits, petrol and fumes.
 - exposures have the highest NSI correlations included fog oils, ingestion of contaminated water, paint.
- Scores for the following exposures were significantly different across combat era: herbicides, MOPP gear, PB or NAPP, fog oils, industrial air pollution, LASER, weapons exhaust, prophylactic meds, RADAR, sand/dust, burn pits, oil well fires, vaccinations.
- Scores for the following exposures were significantly different between males and females: anthrax vaccine, bioweapons, chemical weapons, chlorine gas, infectious disease

References: PACT Act (<http://nap.nationalacademies.org/29219>).



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