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Studies of polystyrene nanoparticles penetration efficiency in PLGA hydrogel of different hardness

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Abstract

As a biologically adaptable biomaterial, hydrogels have been widely used in biomedical engineering in recent years. Nanoparticles or drug delivery penetration efficiency in hydrogel model in vitro has been always the focus of attention in tissue engineering field. Several factors could affect the diffusion process of nanoparticles in the hydrogel, such as the pore size that should be compared to the size of nanoparticles, polymer chain mobility, polymer concentration and crosslink density. Latex microspheres (polystyrene) are easy to produce and surface-modify, have good biocompatibility, and are easy to attach fluorescence molecules. A variety of products is commercially available and is widely used in the study of nanoparticle penetration. In this work, wechangedPLGAhydrogelswithdifferentphysicalpropertiesbychangingdifferent preparation conditions (concentration and UV exposure time). The self-customized force sensor is used to characterizethephysicalpropertiesofhydrogelsunderdifferentconditions.Atthesametime,therelationship between physical properties and polystyrene nanoparticles penetration was established by tracking the diffusion efficiency of fluorescent nanoparticles in the hydrogel.log differences in CFU counts (Mean ± SEM) of S. typhimurium at different time intervals (6, 12 and 24 h) against the initial microbial populations (~107 cells/ml). LR: Lactobacillus rhamnosus GG (NCDC 347); ST: Salmonella typhimurium (ATCC 14028); CTL: Control Mono-culture; CC: Co-culture; G: D-glucose; T: D-tagatose; B: basal medium without carbon.

Biography

Mingze Sun is currently a PhD student at University of Connecticut, majors in Biomedical Engineering. He obtained his master's degree at University of Connecticut, USA and bachelor's degree in Pharmaceutical engineering at Southwest University, China. His doctoral research mainly focuses on anti-cancer drug nanodelivery system and mechanical properties of tumor micro-enviroment. He has published several scientifi c articles on core journals and obtained a national patent. He is also the editor for Bioactive Materials and the author of academic book.

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