

Morphological characterization of nanoparticles obtained by a modified double emulsion technique.

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Abstract

Oral delivery of proteins has long been dubbed the “Holy Grail” of drug delivery, showing great potential but also presenting problems in development. Various factors, including stability and time in the gastrointestinal tract, can affect the absorption of oral delivery proteins [1, 2]. Many attempts have been made in earlier research in order to face this challenge, but nowadays oral delivery of proteins is still a potential problem. In this regard, attention is increasingly drawn to the use of drug delivery systems containing acrylic polymer matrices since these polymers are essentially insoluble in the gastric juice and may be used to impart enteric solubility characteristics to encapsulated drug [3].

Nanoencapsulation of drugs represents one of the most important areas of science, which involves multidisciplinary scientific approach, contributing to human health care. Recent advances in nanoparticles(NP) systems have revealed new functions arising from nanosizing, such as improved solubility, targetability, and adhesion to tissues [4]. Hence, in this work a modified Water/ Oil/ Water (W/O/W) technique specially designed to decrease the particle diameter has been used. One of the most commonly used polymer matrices is the poly (lactic-*co*- glycolic acid) (PLGA) [5], but in this research an enteric copolymer and a mixture thereof with PEG were taken into consideration in order to effectively protect Bovine Serum Albumine (BSA) -as a model protein- from the gastric environment.

Negative-stained samples absorbed in copper microgrids with FORMVAR membranes were observed by using a TEM JEOL- JEM 2000EX microscope. As can be seen in Fig.1 and Fig.2, the diameter of the particles obtained is lesser than 50 nm for both cases, although in Fig.2 some agglomerations are observed. An analysis by sodium dodecyl (lauryl) sulfate/polyacrylamide (8%) gel electrophoresis (SDS-PAGE) was made according to the methods of Laemmli [6] and protein was stained using Coomassie blue dye. As a result, the BSA was not chemically affected under encapsulation conditions.

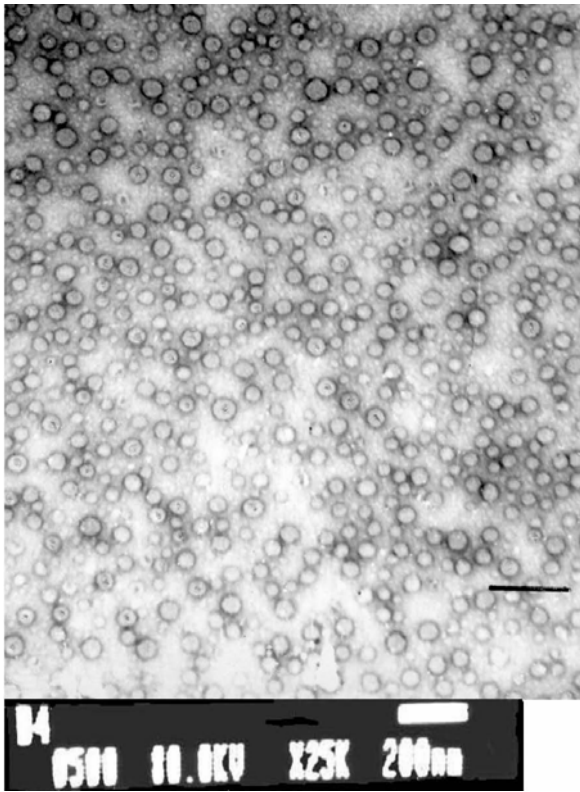


Fig 1. Transmission Electron Micrograph of NP obtained from BSA by using Kollicoat MAE 100P as matrix.

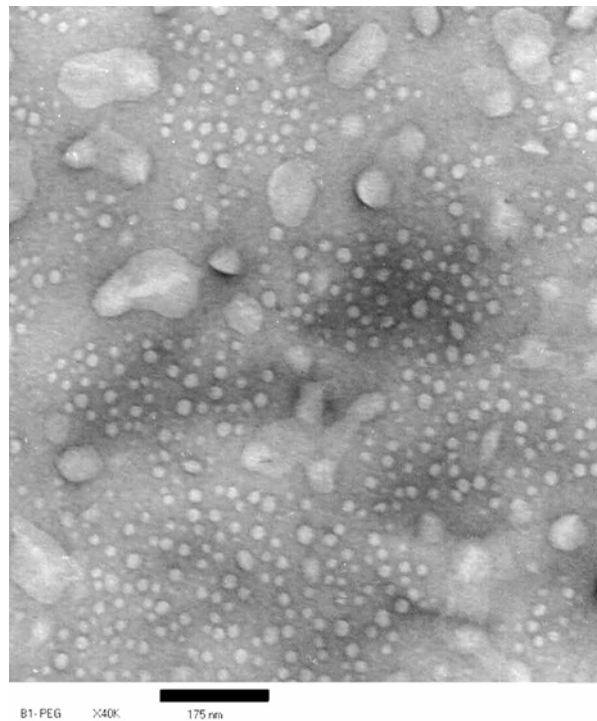


Fig 2. Transmission Electron Micrograph of NP obtained from BSA by using a mixture of Kollicoat MAE 100P and PEG as matrix.

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