

20 The critical temperature of the Japanese In various conditions

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The lower critical temperature has been regarded as a sensitive index for estimating cold adaptability of homeothermia, since Scholander et. al. (1950) suggested it to be near 2PC in most tropical species and with a range from -50% to 15OC in arctic species. The lower critical temperature of male and female Japanese was estimated at various conditions including dressed in clothing, during maximal work, and at hypoxia. The lower critical temperature changed with clothing conditions. In the case of young female adults, the regression equation of the lower critical temperature (LCT) on clo value (I) of clothing ensembles was calculated to be $LCT = 28.93 \exp(-0.2825 I)$ within the range of clo value between 0.44 and 2.14. If the lower critical temperature at 0 clo could be extrapolated along this equation, it would be 28.9%. The rate of changes in the lower critical temperature ($dLCT/dI$) was suggested to be dependent on the clothing conditions as $dLCT/dI = -7.01 \exp(-0.2424 I)$.

The lower critical temperature of adult Japanese showed a tendency to have a relation with the yearly mean air temperature of their home towns, despite a narrow range of air temperature differences of the native piaces in western Japan. The correlation between the lower critical temperature and surface area of the subjects was confirmed to be significant. Therefore, the above tendency was suggested to be derived from a close relation between the yearly mean air temperature and surface area of the subjects.

The maximum oxygen intake was confirmed to be dependent on air temperature at which the measurements of it was performed. The polynomial regression equation of maximal oxygen intake (Vo_{2max}) on air temperature (Ta) was calculated as $V_{cpax} = 28.345 + 0.87466Ta - 0.013713Ta^2$ for female adults and $Vo_{2max} = 71.967 + 3.1157Ta + 0.19825Ta^2 - 0.0047435Ta^3 + 0.000037458T^4$ for male adults. The correspondent air temperature to the lower value of 95% confidence interval of the extreme value was estimated from the regression to be 24.2OC and 39.6OC for female adults and 23.6OC and 36.7OC for male adults. These values suggest the sex difference in the lower and upper critical temperature for maximal oxygen intake. The lower critical temperature at hypoxic conditions was examined from the viewpoint of the influence of nonshivering thermogenesis.