Lysozyme encapsulation into nanostructured CaCO3 microparticles using a supercritical CO2 process and comparison with the normal route

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Résumé en anglais	The aim of the present work was to assess the merits of supercritical CO2 (SC-CO2) as a process for protein encapsulation into calcium carbonate microparticles. Lysozyme, chosen as a model protein, was entrapped during CaCO3 precipitation in two different media: water (normal route) and SC-CO2. The particles were characterized and compared in terms of size, zeta potential, morphology by SEM, crystal polymorph and lysozyme encapsulation. Fluorescent and confocal images suggested the encapsulation and core–shell distribution of lysozyme into CaCO3 obtained by the SC-CO2 process. A high encapsulation efficiency was reached by a supercritical CO2 process (50%) as confirmed by the increased zeta potential value, lysozyme quantification by HPLC and a specific bioassay (M. lysodeikticus). Conversely, lysozyme was scarcely entrapped by the normal route (2%). Thus, supercritical CO2 appears to be an effective process for protein encapsulation within nanostructured CaCO3 particles. Moreover, this process may be used for encapsulation of a wide range of macromolecules and bioactive substances.
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