ACCLIMATION AND MICROCLIMATE COOLING CONSERVE PLASMA VOLUME DURING EXERCISE IN THE HEAT. J.H. Heaney, K.M. Wilmore, M.J. Buono, G.J. Noffal, M.D. Hurst, N.A. Pimental, G.R. Benta. Naval Health Research Center, San Diego State University, San Diego, CA and Navy Clothing and Textile Facility, Natick, MA.

INTRODUCTION. Effective thermoregulation during heat exposure is partially dependent on maintenance of plasma volume (PV). Navy engineroom personnel, who typically work 4-6 hour shifts in thermal environments exceeding 32°C, are constantly subjected to heat strain. This study investigated the effects of microclimate cooling on PV conservation during exercise in the heat following a baseline acclimation (AC) protocol. **METHODS.** Eight engineroom personnel underwent an 8-day acclimation process (35°C, 70% RH) followed by 6 simulated engineroom watches (EW) in an environmental chamber. Two duplicate EW tests, with and without a passive ice vest (IV), were performed in three thermal conditions: EW1=43.3°C, 48%RH; EW2=50.6°C, 33%RH; EW3=57.2°C, 24%RH. During AC, a 2-hr exercise protocol (exercise 25-min, rest 5-min) alternated treadmill walking with stationary cycling. The EW protocol consisted of a 20-min treadmill walk (3mph, 3%grade) and 40-min of seated rest each hour to a maximum duration of 6-hrs or volitional withdrawal. PV changes were determined from seated (20-min) blood samples obtained prior to entering and exiting the heat chamber. **RESULTS.** PV changes (%) across day-1, day-3, day-5 and day-8 (-5, -1.3, -1.7 and +.6 respectively) of AC showed a trend towards conservation but were not statistically significant ($p>.05$). End of test PV changes during IV EW showed a similar conservation trend except for EW3: EW1=-7.1,-.1 ($p<.05$); EW2=-8.5, -4.2 ($p>.05$); EW3=-6.3, -9.7 ($p>.05$) for non-IV and IV conditions respectively. **CONCLUSION.** PV loss decreased over time during AC and was less in the IV conditions for EW1 and EW2. EW3 PV findings may be the result of a considerably longer IV test duration in combination with the high heat. When expressed relative to test duration non-IV PV losses were twice those in the IV exposures. These results suggest that heat acclimation will conserve PV and microclimate cooling can provide continued support of PV conservation during exposure to high heat.

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