EFFECT OF MILD COLD ON METABOLIC AND INSULATIVE ADAPTATION IN MAN

W.D. van Marken Lichtenbelt, P. Schrauwen and M.S. Westerterp-Plantenga, Department of Human Biology, Maastricht University, Maastricht, The Netherlands.

Some studies show that exposure to mild cold causes an increase in temperature gradient (core-skin), while other studies show that energy metabolism increased. The relative contribution of each form of adaptation during mild cold has not been studied. Therefore we studied the short-term effect of mild decrease in environmental temperature on energy metabolism and body temperature distribution.

9 Males stayed 2 consecutive days at 16°C and one day at 22°C in a respiration chamber. 24h EE, diet induced thermogenesis (DIT), sleeping metabolic rate (SMR), activity induced energy expenditure (AEE), and rectal and skin temperatures were measured.

Proximal skin temperatures were 1.2±0.8°C lower at 16°C compared to 22°C, while distally the difference was 4.8±1.6°C. At 16°C body core temperature was significantly 0.2±0.15°C lower than at 22°C ($p<0.01$). Temperature gradients increased significantly at 16°C compared to 22°C ($p<0.01$). At 16°C 24h EE, DIT and AEE increased compared to 22°C ($p<0.02$, $P<0.005$, $p<0.05$, respectively).

In search for acclimation effects day 1 and day 2 at 16°C were compared. 24h EE and AEE were elevated on day 2 compared to day 1 ($p<0.02$ and $p<0.05$). No apparent significant differences in body temperatures were found. However, the change in body temperature gradients (core-proximal skin) was negatively related to the change in 24h EE ($R^2=0.82$, $p<0.002$). This means that those subjects with little or no increase in 24h EE showed an increase or no change in their body temperature gradient, while those that increased their 24hEE showed a decrease in their body temperature gradient.

The results show that inter-individual differences exist with respect to the relative contribution of metabolic and insulative adaptations to mild cold.

MarkenLichtenbelt@HB.unimaas.nl