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Preparation of nanoparticles from thermosensitive chitosan derivatives and their capacity as a drug delivery system

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Nowadays cancer is the main cause of death in the world. Smoking, poor diet and physical inactivity contribute to increase the risk of cancer. Therapies such as radiation and chemotherapy, alone or combined, are still insufficient for successful treatments, and the overall survival rate is still low, thus making it necessary the development of novel therapeutic strategies. Smart nanocarriers constitute an evolving approach of controlled drug delivery to tumor regions, minimizing side effects in the patient. These systems have the possibility to reversibly respond to external factors, such as temperature, pH and ionic strength, among others. Chitosan-graft-poly(N-vinylcaprolactam) (Cs-g-PVCL) is a water-soluble copolymer with advantageous properties for biomedical applications, such as dual pH- and thermo-sensitive close to physiological conditions. In this work we present the development of stimuli-responsive nano-formulations from Cs-g-PVCL copolymer as a potential drug carrier, and evaluate the influence of preparation conditions on their thermosensitive properties. The systems were evaluated by dynamic light scattering (DLS), ζ -potential, atomic force microscopy, IR-FT spectroscopy and thermogravimetric analysis. The results showed that the morphological characteristics of Cs-PVCL-NP depend on the concentration of Cs-g-PVCL and the copolymer:TPP volume ratio. The thermosensitive properties of the nanoparticles were evaluated by turbidimetric method and DLS, showing a phase-transition at temperatures close to physiological conditions. 5-Fluororacyl was chosen as a model drug to test the encapsulation capacity and release of this nanomaterial, which offers very interesting properties for the development of smart chemo-drug controlled delivery carrier, constituting a potential alternative method to cancer treatment.

Biography

Martin P Montero has completed his PhD from University of Sonora, México and he a cofunded three scientific groups devoted to the study synthesis of nanovectors tissue specific, nanoplatforms for bio spectroscopic cell studies and physics of cancer . He is the former director (2014-2018) of Department for Research in Physics of University of Sonora. He has published more than 50 papers in reputed journals and has been serving as referee in specialized journal of nanotechnology, nanoparticles, physics and medicine.

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