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Cryogels: Novel matrices for the repair of cartilage lesions

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Abstract

Cartilage tissue engineering is an emerging area which holds promise for the repair of damaged cartilage. It employs different approaches for example use of three dimensional scaffolds or *ex vivo* generated neo-cartilage as repair materials. Our group is working towards the development of newer and affordable treatment regimes for osteoarthritis. We are using the concept of *cryogelation* for the fabrication process which synthesizes matrices at a sub-zero temperature. We have developed composite matrices from natural polymers like chitosan, gelatin, agarose, alginate for cartilage tissue engineering. Physical and mechanical characterization of these matrices supports their utility for cartilage tissue engineering. These matrices support the growth and proliferation of primary goat chondrocytes together with the synthesis of extracellular matrix. These cryogel matrices being mechanically similar to the native tissue support the synthesis of large amount of extracellular matrix which accumulates as a neo-cartilage on the surface of a scaffold. Biochemical and mechanical characterization exhibits a close similarity between native and neo-cartilage. Furthermore it's *in vivo* biocompatibility and integration with the host tissue was confirmed using balb/c mice. Due to similarity of neo-cartilage with the native tissue it can emerge as a potential repair strategy for cartilage lesions. These cryogel matrices have shown the capacity to repair subchondrial or deep cartilage defects in New Zealand White rabbits without eliciting any adverse immune response. Results authenticate the usage of synthesized novel cryogel matrices as potential scaffolds for cartilage tissue engineering.

Biography

Sumrita Bhat has completed her Ph.D. in the year 2012. During her doctoral programmer she has worked towards the development of matrices for cartilage tissue engineering and has published several research articles in this area. Currently she is working as a post doctoral fellow at Indian Institute of Technology Kanpur, India.