Aging And The Autonomic Nervous System: Effects Of Water Immersion Temperature
Comparative Age-Group Responses to Thermal Immersion Temperatures

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Abstract
Numerous studies have been conducted looking at the effects of water immersion temperature on the autonomic nervous system (ANS). However, few studies have looked at the differences in thermal, cardiovascular and autonomic regulation in a group of college-age subjects versus those of a similar age (20-30) subject group of adults. This study examined these effects on a group of older adults (40-65) who were immersed in two tubs; a neutral tub and a warm tub. The study also included a group of young college-age adults (18-25) who were immersed in the same tubs. The study was designed to test for differences in ANS responses across age groups; with a group of older subjects age 45-65 along with a younger study population. The study protocol initiated with the subjects sitting at the poolside, followed by immersion in the tubs with water at a specified temperature. Core temperature rose similarly in both groups but was sustained in the younger subjects. The direction and magnitude of change occurred in both of the young and older subjects. Despite the relatively small sample sizes the changes were quite consistent between groups. The direction and magnitude of change varied across age groups.

Heart Rate Variability

VLF (Sympathetic) Power Spectral Change by Immersion Temperature

HF Power Spectral Change by Immersion Temperature

Sympatho-vagal Balance Change by Immersion Temperature

Blood Pressure Responses by Immersion Temperature

Conclusions
In this population of healthy individuals, significant autonomic, circulatory and vasomotor change occurred during the periods of immersion, with temperature becoming a statistically significant variable in both young and older subjects. Despite the relatively small sample size the changes were quite consistent between groups. The direction of these physiology changes could potentially have positive health implications in a number of clinical circumstances if these autonomic changes can be reflected in non-invasive human responses over the age span.

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