Creatine supplementation enhances corticomotor excitability and cognitive performance during oxygen deprivation

Clare E. Turner¹, Winston D. Byblow² and Nicholas Gant¹

¹Exercise Neurometabolism Laboratory, ²Movement Neuroscience Laboratory, Centre for Brain Research, The University of Auckland, New Zealand

Poster presented at Neuroscience 2014, Washington, DC. Article Published in The Journal of Neuroscience, Jan 2015

Supplemental neuropsychological, neurophysiological, spectroscopic and ventilatory data available at http://lab.gant.kiwi

Background

Creatine is a naturally occurring compound involved in the buffering, transport and regulation of cellular energy. Creatine has been shown to be neuroprotective in vitro against anoxic/hypoxic damage¹-³. The diet can be safely supplemented with creatine, but the utility of creatine to protect against energetic insult remains to be investigated in humans.

Aim: To assess the influence of dietary creatine monohydrate supplementation on brain function during oxygen deprivation.

Method

15 healthy volunteers completed a week-long, placebo controlled creatine monohydrate supplementation protocol within a double-blind, crossover design. Creatine concentration in the sensorimotor cortex was assessed using magnetic resonance spectroscopy. Cognition and corticomotor excitability were assessed using neurocognitive tests⁴ and transcranial magnetic stimulation (TMS) at baseline and during a 90 min hypoxic gas breathing protocol. Creatine concentration in the sensorimotor cortex increased by 10% with Creatine vs. Placebo supplementation.

The oxygen deprivation protocol caused hypoxemia, reducing peripheral oxygen saturation by 19%.

Creatine supplementation offset the decline in cognition that occurred with Placebo during hypoxia.

Results

Creatine supplementation offset the decline in cognition that occurred with Placebo during hypoxia.

Creatine concentration in the sensorimotor cortex increased by 10% with Creatine vs. Placebo supplementation.

Corticomotor excitability increased during hypoxia with Creatine supplementation, but not with Placebo.

Conclusion

Creatine has potential utility as a neuroprotective supplement when cellular energy provision is compromised.

References