

Distinct release profiles of dual-drug from core-shell nanoparticles

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Multiply drugs combination is a promising strategy in biomedical fields, such as cancer chemotherapy, tissue engineering. The multi-drug system enables to be delivered with multiply targets and exhibits the additive or synergistic effects of drugs. However, the specific distinct drug release kinetics of the multiply drugs are required to meet the clinical needs, especially in the combined therapy of tissue regeneration and tumor chemotherapy. In order to deliver the individual drug at optimal dosages, the release behaviors of each drug in multi-drug systems should be controlled independently. Therefore, two kinds of nanoparticles with core-shell structure (PVP/PLGA and PCL/PLGA) were fabricated by coaxial electrospray in this paper. Each kind of nanoparticles can both encapsulate the hydrophilic rhodamine B and hydrophobic naproxen in one single step efficiently. The monodisperse size distribution as well as the desired core-shell structure was observed. These two multi-drug systems with dual drug loaded exhibited different distinct release profiles, attributing to the distinct core-shell structures of nanoparticles and the difference of two drugs in hydrophilic properties. Meanwhile, the release profiles of encapsulated drugs with different amount were investigated as well. The drug release behaviors were dominated by the following processes: water penetration, surface drug release, outer drug diffusion with shell polymer erosion, inner drug diffusion and nanoparticle collapse. The results suggested that the distinct release kinetics of multiply drugs fabricated by coaxial electrospray can be obtained and tuned to fulfill the clinical requirement in combination therapy.

Biography

Yang Cao is a Ph.D. candidate in Biomedical Engineering at Chongqing University. He is the director of Chongqing University Postgraduates' Innovative Team Building Project. His doctoral investigation involves nano/micro scale drug delivery systems fabrication and multi-drug controlled release. He has published more than 10 papers in reputed journals.

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