

How is Fasting Affecting Brain Oxygenation and Cognition?

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ABSTRACT

Human beings in nearly all societies have experienced the effect of intermittent fasting (IF). It was either imposed because food was scarce or chosen for religious purposes. The beneficial effect of IF on lifespan and the whole organism has been known since the 1930's. It has been well established that IF reduces the risk of cardiovascular and metabolic diseases. It also appears that IF protects neurons. Several mechanisms have been identified such as increased corticosterone and heat-shock protein-70. One of the most recent beneficial effects of IF on neurons was identified to be mediated by brain-derived neurotrophic factors and ketone bodies. However, these data were completed on animals and there is a knowledge gap on the effect of IF in human. **PURPOSE:** To determine the effect of a 24-hour fasting on brain oxygenation and cognition. **METHODS:** For these preliminary data, 4 subjects fasted for 24 hours. During the fast, they were allowed to consume water, unsweetened coffee, and tea. The subjects reported to the lab at 8 am the next day for testing. Participants were equipped with 8 optodes on their forehead (NIRS Oxymon, Artinis) to measure brain oxygenation. Subjects were asked to watch a video of a fireplace as a way to normalize the cognition for 2 minutes before they performed the cognitive testing. Subjects were then asked to complete a computerized card sorting test (Wisconsin test, Psytoolkit.org, WCST). **RESULTS:** Our preliminary data is promising. 24h IF induced an increase for correct answers (51.5 vs. 41.25 for no fasting) and a decrease for wrong answers (7.5 vs. 18.25). There was no difference in brain oxygenation during the WCST, but deoxygenation increased 8-fold. Also, total hemoglobin increased 5.5-fold when compared to baseline. Following 24h fasting, we did not see a difference in oxygenation or deoxygenation, but total hemoglobin increased 50-fold when compared to non-fasting. **CONCLUSION:** Our results will need to be confirmed but it is interesting that fasting seemed to increase the efficiency of the WCST. Performing the WCST also induced a change in cerebral oxygenation and fasting seemed to increase blood flow to the pre-frontal cortex.