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IN VIVO EVALUATION OF CHEMICAL COMPOSITION AND VOLUME FRACTION INFLUENCE ON GASTROPROTECTIVE EFFECT OF DIFFERENT NANOPARTICLES.

Silva, K.B.[1,2*]; Guterres, S.S.[2]; Pohlmann, A.R.[1].
[1]Laboratório K204, Instituto de Química, UFRGS [2]Laboratório de Cosmetologia, Faculdade de Farmácia, UFRGS; .
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Introduction: Gastric mucosa problems are complex diseases and may be related with aging, *Helicobacter pylori* infection, alcoholism, stress and continuous use of drugs like NSAIDs and anticancer agents. In the last years, alternatives to the usual agents for gastric ulcers treatment have been pursued, because these treatments are commonly used for a long period of time and are associated with side effects [1,2]. The use of fish oil as an anti-ulcer agent is one of these alternatives. Fish oil contains long chain omega-3 fatty acids (EPA and DHA), which are essential for many biological processes. Studies have suggested that the use of fish oil for the treatment of gastric mucosa lesions induced by necrotizing agents, drugs, pylorus ligation or stress, decrease significantly these lesions, probably due to the great EPA concentration in the oil [3,4,5]. Nanoparticles have been introduced as a new drug release system for different routes of administration, including oral rout, to control the release and increase de bioavailability of drugs. A hypothesis to these effects is the adhesion of nanoparticles in gastric mucosa due to its great superficial contact area, which indicate a great potential to interact with biological surfaces [6]. Studies have demonstrated a size-dependent adhesion of nanoparticles in the gastrointestinal tract, as well as a dependency of the nanoparticles surface properties on its bioadhesion and selective adhesion of nanoparticles to inflamed tissue on gastric ulcers [6,7,8]. Recently our research group has demonstrated that Q10 and omega-3-loaded lipid nanoparticles presented an effective gastroprotection against ethanol-induced ulcers in rats, compared with Q10 and omega-3 free form[9].

Objective: In order to validate the hypothesis that nanostructures systems could act as a coating of the gastric mucosa by its size distribution, constituent material of the particle or its bioadhesive properties, the aim of this study is the development of two different kinds of nanoparticles (lipid-core nanocapsules and lipid nanoparticles) in two different volume-fraction (4 % and 12 %) through a 2^2 factorial. The formulations will be evaluated concerning its gastroprotective effect and compared to a Q10 and omega-3-loaded lipid nanoparticles in order to establish if the gastroprotection is dependent of the chemical composition of nanoparticles - that makes them bioadhesive - and/or the coating area due to the volume-fraction.

Materials and Methods: The lipid-core nanocapsules will be prepared by interfacial deposition of pre-formed polymer method[10], and the lipid nanoparticles, by high pressure homogenization technique. The formulations will be characterized determining particle size distribution, zeta potential, pH and multiple light scattering. The *in vivo* evaluation of the gastroprotective effect will be performed by ethanol-induced ulcers in Wistar rats model [11]. The statistic analysis will be performed using Tuckey test or one-way ANOVA at the probability level of 0.05.

References:

1. Guedes, M. M. *et. al.*, Biological & Pharmaceutical Bulletin, **31**, 7, 1351-1355, 2008.
2. Schroeter, G *et. al.*,Revista HCPA, **28**, 2, 89-95, 2008.
3. Al-Harbi, M. M. *et. al.*, Food and Chemical Toxicology, **33**, 7, 553-558, 1995.
4. Kirillov, O. I. *et. al.*,Vopr Pitan, Jan-Feb, **1**, 56-59, 1991.
5. Bhattacharya, A. *et. al.*, PLEFA, **74**, 109–116, 2006.
6. Umamaheshwari, R.B. *et. al.*, AAPS PharmSciTech, **5**, 2, Article 32, 2004.
7. Hasani, S. *et. al.*, Pharmaceutical Research, **26**, 5, May, 2009.
8. Lamprecht, A. *et. al.*, Pharmaceutical Research, **18**, 6, 2001.
9. Silva, K.B., Faculdade de Farmácia - Universidade Federal do Rio Grande do Sul, 2009.
10. Jäger, E. *et. al.*, Journal of Biomedical Nanotechnology, **5**, 130–140, 2009.
11. Raffin *et. al.*, European Journal of Pharmaceutics and Biopharmaceutics, **63**, 198–204, 2006.

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