IJAE
Vol. 117, n. 2 (Supplement): 15, 2012
ITALIAN JOURNAL OF ANATOMY AND EMBRYOLOGY

Cytoprotective effects of melatonin in C2C12 skeletal muscle cells: a multiple technical approach

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Melatonin has a wide range of physiological functions including protection against oxidative stress, which is carried out through its ability to act as a free radical scavenger and to stimulate antioxidant enzyme production (Allegra et al., 2003). Oxidative stress is a major player in initiating apoptosis in skeletal muscle, as well as in other tissues. Apoptosis is essential for skeletal muscle development and homeostasis; nevertheless, its misregulation has been frequently observed in various myopathies (Loro et al., 2010). Several authors demonstrated that melatonin exerts anti-apoptotic actions in various cell models (Hibaoui et al., 2009) and our previous studies evidenced that it prevents apoptosis induced by UV-B and H_2O_2 in U937 cells (Luchetti et al., 2006; Salucci et al., 2010). In this work, melatonin activity has been investigated in C2C12 cells, after apoptotic chemical treatments. Myoblasts and myotubes were pre-treated with melatonin and then exposed to H_2O_2, cisplatin, etoposide and staurosporine. Data, obtained by means of TEM and TUNEL-CLSM, show that melatonin prevents apoptosis induced by H_2O_2, cisplatin and etoposide. Differently, staurosporine-induced apoptosis is not inhibited, probably because this trigger has a mechanism of action different from free radical increase. These results confirm melatonin ability to act as an antioxidant and anti-apoptotic molecule, thus suggesting a possible therapeutic strategy for myophaties involving apoptosis misregulation.

References

Allegra et al. (2003) The chemistry of melatonin's interaction with reactive species. J Pineal Res 34: 1-10.
Loro et al. (2010) Normal myogenesis and increased apoptosis in myotonic dystrophy type-1 muscle cells. Cell Death Differ 17: 1315-24.
Hibaoui et al. (2009) Melatonin prevents oxidative stress-mediated mitochondrial permeability transition and death in skeletal muscle cells. J Pineal Res 47: 238-52.
Luchetti et al. (2006) Melatonin prevents apoptosis induced by UV-B treatment in U937 cell line. J Pineal Res 40: 158-67.
Salucci et al. (2010) Melatonin prevents hydrogen peroxide-induced apoptotic cell death. Microscopie 13: 51-57.

Keywords: Melatonin, apoptosis, skeletal muscle.