SEASONAL VARIATION IN BASAL METABOLIC RATE AND THERMOGENIC RESPONSE TO COLD

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The purposes of this study were to clarify a seasonal variation in basal metabolic rate and thermogenic response to cold environment. Twenty healthy men attended to this study, including cold exposure test, measurements of maximal oxygen intake, vascular function, basal metabolic rate, daily activity, and air temperature surrounding them in daily life, in winter and summer. In cold exposure test, subjects were remained supine rest in the climatic chamber for 90 min, where air temperature was gradually declined from 26°C to 5°C in 90 min, with measuring rectal and skin temperatures, oxygen intake, skin blood flow, and blood pressure.

Basal metabolic rate in winter, compared with summer, increased in 13 subjects (increase BMR group) and decreased in others (decrease BMR group). In the increase BMR group, oxygen intake, rectal and finger skin temperatures during cold exposure, and daily physical activity were significantly higher in winter than summer. In the decrease BMR group, there were no seasonal difference in oxygen intake, rectal temperature, and daily activity. In winter, oxygen intake and rectal temperature during cold exposure, and daily physical activity were significantly higher in the increase BMR group. Furthermore, an onset of increment in oxygen intake during cold exposure was observed earlier in the increase BMR group than in the decrease BMR group in winter. These results suggest that cold-induced thermogenesis is affected by seasonal variations in basal metabolic rate, and that a person with increase in basal metabolic rate from summer to winter has a calorigenic type of cold adaptation especially in winter, resulting in improved cold tolerance.

Key words: *thermogenesis, cold tolerance, thermoregulation, seasonal variation, basal metabolic rate, oxygen intake*

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