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Exercise's Effect on Reaction Time and Answer Accuracy During Memory Recall

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Short and long-term memory recall can be improved by regular exercise, based on rat and human brain studies. Regular exercise, by promoting brain blood flow, has been shown to decrease the rate of decline of memory consolidation and recall in adults. Acute exercise can cause an immediate increase of blood flow to the brain thus potentially increasing oxidative supply for memory encoding. Conversely, a hyperglycemic state may interfere with memory encoding. **PURPOSE:** To determine the effects of light exercise (LEC), heavy exercise (HEC), and exogenous glucose (GLU) on reaction time and response accuracy during a computer-based memory recall test. **METHODS:** 15 subjects (20.80 ± 1.26 yr) completed four trials: resting control (CON), low-intensity cycling (LEC), heavy cycling (HEC), and resting glucose (GLU): a 25% glucose solution supplied at 1g/kg of body mass followed by a 25 min rest. For each trial, subjects observed 75 images prior to the assigned treatment and were then asked to recall the images after the treatment. During the post-test, 25 images were replaced with new images; subjects were then asked to recall whether the images had been viewed during the pre-test. Accuracy and reaction time (RT) were assessed. Exercise trials (20 min) were conducted using 20% (LEC) and 40% (HEC) of Wingate anaerobic test work rate. Blood lactate, glucose, and heart rate were collected at specific time points throughout. **RESULTS:** Mean HR was significantly increased during LEC and HEC (117 ± 14.4 bpm and 161 ± 16.5 bpm, respectively) ($p < 0.05$) vs. CON (68.0 ± 9.4 bpm) and GLU (67.8 ± 7.7 bpm). Blood glucose was significantly increased during GLU ($p < .001$) and blood lactate significantly increased during HEC ($p < .001$) vs. all conditions. Despite these physiologic alterations, no main treatment effects were observed for reaction time (RT), or accuracy. However, RT was significantly faster for correct responses (1005.10 ± 22.0 ms) compared to incorrect responses (1328.2 ± 46.5 ms) across all treatments vs. CON ($p < .001$). **CONCLUSION:** Based on the study results, different physiologic stressors resulting from acute exercise or hyperglycemia elicited no positive or adverse effects on short-term memory recall. Though, treatments were associated with a greater RT in selecting correct responses.