March Study of the Month:

Effect of 48 hour Fasting on Autonomic Function, Brain Activity, Cognition, and Mood in Amateur Weight Lifters

Summary by Dr. Qingping (Amanda) Zheng, ND

Fasting is widely used and recommended for disease prevention and treatment. A body of evidence suggests that long-term intermittent and periodic fasting promotes health and reduces the risk of many chronic diseases, however little and equivocal information is available regarding the effects of short-duration fasting. The current study (1) aimed to estimate the effect of a 48 h, zero-calorie diet on autonomic function, brain activity, cognition, and mood in amateur weight lifters.

Study design: A "pre-post" unblinded clinical trial study.

Population: 9 male healthy volunteers with more than 3 years of weightlifting training experience. Intervention: a 48 h, zero-calorie diet program with water provided ad libitum was carried out.

Comparison: Self comparison of each participant was made between after and before fasting.

Outcome: Cardiovascular autonomic function (general heart rate variability); was assessed as resting frontal brain activity (functional near-infrared spectroscopy), cognitive performance including visuospatial Discrimination, spatial orientation ability, working Memory and mental flexibility, and mood were evaluated before and after fasting.

Results: Fasting decreased ($p<0.05$) weight, heart rate, and systolic blood pressure, whereas no statistically changes were evident regarding any of the measured heart rate variability indices. Fasting decreased ($p <0.05$) the concentration of oxygenated hemoglobin and improved ($p<0.05$) mental flexibility, whereas no changes were observed in working memory, visuospatial discrimination, and spatial orientation ability. Fasting also increased ($p<0.05$) anger, whereas other mood states were not affected by it.

Discussion: There are some limitations in this study: the sample is small and male only, the magnitude of observed effects is relatively small despite being statistically significant on some indices and the participants who are resistance-trained individual, which limits the generalizability of these findings to the general population since athletes exhibit an attenuated response to stressors (2). However, this study observed that enhanced prefrontal-cortex-related (PFC) tasks performance was strongly associated with a lower resting brain activity (decreased OxyHb) induced by 48 h fasting. In contrast, hippocampus-related cognitive performance was not affected by total calorie deprivation. We know that the PFC—the most evolved brain region—subserves our highest-order cognitive abilities, has a relatively high metabolic demand, and is sensitive to the detrimental effects of stress exposure (3). Why is performance improved after a zero calorie challenge? How do you interpret these findings? How do you think this might be applicable or perhaps beneficial for patients with cognition dysfunction?

References:

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3. Arnsten AF. Stress signalling pathways that impair prefrontal cortex structure and function. Nat Rev Neurosci. 2009 Jun; 10(6):410-22.

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