

## **Effects of Post-Exertion Malaise on Veterans with Gulf War Illness: fatigue and cognition**

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**Research Topic:** Definition and Diagnostic Biomarkers

**Purpose:** Following an acute bout of exercise, many Gulf War Veterans (GV) experience post-exertion malaise (PEM) which is a feeling of dysphoria and fatigue that follows the exercise. The purpose of this study was to systematically study in PEM in GWI.

**Methods:** Thirty-seven GVs (GWI+, n = 24 [23 male]; GWI-, n =13 [12 male]) volunteered to complete a 30-min bout of cycling at an intensity of 70% of heart rate reserve. Before and after this bout of exercise, they performed a cognitively fatiguing task and a control task. The cognitively fatiguing task was the Paced Auditory Serial Addition Task (PASAT). The control task was a simple auditory monitoring task. Before and after each task block, subjects indicated their fatigue using a visual analog scale of fatigue (VAS-F) that ranged between no fatigue at all and the most fatigue imaginable. The response time (RT), accuracy and VAS-F data were analyzed with Linear Mixed Effects models.

**Results:** For the auditory monitoring task, performance did not change as a function of Group (GWI+ vs. GWI-) or Session (Before vs. After exercise) – for both RT and accuracy, there were no effects nor were there any interactions. For the PASAT task, the GWI- group showed a normal practice effect: they were faster and more accurate in Session 2 (after exercise) than in Session 1 (before exercise). The GWI+ group did not benefit from practice: their RTs and accuracy was approximately the same before and after exercise. The Groups also differed in their cognitive fatigue. The GWI+ group reported more fatigue after exercise than before exercise while the GWI- group reported less fatigue after exercise relative to before.

**Conclusions:** These results show that GVs with GWI experienced PEM after a bout of exercise. This was evidenced by increased fatigue after the exercise, and also by poorer performance on a challenging task relative to GVs who did not have GWI. These results demonstrate not only that GWI GVs experience PEM, but also offer insight into the cognitive processes impacted by PEM in GWI.