The Timeline of Post Exertional Malaise in Myalgic Encephalomyelitis/Chronic Fatigue Syndrome

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ABSTRACT

PURPOSE: To investigate the timeline of post-exertional malaise (PEM) using objective and subjective measures in Myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS). The primary aim was to determine whether PEM extends beyond 24-hours, and if a 48-hour or 72-hour repeated exercise protocol would provide additional information as a diagnostic tool. The secondary aim was to analyse subjective patterns of fatigue during PEM.

METHODS: Sixteen ME/CFS and 16 age and gender matched controls participated in the study. Participants were randomly assigned to either a 48-hour or 72-hour repeated cardiopulmonary exercise test protocol on a cycle ergometer. Objective measures were recorded at anaerobic threshold (AT), respiratory exchange ratio (RER) and maximal exercise. All ME/CFS participants recorded their subjective fatigue 7-days prior to and 10-days post exercise utilising the daily diary of fatigue.

RESULTS: Results from the 48-hour and 72-hour protocol indicated no decline in functional capacity in any group across days. There was a significant increase in workload and $\%VO_{2max}$ at AT within the 72-hour ME/CFS group only. Subjective timelines of fatigue showed significant differences between the 48-hour and 72-hour protocol, with the 48-hour ME/CFS group taking significantly longer to recover (mean 11 days) than the 72-hour ME/CFS group (mean 5 days). Conversely, both control groups were recovered in less than a day. However, there was high variation across measures of subjective fatigue among ME/CFS participants.

CONCLUSIONS: The results of this study further support the use of 24-hour repeated protocols to determine functional decline during PEM. Results also provide new information regarding a potential improvement in function 72-hours after an initial exercise bout in ME/CFS. Subjective results indicate no identifiable pattern in relation to subjective fatigue during PEM. Future research should focus on a larger clinical trial to further understand the implications and consistency of the data from this study.

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A

AT	Anaerobic threshold

B

BMI	Body mass index
bpm	Beats per minute
BP	Blood pressure

C

CBT	Cognitive behavioural therapy
cm	Centimetres
CO_2	Carbon Dioxide
CFS	Chronic Fatigue Syndrome
CCC	Canadian consensus criteria
CTRL	Controls

G

GET	Graded exercise therapy

H

HR	Heart rate
HR_{max}	Heart rate max

I

ICC	International consensus criteria

K

Kg	Kilograms

M

m	Metres
ME	Myalgic Encephalomyelitis
$ml.kg.min^{-1}$	Millilitres per kilogram per minute
MS	Multiple Sclerosis
mmHg	Millimetres of mercury

P

PEM	Post-exertional malaise

R

RER	Respiratory exchange ratio
RPM	Revolutions per minute
RPE	Rating of perceived exertion

S

SD	Standard deviation

V

V_E	Minute ventilation
VO_2	Oxygen consumption
VO_{2max}	Maximal oxygen uptake
VT	Ventilatory Threshold

W

W	Watts