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Effects of the resveratrol, lipid-core nanocapsules and resveratrol-loaded lipid-core nanocapsules on phototherapy-induced skin damage

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Resveratrol (RSV) is a well know photochemopreventive, but is unstable under UVA radiation. Resveratrol-loaded nanocapsules (NCRSV) are less susceptible to UVA degradation than free RSV and may potentially be used as a photochemopreventive in psoralen +UVA therapy (PUVA). Considering this, the aim of our research work was to further evaluate the applicability of NCRSV as a photochemopreventive and test the *in vivo* inhibition of phototherapy induced skin damage. NCRSV were prepared by the nanoprecipitation method, and characterized according to size distribution and encapsulation efficiency. RSV release profile was also evaluated. The interaction between the polymer and polymer/RSV mixtures with porcine skin stratum corneo was analyzed by atomic force microscopy (AFM). An *in vivo* assay was performed; HRS/J mice received 200 µL of water, blank lipid core nanocapsules (NCB), NCRSV or RSV, two times a day. The PUVA therapy consisted on the topical application of 0.2 mg of 8-MOP per 6 cm^2 and 60 minutes of exposure to UVA light. Fold thickness of the skin (Mitutoyu® thickness gauge), erythema (Mexameter RMX18) and transepidermal water loss (Tewameter RTM300) were measured. At the end of the experiment the skin was removed, the oncogene p53 and tiobarbituric acid reactive species (TBARS) were quantified. The mean particle sizes of NCB and NCRSV were 210 nm and 185 nm, respectively and showed monomodal size distribution. The formulation was capable of encapsulating RSV with an encapsulation efficiency of 98-100%. NCRSV had a biexponential release profile, exhibiting a prolonged release of 60% of the initial amount of RSV, indicating that RSV is partially adsorbed to the particle wall. The presence of RSV in the polymer film reduced the interaction force with porcine skin, as show by AFM. Free RSV, NCB and NCRSV reduced physiological skin damage, but free RSV was the most promising in this aspect. NCB was the only formulation capable of reducing the generation of p53 and TBARS when compared to the control. This shows that blank polymeric nanoparticles are not inert and that when the interaction between the polymer wall and the skin is reduced, as happened with the addition of RSV, the therapeutic effect may also be reduced.

Biography

Cassia Britto Detoni completed her PhD in Pharmaceutical Sciences at the Federal University of Rio Grande do Sul at the age of 27 (2013), specializing in the development of nanocarriers applied to drugs and cosmetics. She is a Post doctorate researcher at the Federal University of Bahia in Industrial Engineering, Brazil, and temporary Professor of Pharmaceutical Technology at the State University of Feira de Santana, Bahia-Brazil.

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