ABSTRACT FOR ORAL PRESENTATION

Prilling and Supercritical drying: the successful combination to produce polysaccharide aerogel beads as tunable drug delivery systems

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Aerogels are very interesting materials for drug delivery applications because of their high porosity and surface-area. Particularly, biocompatible and biodegradable polysaccharide-based aerogels are able to modulate drug's adsorption and release, increasing stability and bioavailability of degradable and low soluble drugs. Aerogel production may be conducted by different technologies; among them prilling is a versatile encapsulation technique able to produce monodispersed polysaccharide-based particles loaded with different bioactive molecules. It consists of two steps: the first is based on the breaking apart of a laminar jet of polymer solution into a row of mono-sized droplets by means of a vibrating-nozzle device (SOL_phase), the second on the sol-gel transition of the droplets in hydrogel beads (GEL_phase) [1]. The obtained hydrogel must be dried and drying conditions play an important role in determining the final properties and, therefore, application [2-6].
Aim of the present research was to verify the possibility of using Prilling and Supercritical Drying as Tandem-Technique to produce polysaccharide-based aerogel beads as controlled drug delivery system of NSAID with low solubility such as ketoprofen (K).
Alginate (Alg) beads loaded with K were produced *via* prilling/ionotropic gelation/SC-CO_2 drying route. The main factors influencing SOL_phase, GEL_phase as well as drying_step were investigated with the aim to find the operative conditions necessary to produce uniform particles in a reproducible way. The influence of Alg molecular weight, drug-polymer mass ratios, gelation solvent on morphology, porosity, textural properties, stability, drug-loading and drug-release profiles in simulated gastro-intestinal fluids was investigated.
Results showed that the Tandem-Technique allows to successfully produce spherical aerogels with high encapsulation efficiency, narrow size distribution, reduced particle shrinkage, smooth surface and nanoporous internal texture. The nanostructured beads acts as immediate release system significantly improving dissolution rate of low water-soluble ketoprofen.
Such systems appear as promising carriers of poorly water-soluble drugs acting as fast-dissolving oral formulations.

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