

EFFECT OF RAFT USE ON PROGRESSIVE HYPOTHERMIA

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Increasing the insulation surrounding an individual would appear to provide the means to reduce heat loss and minimize changes in core and skin temperatures during exposure to cold water environments. It is generally accepted that use of a raft in a cold water environment will increase survival times based on an increase in insulation and decreased convective heat loss, thus minimizing the effect of exposure on core temperature. This study examined the relationship of skin and rectal temperatures as a function of exposure time, with and without a raft.

Four males, aged 31-44, and one female, aged 32, were studied once in each of the test configurations, i.e., a NASA dry-type anti-exposure suit alone (CAPS), in conjunction with a raft (CAPS/r), a standard Navy CWU-27/P flight coverall alone (Cont), and the CWU-27/P with a raft (Cont/r). The raft used was a NASA variant of the Navy LPU-18/U raft modified to include a canopy. Conditions were $T_{\text{water}} = 4.4^{\circ}\text{C}$ and $T_{\text{air}} = 5.6^{\circ}\text{C}$ with 1 foot waves (chop) and constant spray. CAPS and Cont trials were for 6 hour maximum durations while CAPS/r and Cont_r were for 24 hour maximum exposures.

Rectal temperatures (T_{re}) were observed to drop significantly, i.e., $>2.0^{\circ}\text{C}$, during most CAPS/r runs despite relatively warm and constant mean weighted skin temperatures (T_{sk}) of between 25° and 30°C . Temperatures within the interior space of the closed raft increased from ambient T_{air} , i.e., 5.6°C , to an upper limit of 21.5°C over the duration of the CAPS/r runs. This contrasted with the observations made during three of the five CAPS runs, in which recorded T_{re} were higher than the corresponding CAPS/r runs despite a lower T_{sk} . Cont and Cont_r runs followed a more predictable pattern, in which both T_{re} and T_{sk} were higher in the raft rather than during immersion.

Protection of T_{sk} appears to be at the expense of maintaining T_{re} during long duration exposures, as observed in comparisons of the CAPS/r versus CAPS runs. Maintenance of relatively high T_{sk} s suggest that a mechanism similar to the undetected progressive hypothermia observed in the diving community is responsible for the depressed T_{re} s during the CAPS/r runs. The control data indicates that the CAPS observations are unlikely to be a function of subject variability since subject sustained higher T_{re} s in the raft versus immersion during control runs. Despite lower T_{re} s observed in some CAPS/r runs, other survival considerations (e.g., stable floatation platform, drowning protection, and increased visibility to SAR) lead us to recommend the use of a raft in cold water survival situations.