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Image guided drug delivery: A non-invasive approach for targeted cancer therapy

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Cancer chemotherapy usually relies on systemic delivery with limited tumor specificity, and therefore may result in adverse side effects in normal tissues and insufficient drug delivery to the target tumor. Image-guided drug delivery is exciting and emerging fields that can enhance spatial targeting, detect and measure drug release using markers co-loaded with drugs within the nanocarriers, and improve targeting when compared with more traditional drug delivery strategies. Various imaging modalities such as ultrasound and MRI can provide acquisition of anatomic targets structure for treatment planning, accurate thermometry for treatment monitoring and control, and real-time monitoring of intratumoral drug release. Our studies show that combination of MRI and ultrasound technology with thermosensitive nanocarriers results in enhanced tumor drug delivery and distribution. This technology has significant potential for clinical translation.

Biography

Ashish Ranjan obtained his Ph.D. from Virginia Polytechnic Institute and State University and postdoctoral studies from National Institutes of Health, MD. He is an Assistant Professor in the Center for Veterinary Health Sciences, Oklahoma State University. He has published/presented more than 50 articles and has been serving as an editorial board member of repute in Journal of Nanomedicine and Biotherapeutic Discovery (JNBD) and Advances in Dairy Research.

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Biomimetic scaffolds for bone tissue engineering

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The combination of Engineering with Life Sciences has generated a new field known as Biomimetics. The concept of biomimetics is based on the abstraction of nature's way of biomineralization that simultaneously carries out designing, synthesis and construction to fabricate hierarchical multi-functional structures in nature. Materials scientists have applied the concept of Biomimetics to develop functional nanomaterials and structures suitable for different applications including tissue engineering. Synthesis of a bioactive scaffold for bone tissue engineering has been an interesting challenge for biomaterial scientists. Development of a scaffold with mutually contradictory design requirements like high porosity coupled with high mechanical stability and structural sensitive osteo-inductive and osteo-conductive activities has been one such issue that could not be addressed by conventional approaches. We know that our skeletons are made up of self assembled nanosized building blocks produced by matrix mediated biomineralization. The most basic process in biomineralization operate at the nanometer length scale and involve proteins or other macromolecules in controlling nucleation, growth and inhibition of mineral phase.

Here we reported communication matrix mediated produce for synthesis of nanocomposite scaffolds. In this process we used poly (vinyl alcohol) / gelatin nanogel mediated *in situ* nucleation of hydroxyapatite nanoparticles and their subsequent self assembly induced three-dimensional growth into mineralized macroporous scaffolds with functionalized surfaces. Here in biomimetic process basically the secondary bonds play an important role for constructing micro architecture. Presentation will include the response of mesenchymal stem cells on different biomimetic scaffolds having systematic variation in its chemistry and structures.

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