Hsp70 Induction and *hsp70* Gene Polymorphisms as Indicators of Acclimatization under Hyperthermic Conditions

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Acclimatization occurs due to repeated mild increases in core temperature, allowing an organism to carry out increased work in hot, humid environments without the threat of heat illness (1).

Exposure to stimuli such as heat, exercise and oxidative stress results in the formation of heat shock proteins in the cells. Hsp70, which is induced by different *hsp70* genes, plays an important role in cellular protection and adaptation during and following stress (2).

This study was conducted to determine whether the level of induced Hsp70, together with the presence of specific *hsp70* gene polymorphisms, may be used as indicators to identify individuals who are able to acclimatize.

Hsp70 levels both before and after acclimatization were determined in response to heat stress. The *hsp70* gene polymorphisms of each individual were also determined. The basal serum Hsp70 levels in individuals who were able to acclimatize decreased due to acclimatization, allowing more Hsp70 to be induced in response to the second heat stress compared to the initial heat stress. Those who were unable to acclimatize showed increased basal serum Hsp70 levels in response to acclimatization, which prevented these individuals from inducing high Hsp70 levels in response to the second heat stress.

None of the individuals who were unable to acclimatize possessed the A\A, P2P2, A1A1 genotype combination, however six of the individuals who were able to acclimatize possessed this genotype combination.

Therefore the level of induced Hsp70 in the serum and the presence or absence of the A\A, P2P2, A1A1 genotype combination have the potential to be used as markers of acclimatization.

[1]Moseley, P. L. (1997). Heat shock proteins and heat adaptation of the whole organism, *J. Appl. Physiol.*, **83**, 1413-1417.

[2]Polla, B. S., Katengwa, S., Francois, D., Salvioli, S., Franceschi, C., Marsac, C. and Cossarizza, A. (1996). Mitochondria are selective targets for the protective effects of heat shock against oxidative injury, *Proc. Natl. Acad. Sci.* USA, **93**, 6458-6463.