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PII: S0928-0987(17)30578-X
DOI: doi:10.1016/j.ejps.2017.10.023
Reference: PHASCI 4269

To appear in: *European Journal of Pharmaceutical Sciences*

Received date: 20 May 2017
Revised date: 12 September 2017
Accepted date: 14 October 2017

Please cite this article as: Venkateshwaran Krishnaswami, Chandrasekar Ponnusamy, Senthilkumar Sankareswaran, Muthuselvam Paulsamy, Madi Madiyalakan, Rajaguru Palanisamy, Ruckmani Kandasamy, Subramanian Natesan , Development of copolymeric nanoparticles of hypocrellin B: Enhanced phototoxic effect and ocular distribution. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Phasci(2017), doi:10.1016/j.ejps.2017.10.023

DEVELOPMENT OF COPOLYMERIC NANOPARTICLES OF HYPOCRELLIN B: ENHANCED PHOTOTOXIC EFFECT AND OCULAR DISTRIBUTION

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Abstract

In the present work, we have developed a photosensitizer hypocrellin B (HB) and nano silver loaded PLGA-TPGS nanoparticles with improved singlet oxygen production for enhanced photodynamic effect for the efficient treatment of age related macular degeneration. Random copolymer (PLGA-TPGS) synthesized by ring opening and bulk polymerization was characterized by IR, ^{1}H-NMR and TGA analysis. HBS-CP-NPs prepared by nanoprecipitation techniques were spherical shaped89.6-753.6 nm size particles with negative zeta potential. The average encapsulation efficiency was 84.06± 11.43 % and HB release from the HBS-CP-NPs was found to be biphasic with a slow release of 1.41 % in the first 8 h and 48.91 % during 3 days as measured by RP-HPLC. DSC thermograms indicate that HB was dispersed as amorphous form in HBS-CP-NPs. The ROS generation level of HBS-CP-NPs was significantly higher than that of HB/HB-CP-NPs. The production of $^{1}O_2$ of HBS-NPs has been assessed using EPR spectrometer. The $^{1}O_2$ generating efficiency follows the order of nano silver>HB-CP-NPs> HBS-CP-NPs > pure HB drug solution. The superior phototoxic effect of HBS-CP-NPs (85.5 % at 50 µM) was attained at 2 h irradiation in A549 cells. Significant anti angiogenic effect of HBS-CP-NPs was observed in treated CAM embryos. Following intravenous injection of HBS-CP-NPs to rabbits, the maximum amount of HB was found in retina (3 h), iris (9 h), aqueous humour (9 h) and vitreous humour (9 h).

Key words: Hypocrellin B, photodynamic, nano silver, singlet oxygen