Evaluation of lutein-loaded PVP nanoparticles in declarative memory of mice

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Introduction
Lutein is a xanthophyll carotenoid associated with cognitive improvement (Johnson, 2012). Nevertheless, this compound is very sensitive to external agents. Encapsulation procedures are able to slow down degradation processes and enhance bioavailability. This paper aims the preparation and characterization of lutein-loaded poly(vinyl pirrolidone) nanoparticles and its effect on mice’s declarative memory in object recognition task.

Materials and Methods
Lutein-loaded PVP nanoparticles (LL) were prepared by dissolution in common solvent according to Karavas et al. (2006). Nanoparticles were characterized by Fourier Transform Infrared Spectrometry (FTIR) and Differential Scanning Calorimetry (DSC). The recognition object task was carried out according to Bevins e Besheer (2006) using 75 adult male Swiss mice. Animals were divided into 6 groups and each group received vehicles (saline or olive oil), pristine lutein (PL) and LL by oral gavage during 14 days. One-way ANOVA at the significance level of 5% was used.

Results and Discussion
Fig. 1 shows the infrared spectra and DSC thermograms of PL, PVP, physical mixture and LL.

Fig. 1 - Infrared spectra and DSC thermograms.

Characteristics absorption groups of lutein were not present in LL spectra. PL thermal analysis showed an exothermic peak at 107.2°C corresponding to the degradation of its chemical structure. Such peak could not be detected in the LL thermogram. These results suggested that lutein was well encapsulated and distributed inside the nanoparticles.

Fig. 2 shows the object discrimination index (ODI) in object recognition task.

Fig. 2 - Object discrimination index (ODI).

Nanoparticles presented spherical shape and uniform size around 200 nm (images not shown). ANOVA analysis showed that PL and LL promoted effect on mice’s memory. It was possible to observe, in ODI test, that lutein enhanced the discrimination between the objects in comparison to the respective vehicle. Besides, low doses (1.5 and 10 mg.Kg⁻¹) of LL have the similar effects of PL (100 mg.Kg⁻¹). These results proved that LL ameliorated of the male Swiss mice memory.

Conclusion
Administration of lutein-loaded PVP nanoparticles during 14 days was able to promote positive effects on the memory of mice in the object recognition task in lower doses that pristine lutein. ODI test showed that lutein has a positive effect on mice memory.

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References