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Title of research: Inspiratory airflow dynamics during sleep in Gulf War illness (GWI) and the effects of nasal continuous positive airway pressure on the symptoms of GWI.

Funding Source: VA Career Development Award.

Start and end dates: 10/2005 to 10/2008.

Purpose: To determine whether veterans with Gulf War Illness (GWI) are distinguished by sleep disordered breathing (SDB) compared to asymptomatic veterans of the first Gulf War and whether nasal continuous positive airway pressure (nasal CPAP) alleviates the symptoms of veterans with Gulf War Illness (GWI) and sleep disordered breathing (SDB).

Results:

- 1) During supine NREM stage 2 sleep, veterans with GWI had  $96 \pm 5\%$  (mean  $\pm$  SD) characterized by inspiratory airflow limitation (sleep disordered breathing) while veterans of the first Gulf War without GWI had  $36 \pm 25\%$  of their breaths characterized by sleep disordered breathing ( $p < 0.0001$ )

**Figure 1.**

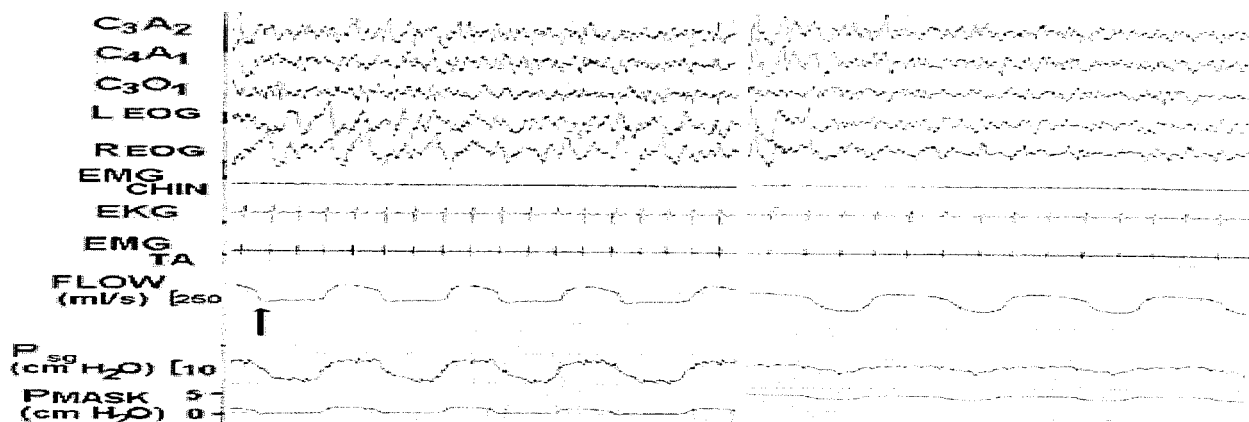


Figure 1 demonstrates the wide, flattened inspiratory airflow tracing (inspiration is down going indicated by the arrow) of a veteran with GWI and sleep disordered breathing, and the narrow, rounded inspiratory airflow tracing of a veteran without GWI.

2) Three weeks of treatment with nasal CPAP improved the pain (34%;  $p = 0.0008$ ), fatigue (38%;  $p = 0.0002$ ), cognitive function (33%;  $p = 0.004$ ), sleep quality (41%;  $p = 0.0003$ ), physical health (34%;  $p = 0.0003$ ) and mental health (16%;  $p = 0.03$ ) of 8 veterans with GWI compared to no improvement for 9 veterans treated with sham nasal CPAP

**Figure2.**

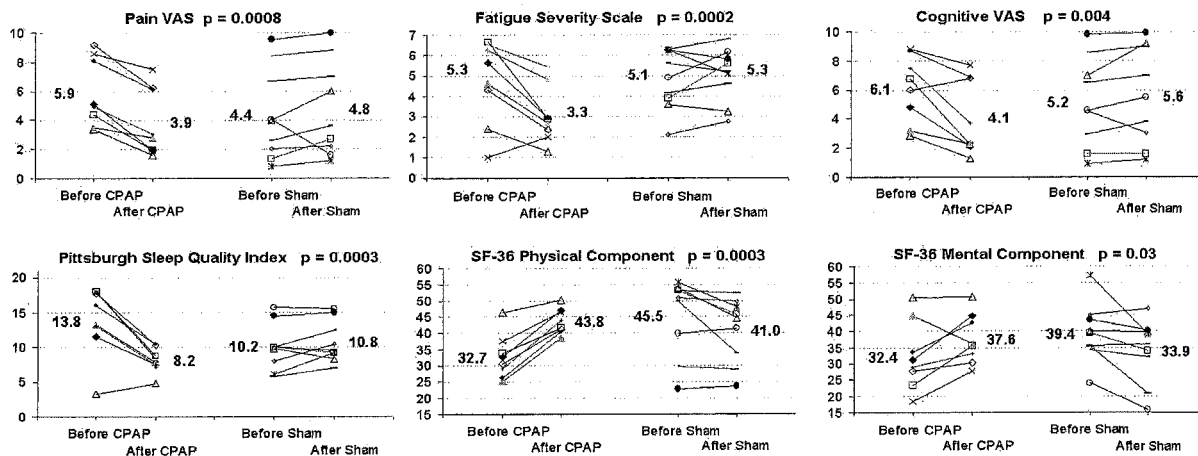


Figure 2 demonstrates the improvement of the questionnaire data characterizing the symptoms and health quality of veterans with GWI treated with nasal CPAP compared to the lack of change of the questionnaire data for veterans with GWI treated with sham nasal CPAP.

**Conclusions:** Veterans with GWI are characterized by sleep disordered breathing that distinguishes them from asymptomatic veterans of the first Gulf War and nasal CPAP, which eliminates sleep disordered breathing, can improve symptoms in veterans with GWI.

**References:**

1. Amin, M.M., et al., *The effect of nasal continuous positive airway pressure on the symptoms of Gulf War illness.* Sleep Breath.
2. Amin, M.M., et al., *Inspiratory airflow dynamics during sleep in veterans with Gulf War illness: a controlled study.* Sleep Breath.