

ESSR Journal Club

Covered Article: “New Insights into the Impact of Dehydration on Blood Flow and Metabolism During Exercise” by Steven J. Trangmar and José González-Alonso. *Exercise and Sport Sciences Reviews*. 45(3), July 2017.

1. Outline the primary cardiovascular alterations seen when dehydration develops during prolonged submaximal exercise in the heat.
2. The magnitude of the reductions in stroke volume and cardiac output (systemic blood flow) likely depends on the overall physiological strain caused by the combined stress of dehydration, hyperthermia, and the functional load imposed by exercise. Explain the dehydration-induced responses in systemic blood flow during isolated-limb and whole-body exercise.
3. The fall in stroke volume with dehydration might be explained by alterations in intrinsic (situated within the heart) or extrinsic (originating outside the heart) mechanisms. Which mechanisms are most likely to explain the fall in stroke volume with progressive dehydration and hyperthermia?
4. How does progressive dehydration affect limb (leg and arm) blood flow during the small- and large-muscle mass exercise? Describe the relation between limb and systemic blood flow during prolonged and incremental exercise to task failure.
5. How would you design a study to identify the central and peripheral factors that reduce stroke volume with dehydration and hyperthermia during prolonged moderate-intensity exercise in the heat?
6. Describe the cerebral blood flow response during exercise. What are the primary mechanisms underpinning the reductions in cerebral blood flow during dynamic exercise, with and without dehydration?
7. Do dehydration-induced reductions in blood flow during exhaustive exercise affect equally the aerobic metabolism of all bodily organs and tissues?
8. The proposed theoretical model presents three main factors that ultimately limit performance when a person is dehydrated. Why is cerebral aerobic metabolism unlikely to limit performance in the studies presented in the review?
9. Relatedly, what are the primary mechanisms by which dehydration accelerates the decline in performance capabilities during strenuous whole-body exercise?
10. Based on the physiological responses described in the review, are the fluid replacement requirements the same during low-intensity prolonged exercise (such as walking) compared with moderate-intensity exercise?