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THE EFFECT OF SUBCUTANEOUS FAT ON LOCAL SKIM TEMPERATURES IN NAKED AND CLOTHED NAN: AN EXPERIMENTAL AND COMPUTER MODEL STUDY

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Subcutaneous fat effectively prevents heat loss during exposure to cold and obesity is known to decrease skin temperatures especially in the trunk (e.g. 1). In the present study skin temperatures were measured from 15 sites on the bodies of **19-28** year-old males. Two experimental groups were constructed: 1) naked (dressed in shorts, n=12) subjects at 10°C at rest, and 2) clothed **(2.4** clo, n=6) subjects at work (82 W) at -15°C. In both experiments, the cold exposure lasted for **90** min. Fat percent was calculated from skinfolds. Both groups were divided into lean **(11.5±2.3** (mean ± SD) in naked and 12.5+2.1 in clothed) and obese (21.5±2.1 and 20.5±1.3, respectively).

In cold exposure fat clearly decreased local skin temperatures only in a few sites of the body in exp. 1, but those differences were great. In exp. 2 the effect of fat was smaller in separate measured sites but the effect was more uniform throughout. Stepwise regression analysis showed that fat percent was the best predictor for differences in local skin temperatures.

For evaluation of the role of the subcutaneous fat a computer prediction model was made where both the total fat percent and the local distribution of fat could be changed. The model is based mainly on the work of Gordon **(2)**. The local skin temperatures calculated by the model are similar to the experimental results from lean persons, but higher than the results from the obese subjects. When the fat percent calculated from skinfolds and the asymmetry of fat distribution were considered, a decrease of about **2°C** in the abdominal skin temperature was achieved. The results calculated by the model are the similar to those of the clothed subjects at rest. The findings shows that the distribution and thickness of subcutaneous fat can explain individual differences in local skin temperatures and this should be taken into consideration in thermoregulatory modelling.

References

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(2) Gordon, R., Roemer, R. & Horvath, S.: Mathematical model of the human temperature. Regulatory system - Transient cold exposure response. IEEE Trans. on Biomedical Engineering. Vol. BME **-23**, no **6 (1976).**