

infrequently, however. Dependent variables were rectal temperature T_{re} , mean weighted skin temperature T_{sk} (from chest, forearm, thigh and lower leg) and subjective evaluation of garment performance. Tests were terminated after 2 hours or when subject $T_{re} = 35^{\circ}$. The results showed linear T_{re} cooling rates ($^{\circ}\text{C}\cdot\text{hr}^{-1}$) for cold-water immersion as follows: FS = 6.1 ± 1.7 ; WS = 1.7 ± 1.0 ; AC = 2.7 ± 1.8 ; BC = 2.9 ± 1.4 ; NI = 0.8 ± 0.4 ; NX = 3.3 ± 1.3 . Cooling rates atop the capsized boat were: FS = 2.7 ± 2.1 ; WS = 1.0 ± 0.3 ; AC = 0.7 ± 0.2 ; BC = 0.9 ± 0.5 . Cooling rates in the liferaft were: FS = 3.3 ± 2.3 ; WS = 0.6 ± 0.2 ; AC = 0.7 ± 0.3 ; NI = 0.7 ± 0.2 ; NX = 1.2 ± 0.4 . Significant differences ($p < 0.05$) between cooling rates in the water and those atop the boat or in the liferaft were found for all garments except NI. Significant differences were found between NI and NX for all environments. T_{sk} changes paralleled those of T_{re} for each garment/environment. The results demonstrate that survivors have a slower onset of hypothermia out of the water, even when exposed to continuous cold wind and spray and occasional breaking seas, than when remaining immersed. With respect to protection against immersion hypothermia, tight-fitting "wet" suits are better than loose-fitting "wet" garments, and intact "dry" suits are better than "wet" suits. Leaky "dry" suits, however, provide no better protection than do loose-fitting "wet" suits in cold, rough seas.

41 Human body proportions: The problem of variation and the construction of population norms

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The variation in human somatic proportions is a matter of interest for human biologists and of concern to clothing manufacturers. This paper concerning the quantification of human proportions is divided into two parts. Part one illustrates the variation in proportions by application of the Ross and Wilson Phantom tactic for proportionality assessment to four large anthropometric data sets. These data sets are:

- 1) COGRO - the Coquitlam Growth Study, 441 boys and 465 girls aged 6 - 18 years
- 2) CANAD - 199 university females and 221 university males aged 18 - 35 years.
- 3) MOGAP - Montreal Olympic Games Anthropological Project, 338 male and 149 female Olympic athletes.
- 4) LIFE - YMCA Lifestyle Inventory and Fitness Evaluation program - >19,000 males and females 15 - 75 years of age.

Significant differences in proportions of girths and limb segment lengths were shown with reference to differences in height, age, sex, race and athletic training.

The second part of the paper addresses the need for large scale norms for comprehensive batteries of anthropometric measurements. The LIFE data is an example of a very large sample but with a limited (only 11) number of measurements. Using regression equations developed in the smaller samples, measurements for new variables were predicted for the LIFE data in order to produce a comprehensive anthropometric data base. The accuracy of these predictions was tested using a split-sample design on the small data sets. This approach was found to be satisfactory for the production of large scale norms based on known relationships in smaller samples. Recommendations were made on how norms for measurements pertinent to the clothing industry might be developed.

42 Physiological response of subjects wearing vapour permeable anti-exposure garments during immersion

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Vapour permeable constant wear anti-exposure garments may effectively protect air crew during cold water immersion.