



# **STAMPEDE Studies of Post-Deployment Respiratory Symptoms**

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# Disclaimer



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- Speaker's Bureau – Janssen/GSK



# DoD Studies



- Acute eosinophilic pneumonia – Sine CR et al, *Respir Med* 2018; 137:123-28.
- COPD – Matthews T et al, *Mil Med* 2014; 179:1273-78
- Asthma – Delvecchio SP et al, *J Asthma* 2014; 52:363-69
- Sarcoidosis – Anderson J et al, accepted to *Mil Med*
- STAMPEDE I – Morris MJ et al, *AJRCCM* 2014; 190:77-84
- STAMPEDE III – Morris MJ et al, In revision for *Chest*



# AEP



- 43 ADSM A/E to Landstuhl with acute respiratory illness
- Predominantly male; average age of 25.5 years
- 91% with smoking history with 77% recently increased
- 100% had hypoxia
- 67% required mechanical ventilation
- Mean BAL eosinophilia of 37%
- Changed approach to acute respiratory illnesses evacuated from theater



# COPD



TABLE IV. PFT of Documented Smokers

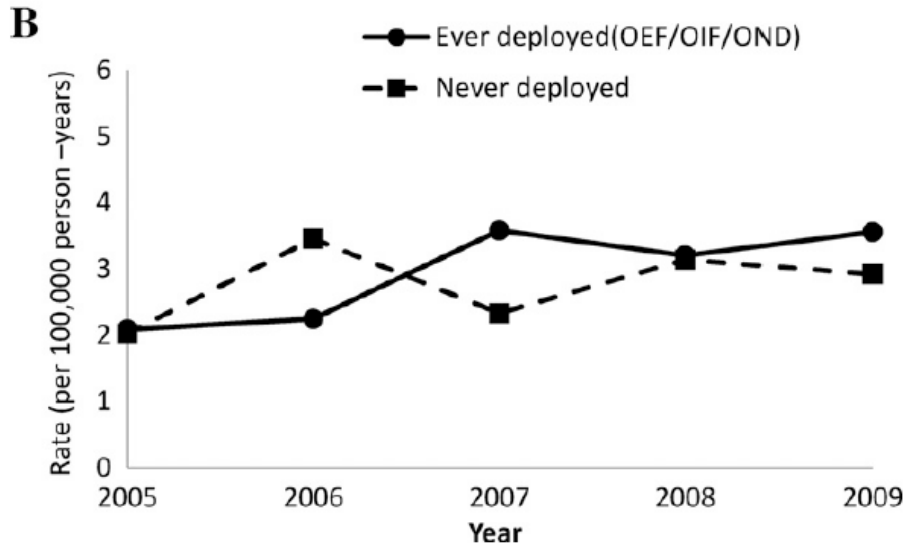
	<i>N</i>	Deployed	<i>N</i>	Nondeployed	<i>p</i> -Value
FVC (L)	100	4.45 ± 0.83	67	4.32 ± 0.98	0.62
FVC (% Predicted)	106	88.6 ± 14.2	69	89.8 ± 14.5	0.59
FEV <sub>1</sub> (L)	102	3.06 ± 0.74	68	2.93 ± 0.81	0.26
FEV <sub>1</sub> (% Predicted)	107	75.5 ± 17.3	70	74.0 ± 18.5	0.58
FEV <sub>1</sub> Post-BD (% Predicted)	76	79.7 ± 15.7	45	75.9 ± 14.2	0.18
FEV <sub>1</sub> % Change Post-BD	77	6.7 ± 6.7	47	7.0 ± 8.9	0.84
FEV <sub>1</sub> /FVC	99	68.4 ± 10.8	67	65.8 ± 11.6	0.80
TLC (L)	37	6.73 ± 1.18	19	7.02 ± 1.11	0.37
TLC (% Predicted)	41	98.9 ± 16.9	20	105.2 ± 16.0	0.17
RV (L)	35	2.09 ± 0.76	19	2.53 ± 0.88	0.06
RV (% Predicted)	38	112.0 ± 46.9	20	132.7 ± 53.0	0.13
DLCO (mL/mm Hg/min)	29	26.2 ± 6.6	23	22.3 ± 6.3	0.03
DLCO (% Predicted)	38	86.7 ± 25.2	23	75.2 ± 21.4	0.07

FVC, forced vital capacity; FEV<sub>1</sub>, forced expiratory volume at one second; BD, bronchodilator; TLC, total lung capacity; RV, residual volume; DLCO, diffusing capacity for carbon monoxide.

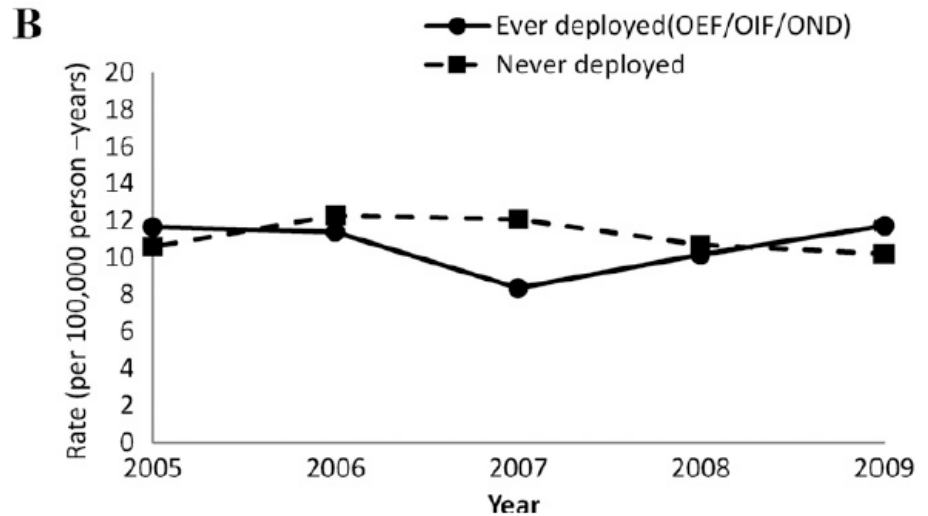
No differences in PFT values based on deployment history



# COPD



**FIGURE 1.** Annual rates of emphysema (ICD-9 492) by (A) branch of service and (B) deployment history, Defense Medical Surveillance System data, active duty military 2005–2009.



**FIGURE 2.** Annual rates of chronic airway obstruction (ICD-9 496) by (A) branch of service and (B) deployment history, Defense Medical Surveillance System data, active duty military 2005–2009.



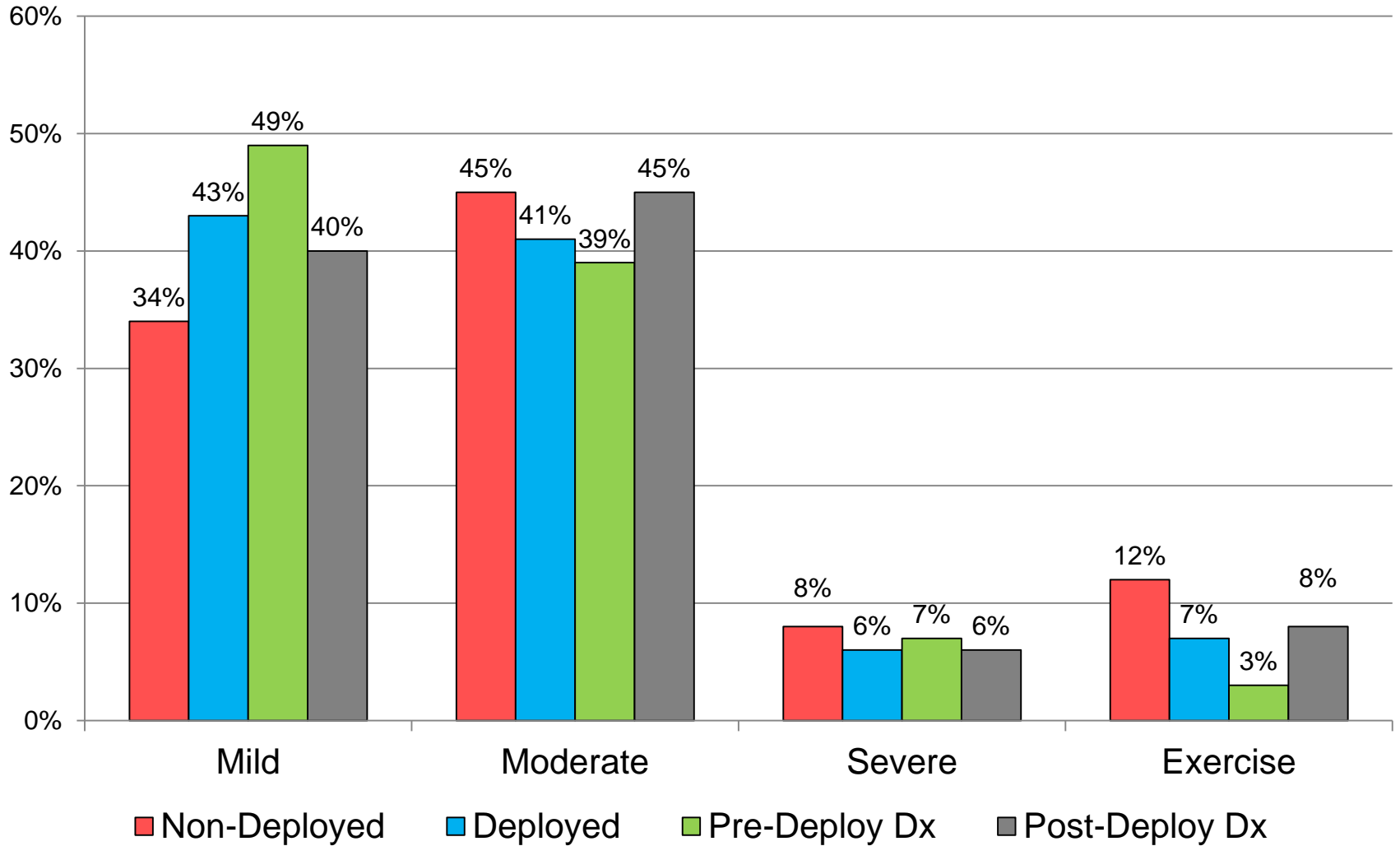
# Asthma



	ALL	Non-Deployers	Deployers	P Value	Pre-Deploy Diagnosis	Post-Deploy Diagnosis	P value
N	337 (84%)	173 (84%)	169 (87%)		82 (88%)	87 (86%)	
FEV <sub>1</sub> (% pred)	78.6 ± 17.5	77.9 ± 18.0	79.2 ± 17.1	0.507	77.9 ± 18.7	80.5 ± 15.4	0.166
FVC (% pred)	87.5 ± 16.9	88.0 ± 17.6	87.1 ± 16.1	0.632	86.0 ± 17.4	88.1 ± 15.0	0.208
FEV <sub>1</sub> /FVC	75.1 ± 11.1	74.6 ± 12.0	75.6 ± 10.1	0.045	75.2 ± 10.0	76.1 ± 10.2	0.067
Post-BD FEV <sub>1</sub> (% pred)	85.0 ± 16.7	84.6 ± 18.1	85.3 ± 15.4	0.760	84.0 ± 15.7	86.6 ± 15.1	0.181



# Asthma







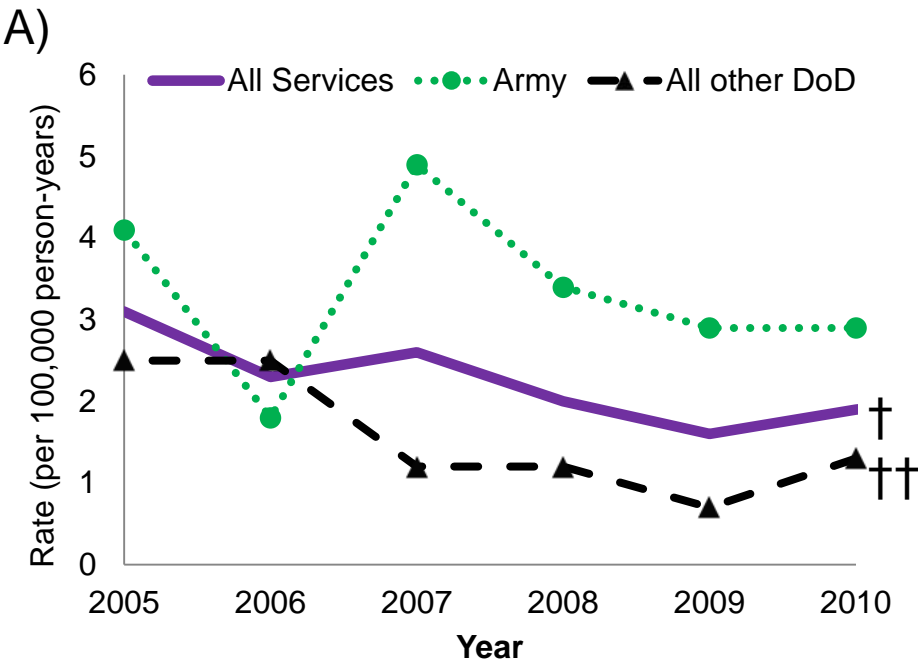
# Sarcoidosis



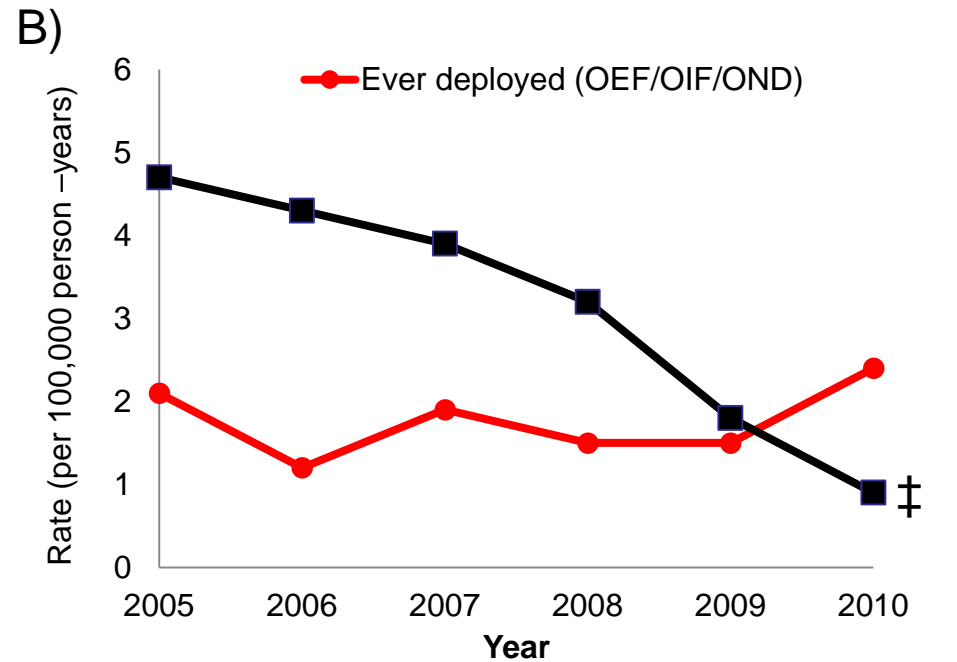
	<b>All Patients (n = 363)</b>	<b>No Deployment (n = 130)</b>	<b>Pre-Deployment (n = 48)</b>	<b>Post-Deployment (n = 185)</b>	<b>P value</b>
<b>Stage 0</b>	10 (2.7%)	2 (1.6%)	2 (4.2%)	6 (3.5%)	0.49
<b>Stage 1</b>	150 (41.3%)	53 (42.7%)	25 (52.1%)	72 (41.6%)	0.67
<b>Stage 2</b>	130 (35.8%)	45 (36.3%)	14 (29.2%)	71 (41.0%)	0.12
<b>Stage 3</b>	48 (13.2%)	22 (17.7%)	5 (10.4%)	21 (12.1%)	0.39
<b>Stage 4</b>	7 (1.9%)	2 (1.6%)	2 (4.2%)	3 (1.7%)	0.73



# Sarcoidosis



† Statistically significant decrease in rates over time,  $p=0.027$   
†† Borderline statistically significant increase in rates over time,  $p=0.051$



‡ Statistically significant decrease in rates over time,  $p=0.001$

\*A case of pulmonary sarcoidosis was defined as any inpatient encounter coded with both ICD-9 135.XX and 517.8 in any diagnostic position or two or more outpatient encounters with both codes in any diagnostic position within 730 days. An individual was counted as a case only once per annual surveillance period. Cases diagnosed prior to the beginning of each surveillance period (i.e. prevalent cases) were excluded from each annual rate calculation.



# STAMPEDE I



- Identify any acute effects of deployment-related exposures
  - Active duty military with new onset dyspnea
  - Evaluated within 6 months of redeployment
  - Full PFTs, CXR, HRCT, methacholine
  - Bronchoscopy with BAL
  - Other clinical studies as indicated (e.g. CPET, laryngoscopy)
- Specifically evaluated for acute/subacute interstitial lung disease



# STAMPEDE I Exposures



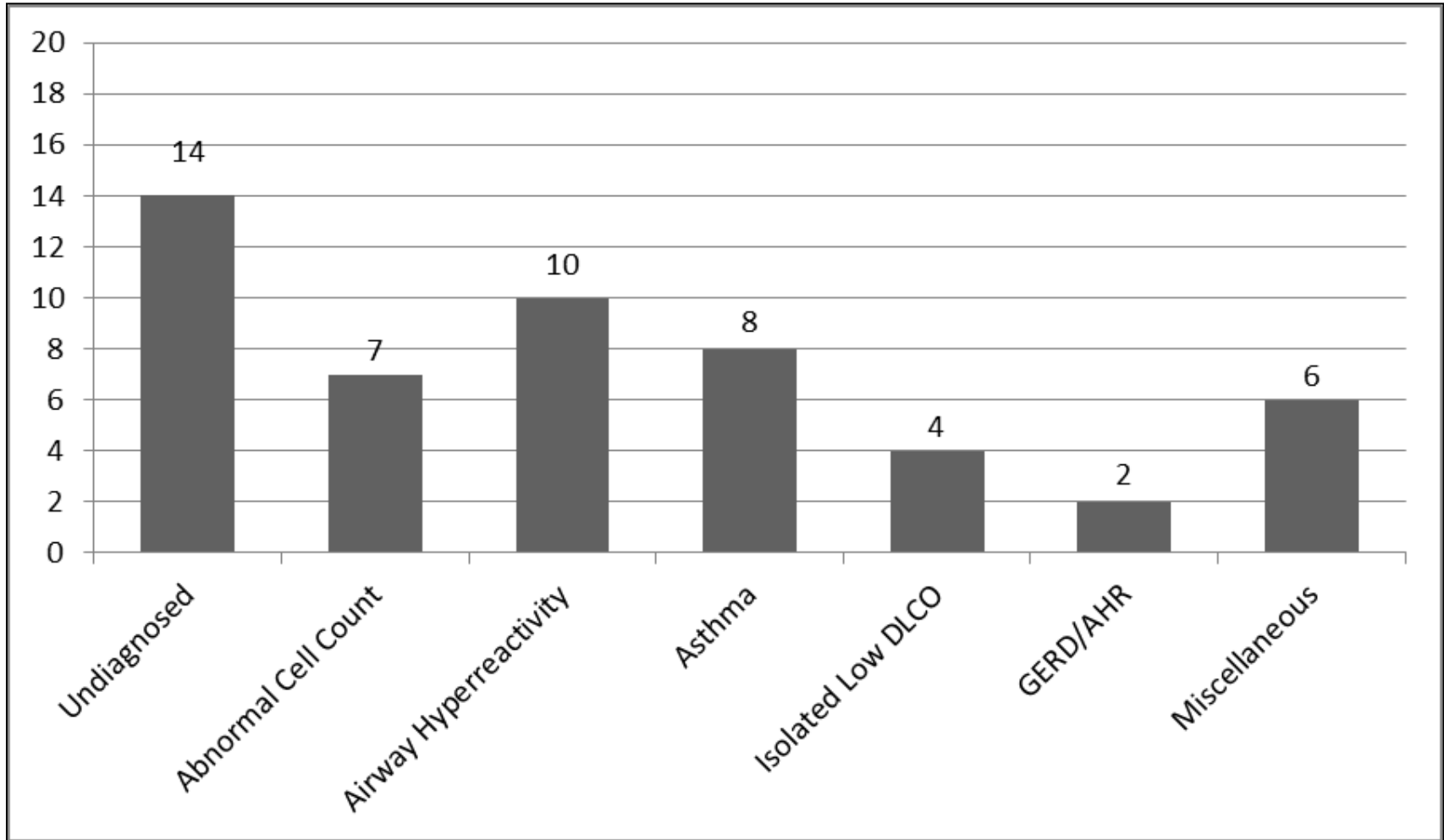
**Table 1.** Reported Frequency and Duration of Airborne Exposures

	Exposure (1–3)	Severity (0–3)	Health Effects	Treatment Visits
Dust/sand	2.55 ± 0.50	1.71 ± 0.68	17/34 (50%)	7/34 (20.6%)
Burn pits	2.00 ± 0.85	1.30 ± 0.85	14/34 (41.2%)	4/34 (11.2%)
Vehicle exhaust	1.85 ± 0.83	0.72 ± 0.77	5/34 (14.7%)	0/34 (0%)
Smoke/fumes	1.32 ± 1.01	0.80 ± 0.87	6/34 (17.6%)	4/34 (11.2%)

Self-reported exposures and severity based on the following scale. Exposure: 1 = occasionally, 2 = regularly, 3 = continuously. Severity: 0 = none, 1 = mild, 2 = moderate, 3 = severe.



# STAMPEDE I Diagnoses





# STAMPEDE III Procedures



- Full PFTs with pre/post bronchodilator
- Chest imaging – CXR/HRCT Chest
- Impulse oscillometry (IOS) / Exhaled nitric oxide
- Methacholine challenge testing (MCT)
- Bronchoscopy/BAL: cell count, flow cytometry
- Exercise laryngoscopy
- Cardiopulmonary exercise testing (CPET)
- Echocardiography
- Allergy testing (RAST, IgE, CBC, CRP, Nicotine)



# STAMPEDE III Demographics



	<b>N</b>	<b>Age</b>	<b>Male (%)</b>	<b>BMI (kg/m<sup>2</sup>)</b>
<b>Dyspnea</b>	122	39.1 ± 7.8	104 (85%)	28.5 ± 3.5
<b>Asthma</b>	87	37.5 ± 8.3	75 (86%)	29.8 ± 3.8
<b>AHR</b>	57	36.9 ± 9.1	52 (91%)	28.9 ± 3.6
<b>Airway Disorders</b>	41	39.5 ± 9.9	36 (88%)	28.3 ± 4.1
<b>Nonspecific PFT</b>	40	39.3 ± 8.6	35 (88%)	27.4 ± 3.6
<b>OLD</b>	11	39.6 ± 7.6	9 (82%)	26.1 ± 4.3
<b>DLD</b>	6	37.7 ± 7.9	6 (100%)	29.7 ± 3.9
<b>Miscellaneous</b>	16	39.4 ± 7.9	16 (100%)	29.3 ± 2.2
<b>TOTAL</b>	380	38.5 ± 8.4	333 (88%)	28.7 ± 3.7



# STAMPEDE III Exposures



	<b>Exposure (0-3)</b>	<b>Severity (0-3)</b>
<b>Dust/Sand</b>	2.03 ± 0.72	1.63 ± 0.75
<b>Burn Pits</b>	2.04 ± 0.80	1.47 ± 0.89
<b>Vehicle Exhaust</b>	1.71 ± 0.79	0.88 ± 0.85
<b>Smoke/Fumes</b>	1.39 ± 0.82	0.92 ± 0.92

Self-reported exposures and severity of exposures based on the following scales:

Exposure: 0 – None; 1 – Occasionally; 2 – Regularly; 3 – Continuously

Severity: 0 – None; 1 – Mild; 2 – Moderate; 3 – Severe





# STAMPEDE III Co-Morbidities



	Smoking	GERD	Allergy Testing	OSA	BMI > 30 kg/m <sup>2</sup>	Mental Health	PTSD or TBI
<b>Dyspnea</b>	48 (41%)	19 (16%)	42 (36%)	45 (37%)	35 (29%)*	55 (45%)	38 (31%)
<b>Asthma</b>	34 (39%)	16 (20%)	47 (58%)	39 (45%)	40 (46%)	47 (54%)	26 (30%)
<b>AHR</b>	19 (33%)	3 (6%)	25 (48%)	16 (29%)	22 (39%)	32 (56%)	16 (28%)
<b>Airway</b>	11 (28%)	6 (15%)	15 (38%)	16 (39%)	12 (29%)	25 (61%)	13 (33%)
<b>Nonspecific PFT</b>	10 (25%)	1 (3%)	14 (40%)	17 (43%)	9 (23%)	19 (48%)	16 (40%)
<b>OLD</b>	7 (64%)	0 (0%)	5 (46%)	6 (55%)	2 (18%)	8 (73%)	6 (55%)
<b>DLD</b>	0 (0%)	0 (0%)	0 (0%)	1 (17%)	3 (50%)	1 (17%)	2 (33%)
<b>Miscellaneous</b>	7 (44%)	3 (21%)	7 (47%)	6 (38%)	7 (44%)	6 (38%)	4 (25%)
<b>TOTAL</b>	136 (36%)	48 (14%)	155 (44%)	146 (39%)	130 (34%)	193 (51%)	121 (32%)



# Conclusions



- Evaluation of chronic respiratory symptoms complex and may be multifactorial
- Significant percentage without evidence of lung disease based on imaging, PFTs
- Diffuse lung disease infrequent in studied population
- Clinical evaluation should focus on asthma, AHR and upper airway disorders

