The Assessment of Daily Energy Expenditure of Commercial Saturation Divers using Doubly Labelled Water

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What did we already know

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Energy expenditure and fluid production in hyperbaric He-O_2 environments using doubly labeled water

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Method:

Recruited US navy divers

Simulated a dry saturation dive at hyperbaric pressure equivalent to 50 and 317 m with a helium-oxygen gas mixture

Assessed average energy expenditure across the simulated dive using doubly labelled water technique

Results

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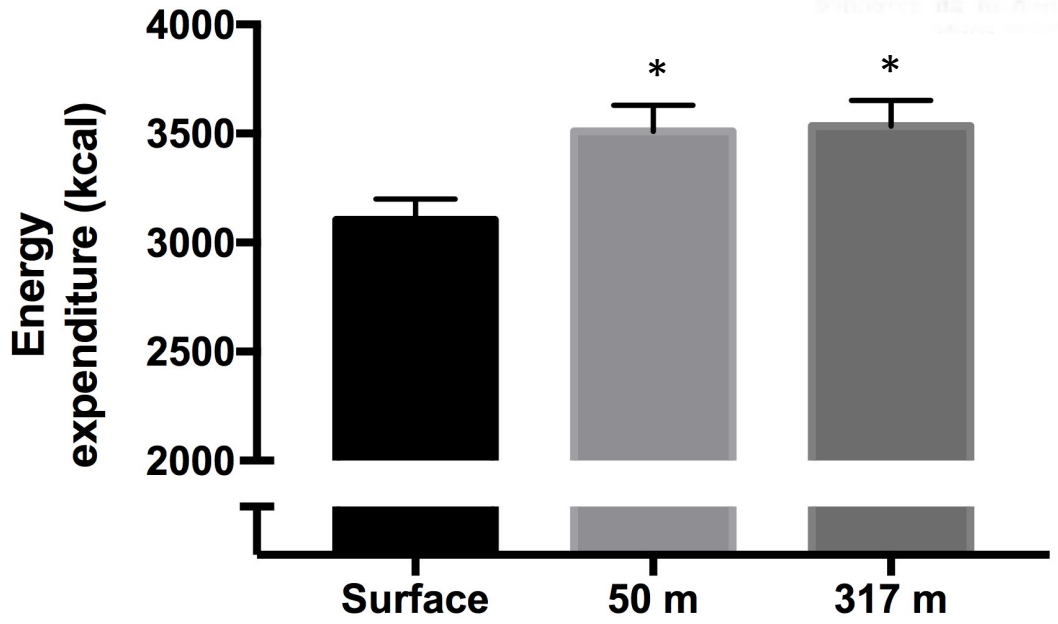
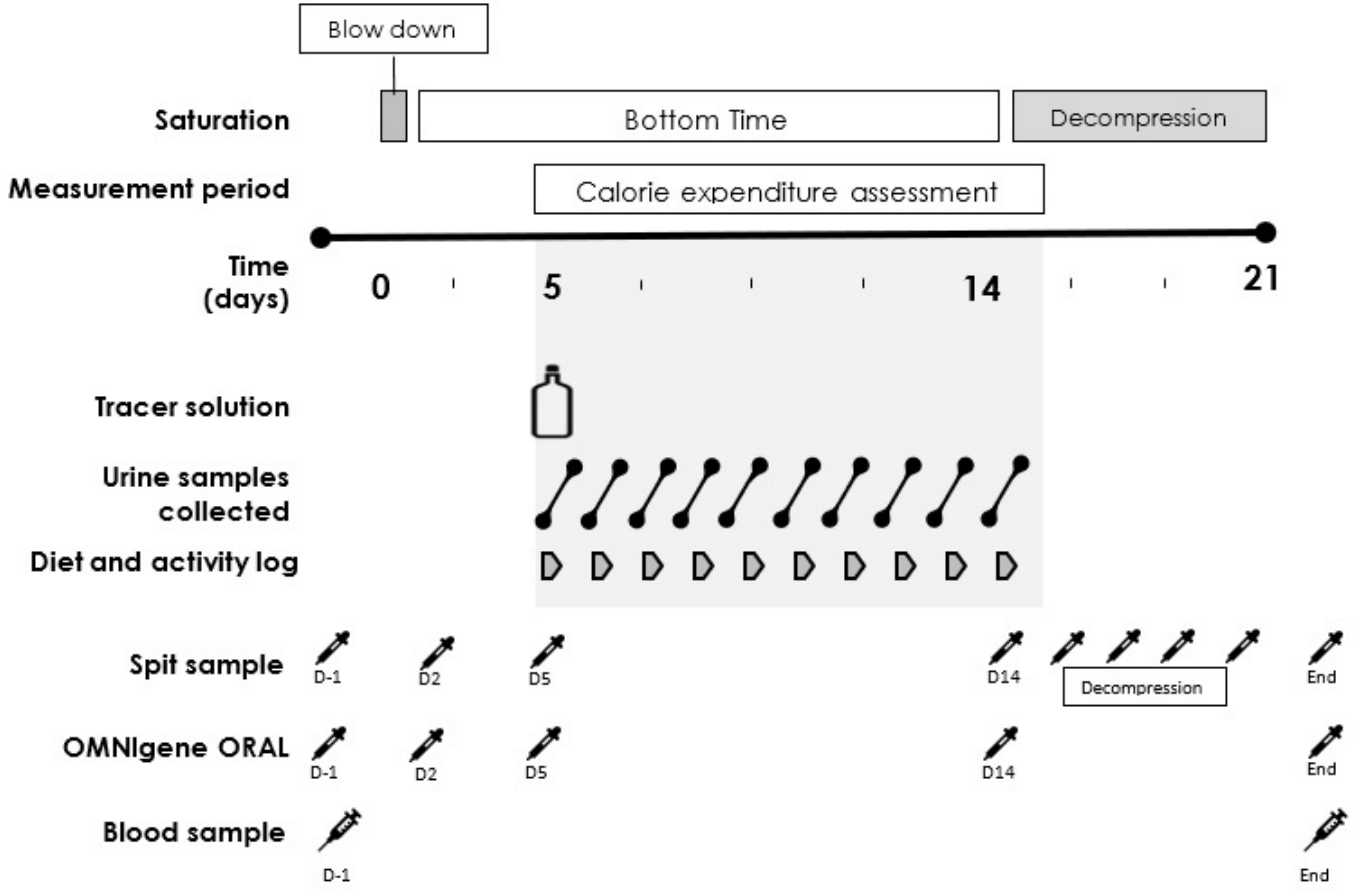


Significant increase in energy expenditure (average 430 kcal) was observed regardless of magnitude of hyperbaric pressure, therefore suggesting the hyperoxic and helium atmosphere are principle drivers.

Study aims

- the purpose of this study was to determine the average daily energy expenditure of occupational saturation divers who are undertaking a 21-day commercial dive in the North Sea using the gold standard energy assessment technique of Doubly Labelled Water (DLW).

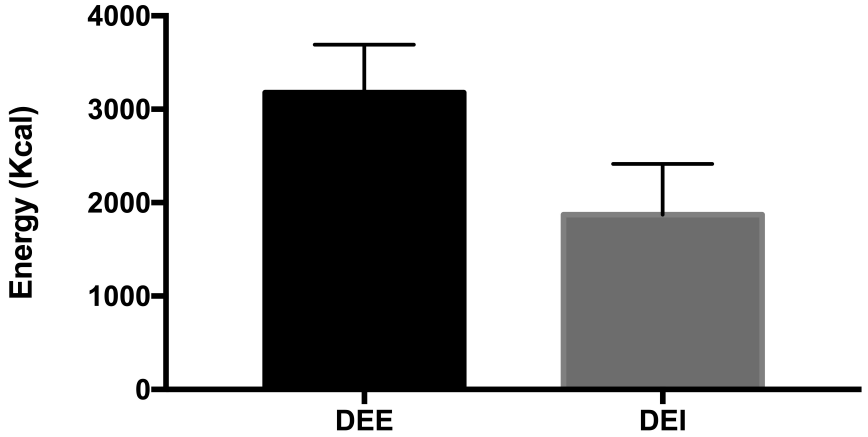
Study design

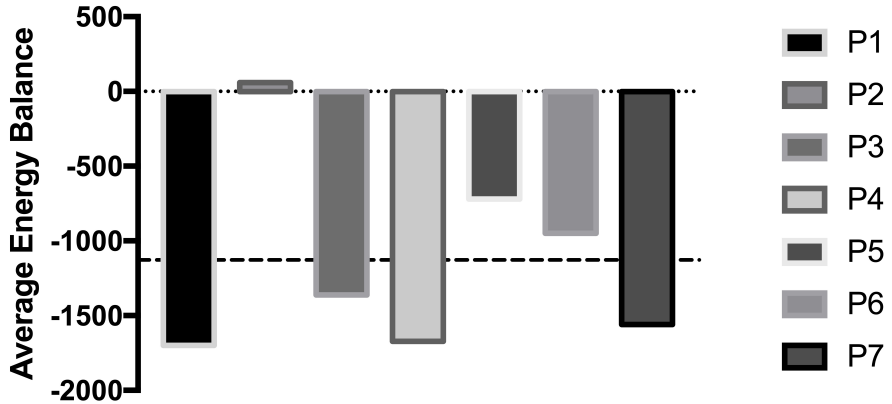


Doubly Labelled Water method involves enriching the body water of a subject with heavy hydrogen (^{2}H) and heavy oxygen (^{18}O), and then determining the difference in washout kinetics between both isotopes, being a function of carbon dioxide production

Outcomes

- Divers were in a negative energy balance by over 1000 kcal/ day
- Divers self reported this to be ‘light’ operation, performing half the work that they would normally do
- Significant correlation between DEE and time spent underwater
- No changes in body mass were observed across the 21 day dive





Saturation Divers may be Susceptible To A Negative Energy Balance

Consequence:

- Body weight loss (Busch-Stockfish + Bohlen, 1994)
- Immunosuppression (Brenner et al. 1999)
- Impaired cognitive function and decision making?
- Early fatigue development during underwater excursions?

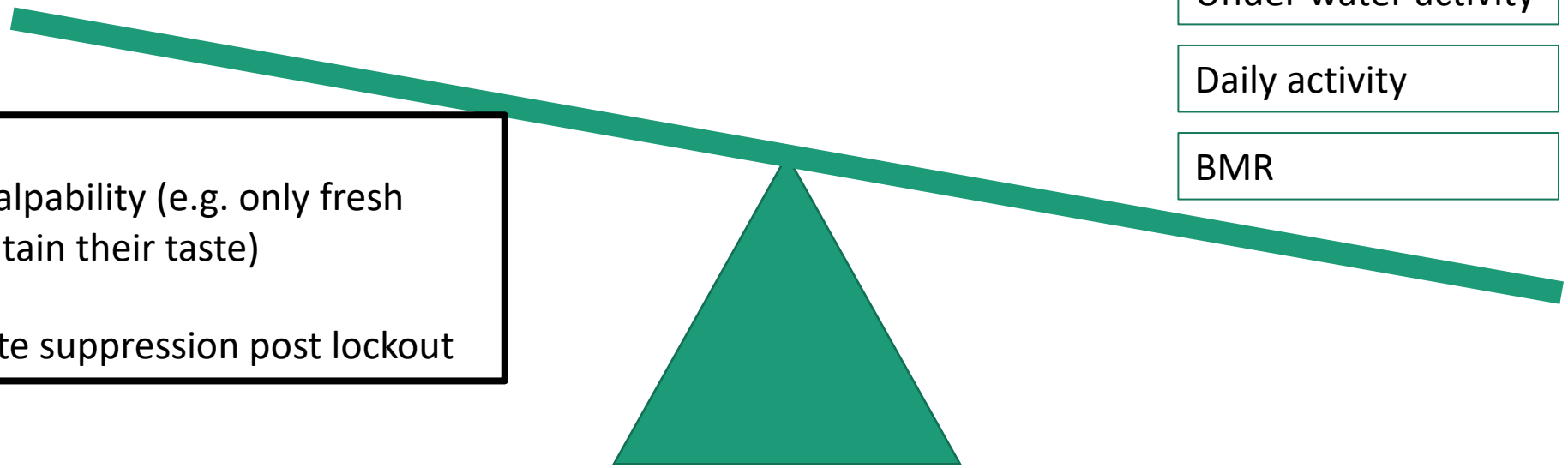
Calories consumed may also reduce

Environmental factors

Under water activity

Daily activity

BMR



Due to:
Reduced food palpability (e.g. only fresh vegetables maintain their taste)

Potential appetite suppression post lockout