



# The protective effect of melatonin against age-associated sarcopenia-dependent tubular aggregates formation, lactate depletion and mitochondrial changes

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## Abstract:

To gain insight into the mechanism of sarcopenia and the protective effect of melatonin, the gastrocnemius muscles of young (3–4 months), early-aged (12 months), and old-aged (24 months) wild-type C57BL/6J female mice were examined by magnetic resonance and microscopy. Locomotor activity, lactate production, and nuclear apoptosis were also assessed. The results support the early onset of sarcopenia at 12 months of age, with reduction of muscle fiber number, muscle weight/body weight ratio, lactate, and locomotor activity. Lipid droplet infiltration and autophagosomes were also detected. These changes driven little effects on the early-aged muscle, but they got worse in old-aged animals by the progressive damage of the muscle. Old-aged muscle showed a reduction of the mitochondrial number, a destruction of the mitochondrial cristae, and swelling. Tubular aggregates and nucleic acid fragmentation were the most striking findings in old-aged muscle, reflecting a broad damage with loss of autophagy efficacy. Oral melatonin administration conserved the normal muscular architecture, weight, muscle fiber number, and activity in the old age; it stimulated lactate production, prevented mitochondrial damage and tubular aggregates, and reduced the percentage of apoptotic nuclei in aged muscles. Altogether, gastrocnemius muscle showed age-mediated signs of sarcopenia that were reduced by melatonin treatment.

## Keywords:

Aging, Autophagosome, Melatonin, Gastrocnemius, Sarcopenia

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