SWACSM Abstract

Age-Related Changes in Skeletal Muscle Oxygen Utilization: A Review

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ABSTRACT

The cardiovascular and skeletal muscle systems are intrinsically interconnected, sharing the goal of delivering oxygen to metabolically active tissue. Deficiencies within those systems that affect oxygen delivery to working tissues are a hallmark of advancing age. Oxygen delivery and utilization are reflected as muscle oxygen saturation (SmO_2) and may be assessed using near-infrared resonance spectroscopy (NIRS). **PURPOSE**: This review is intended to provide an update on the current state of literature regarding age-related effects on SmO_2. Furthermore, we attempt to bridge the gap between SmO_2 and associated underlying mechanisms affected by aging. **FINDINGS:** SmO_2 has been observed to be reduced by ~38% at rest, ~24% during submaximal exercise, and ~59% during maximal exercise with aging (>65 y). Furthermore, aging prolongs restoration time of SmO_2 back to baseline by >50% after intense exercise. Regulatory factors that contribute to reduced SmO_2 with age include blood flow, capillarization, endothelial cell function, nitric oxide, and mitochondrial function. These mechanisms are generally governed by reactive oxygen species (ROS) at the cellular level. However, mishandling of ROS with age ultimately leads to alterations in structure and function of the regulatory factors tasked with maintaining SmO_2. **CONCLUSION**: Aging reduces SmO_2 at rest, during submaximal/maximal exercise, and extends restoration timeframe of SmO_2 following exercise. Compelling data suggests dysregulated ROS handling leads to reductions observed in O_2 delivery & utilization.