

Preparation of PLA/HAP composite microspheres for 3-Dimensional Printing

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Calcium phosphate nanoparticles are important for the nano medicine in biomedical. It is main inorganic component in the human bone and teeth. It has good biodegradability, biocompatibility and bioactivity. Mainly calcium phosphate nanoparticles (nCaP) are nontoxic. Therefore it can be used as a drug carrier. Because in different pH areas it can be controlled the drug release and mainly able to release drug in proper area. Especially this nanoparticle calcium phosphate used to treat bone cancers. Bone cancer is malignant tumor. There are different types of bone cancers such as osteosarcoma, Chordoma, fibrosarcoma, chondrosarcoma....etc. This research was found poly lactic acid (PLA) and poly lactic-co- glycolic acid (PLGA) microspheres for 3 dimensional (3D) printing and as a drug carrier respectively. PLA has high molecular mass. Therefore it is difficult to prepare nanometer scale microsphere from PLA. 3D printing microsphere should be in micrometer scale and drug loading microsphere should be in nanometer range. Inside this microsphere have nCaP particles. These nCaP particles in nanometer range and it is the special material for treatment. This microsphere preparation was checked with nCaP which prepared in different temperature. The nCaP particles were prepared during one hour and microsphere samples were prepared during three hours. Micrometer scale microspheres and nanometer scale microspheres were prepared with magnetic stirring method and ultrasonic method respectively. There are different methods to prepare nCaP particles. In here, precipitation method was used to prepare nCaP particles.

Crystallinity of the nCaP particles vary with temperature. Prepared 3D printing microspheres were in 50 μ m to 80 μ m range and nanospheres were in 90nm to 100nm range. These all nCaP particles and microspheres were characterized by using different methods and instruments. All characterization methods were given best results about microspheres and able to use as 3D printing and as drug carrier.

Keywords: Bone cancer, Drug carrier, Microsphere, Nanoparticle