

Mitochondrial Energy Utilization is Unchanged with Age in the Trophocytes and Oenocytes of Queen Honeybees (*Apis mellifera*)

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Abstract : The lifespans of queen honeybees (*Apis mellifera*) are much longer than those of worker bees. The expression, concentration, and activity of mitochondrial energy-utilized molecules decreased with age in the trophocytes and oenocytes of worker bees, but they are unknown in queen bees. In this study, the expression, concentration, and activity of mitochondrial energy-utilized molecules were evaluated in the trophocytes and oenocytes of young and old queen bees by biochemical techniques. The results showed that mitochondrial density and mitochondrial membrane potential; nicotinamide adenine dinucleotide (NAD⁺), nicotinamide adenine dinucleotide reduced form (NADH), and adenosine triphosphate (ATP) levels; the NAD⁺/NADH ratio; and relative expression of NADH dehydrogenase 1 and ATP synthase normalized against mitochondrial density were not significantly different between young and old queen bees. These findings reveal that mitochondrial energy utilization maintains a young status in the trophocytes and oenocytes of old queen bees and that trophocytes and oenocytes have aging-delaying mechanisms and can be used to study cellular longevity.

Keywords : aging, longevity, mitochondrial energy, queen bees

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