AGE-DEPENDENT HEAT SHOCK RESPONSE OF A DIURNAL RODENT SPECIES FROM EXTREME DRY AND HOT ENVIRONMENTS

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Two unique characteristics, heat tolerance and longevity, make the golden spiny mouse (*Acomys russatus)*, a diurnal rodent inhabiting extreme hot and dry habitats, a good research model for heat shock response in relation to aging. The aim of this study was to provide a critical testing to hypotheses currently based on cell culture and laboratory animal experiments. Young (5-8 month) and Old (3-5 years) mice were compared at the whole organism and the cellular levels. Mice were acclimated to an ambient temperature of 27°C under a 12L:12D photoperiod. Young mice (n=10) and old mice (n=8) were exposed to 44°C. Plasma cortisol concentration, HSF1 (heat shock factor 1) activation and HSP70 (72 and 73kd heat shock proteins) expression in the liver were measured in young (n=6) and old (n=6) mice exposed to 44°C for 30 and 90 minutes. Control mice (n=6) were tested without being exposed to heat. The animals were sacrificed and tissues were quickly removed. The old mice thermoregulatory capacity was lower than that of young mice, as mortality at 44°C started 30 minutes earlier than in young mice and reached 50% an hour earlier. No significant difference in plasma cortisol concentration was found between old and young mice. Lower HSF1 activation and HSP 70 expression was found in old mice compared to young ones. Unexpected expression of both HSP 72 and HSP 73 was found in old and young mice of both the control and exposure animal groups. These results support existing theories of aging and the molecular heat shock response. However, the ability of *A. russatus* to maintain its cortisol levels at an old age, and the constitutive expression of HSP 72kd (the inducible form), present an organism with unique cellular and systemic adaptation to diurnal activity in extreme hot and dry habitats.

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