

## **ABSTRACT**

Progressive whole-body hyperthermia with passive heat stress is associated with a host of physiological adjustments. These include large increases in peripheral blood flow and cardiac output and a smaller selective redistribution of blood flow from the cerebral and visceral tissues to the limbs, head and torso, with perfusion pressure being only slightly reduced. Aerobic metabolism also increases in these conditions, but the magnitude is small in absolute terms, suggesting a predominant role of thermosensitive mechanisms in passive hyperthermia-induced cardiovascular adjustments. Although exercise heat stress requires substantially greater blood flow requirements compared to passive heat stress alone, the magnitude of this hyperemic response is less than would be expected given the extent to which both conditions independently increase blood flow in isolation. As a result, submaximal exercise limb blood flow is only slightly higher during small muscle mass exercise in the heat, and is similar to control conditions during whole body exercise. When exercise intensity is increased further towards maximal levels, the superimposition of heat stress leads to earlier reductions in regional and systemic blood perfusion, compromised locomotor limb aerobic metabolism, and ultimately results in impaired endurance capacity. This chapter provides an integrative overview of the human cardiovascular response to passive heat stress and exercise heat stress, with emphasis on its consequences on exercise performance in the heat.