Effects of combined creatine and glycerol supplementation on physiological responses during exercise in the heat.

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It is well documented that exercising in high ambient temperature environments can have a profound effect on thermoregulation and exercise performance. Both glycerol (Gly) and creatine (Cr) have been shown to act as hyperhydrating agents when consumed with fluid and to reduce thermal strain during prolonged exercise in the heat (e.g. Lyons et al. *Med Sci Sports Exerc* 22: 77-83, 1990; Kilduff et al. *Int J Sport Nutr Exerc Metab* 14: 443-60, 2004). **PURPOSE**: To examine the effects of combined Cr and Gly supplementation, intended to increase initial total body water (TBW) levels, on the physiological responses to prolonged exercise in the heat. **METHODS**: Twenty-three well-trained male cyclists were matched for body mass (BM) and were randomised in a double blind fashion to either a Cr or a placebo (Pl) group. Cr supplementation consisted of 22.8 $g \cdot d^{-1}$ of $Cr \cdot H_2O$ (equivalent to 10 g Cr x 2 daily) and 75 g of glucose polymer made up in 1 litre (L) of warm water (x 2 daily). The Pl supplement consisted of 170 $g \cdot d^{-1}$ of glucose polymer (85 g x 2 daily). Subjects participated in two supplementation regimens each lasting seven days and comprising an exercise trial both pre- and post-supplementation. During the first supplementation regimen, subjects in both groups received either 1 g $Gly \cdot kg^{-1}$ BM or an equivalent amount of Pl before crossing over during the second supplementation regimen. The exercise trials consisted of 40 min constant-load exercise at 63% WRmax followed by a 16.1 km (10 mile) time trial at 30^{o} C ambient temperature and 70% relative humidity. **RESULTS**: In the Pl group, TBW increased (mean ± s.d.) by 0.57 ± 0.27 L ($P<0.01$) during Gly supplementation and did not change significantly during supplementation with Pl ($P=0.52$). In the Cr group, TBW increased by 0.63 ± 0.33 L ($P<0.01$) during Pl and by 0.87 ± 0.21 L ($P<0.01$) during Gly supplementation. The rise in heart rate (HR), rectal temperature (Tre) and rating of perceived exertion (RPE) during exercise was significantly attenuated after both supplementation regimens in the Cr group. However, there was no difference in pre and post supplementation time trial performance in either group. The addition of Gly to Cr significantly increased TBW further than Cr alone ($P=0.02$) but did not further enhance the attenuation in HR, Tre and RPE during exercise. **CONCLUSIONS**: The combination of Cr and Gly is more effective at hyperhydrating than either Cr or Gly alone but does not further enhance the reduction in thermal strain compared to Cr alone. The possibility that this novel “water-loading” protocol may improve performance during exercise of greater duration in the heat remains to be determined.

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