



## Exercise Biochemistry Review

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### **Aerobic physical training in cool environment protects rat brain against oxidative damage during rest and exercise in heat through the increased expression level of HSP70**

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**Objective** The purpose of the study was to explore the mechanism underlying physical training in cool environment (20°C) improving tolerance to exercise-heat stress.

**Methods** Rats were randomly divided into aerobic exercise group (AE group) and control group (C group). Rats of AE group undertook 5 weeks aerobic physical training in cool environment, rats of C group were kept sedentary. Through Western blotting method, the expression of HSP70 in rats motor cortex of both groups was detected. The hydroxyl radical scavenging capacity (HRSC), malondialdehyde (MDA), superoxide dismutase (SOD) activity, xanthine oxidase (XOD) and glutathion peroxidase (GPX) in rat motor cortex were detected immediately after 1h heat exposure or exhaustive exercise in heat (38-40 °C). The exhaustion time and changes of rectal temperature during exhaustive exercise were recorded.

**Results** Results showed that, the HSP70 expression of AE group is higher than C group ( $P < 0.05$ ). After 1h heat exposure or exhaustive exercise, the XOD and MDA of AE group are all lower than C group ( $P < 0.05$ ). The HRSC, SOD and GSH-PX of AE group are all higher than C group ( $P < 0.05$ ). At 30, 45 and 60 min time point, the rectal temperature of AE group are all lower than C group ( $P < 0.05$ ). The exhaustion time of AE group is higher than C group ( $P < 0.05$ ).

**Conclusions** Our results suggest that the enhanced expression of HSP70 and the decreased rise rate of core temperature, may result in the lower oxidative damage in rat brain, this may be one important factor for physical training in cool environment improving tolerance to exercise-heat stress.