

Cytokine responses to exercise and activity in patients with chronic fatigue syndrome: Proof of principle study
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Objective: The aim of this study was to test whether the characteristic feature of post-exertional malaise in CFS/ME is associated with elevated cytokine plasma concentrations TGFbeta, TNF-alfa, IL-6 and IL-8. **Method:** This proof of principle study compares the cytokine responses of 24 CFS/ME cases and 21 healthy sedentary controls, to the physical activity involved in 1) commuting from home to hospital and 2) completing a sub-maximal aerobic exercise test.

Results: Cases were significantly more likely to report increased fatigue at rest, and after commuting and aerobic exercise. Cases spent significantly less time exercising ($p = 0.02$). Plasma levels of TNF-alfa and IL-6 were most often unmeasurable in both cases and controls and so statistical analysis was not appropriate. Plasma levels of TGFbeta were significantly elevated in cases at all times compared to controls, including at rest in the morning prior to commuting. Plasma levels of IL-8 were not elevated in cases compared to controls except at 2 days after aerobic exercise. Changes in TGF-beta and IL-8 seen after commuting and after aerobic exercise were not significantly different between groups. Increased post-commuting fatigue, pain and malaise were not associated with an increased plasma concentration of TGF-beta in cases compared to controls. Depressed and anxious mood, physical deconditioning and sleep disturbance did not confound the differences in TGF-beta and IL-8 concentrations between cases and controls.

Conclusions: We found elevated concentrations of TGF-beta in cases of CFS, which were not confounded by depressed or anxious mood, physical deconditioning or sleep disturbance, but this elevation was not associated with post-exertional fatigue. We did not replicate previous findings of elevated TNF-alpha or IL-6.

Keywords: chronic fatigue syndrome, cytokines, post-exertional malaise, aerobic exercise, TGF-beta