

Human Serum Albumin Nanoparticles for Ocular Delivery of Melatonin †

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Abstract: The use of proteins such as human serum albumin (HSA) to form nanometric systems has the advantages of being non-toxic, biodegradable, and without antigenic activity. This molecule is ideal for the transport of insoluble drugs such as melatonin (Mel), which has anti-apoptotic and antioxidant properties, promising for the treatment of neurodegenerative eye diseases. The HSA nanoparticles loaded with Mel were synthesized by combining desolvation and thermal stabilization processes. The lyophilized and suspension systems were characterized physicochemically, and their biopharmaceutical properties (*in-vitro*) and stability were subsequently evaluated. Whitish colloidal dispersions of nanometric size, spherical shape, monodisperse population (PDI <0.1), and stability in the evaluated period were obtained, with a pH close to neutrality, 15% drug encapsulation and process yield values higher than 80%. In FTIR studies, thermal analysis, and RX diffraction, the successful incorporation of the drug into the cavities of the nanoparticles could be evidenced. On the other hand, the systems released the drug for a long time, reaching 60% at 24 h after the test, adjusting to the Lumped kinetic model ($r^2=0.983$). These promising findings will allow us to evaluate the effect of the formulations as an alternative for treating neurodegenerative diseases at the ocular level.

Keywords: melatonin; nanoparticles; albumin; neuroprotection; ocular diseases.

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Conflicts of Interest

The authors declare no conflict of interest.