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Modulation of the endocrine and immune systems by well-controlled hyperthermia equipment

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ABSTRACT

Since high levels of hyperthermia induce immunosuppression to a certain extent (*i.e.*, granulocytosis and lymphocytopenia) in patients, we applied mild hyperthermia in volunteers using equipment enabling well-controlled hyperthermia. Restricted control of rectal temperature at 39.4 (± 0.2)°C for 30 min was conducted and various parameters of the body were examined. The most prominent change observed during exposure to hyperthermia was elevated levels of pH and PO_2 in the blood, even in the venous blood. A transient elevation of ACTH, cortisol and growth hormone in the blood was also seen during this time. In parallel with this phenomenon, the number of total lymphocytes and those of its subsets (especially $CD57^+$ or $CD56^+$ NK cells and NKT cells) increased. More interestingly, the proportion of HLA-DR (MHC class II antigens) increased in NK and NKT cells, and their intensity on the surface of $CD20^+$ B cells increased. These results suggest that mild hyperthermia is important for modulation of the functions of the circulatory, endocrine and immune systems.

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