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PROTEIN CROSSLINKING BY HIGH ENERGY IRRADIATION - TOWARDS THE DEVELOPMENT OF SIZE-CONTROLLED BIOCOMPATIBLE NANOCARRIERS

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Protein and peptide based delivery systems are on the spotlight considering their unique properties specially related to site specific delivery and high biocompatibility despite other biopharmaceutical advantages. Following the recent success of the so-called NAB platform, most of the attention has been driven towards the development of cosolvent-free or crosslinker-free technologies capable of producing protein nanoparticles with a specific size or shape, in the seek for better or preferential tumor uptake and low or negligible toxicity among other features. Within this context irradiation stands a tool capable of promoting protein crosslinking and sterilization of the systems simultaneously, in which combined or not with other techniques may allow the design of nanocarriers without the need of monomers or toxic crosslinkers. This research details the use of high energy irradiation towards the design of size-controlled protein-based nanocarriers for drug delivery. The albumin or papain based nanocarriers were designed by combining desolvation/solvation techniques followed by gamma irradiation or gamma irradiation alone. Size-controlled nanocarriers were manufactured up to 80 nm, as determined by dynamic light scattering, depending upon the protein or the presence of cosolvent. Nanocarrier morphology was evaluated by transmission electron microscopy, and protein crosslinking was evaluated by means of bityrosine formation using fluorescence measurements. Final applications of the developed systems comprise relevant potential for the delivery of radiopharmaceuticals or chemotherapic agents.