Journal of Stem Cells & Regenerative Medicine
ISSN 0973 - 7154

Proceedings of the Annual Symposium & Plenary Session on Regenerative Medicine (PASRM)

JSRM Code: 007020700018

Repair of Cartilage injuries using in vitro engineered 3D cartilage tissue- Preliminary Results of Our Animal Studies

Arumugam S[1] , Manjunath S[2], Senthilkumar R[2], Rajendiran S[3], Yoshioka H[4], Mori Y[4], Abraham S[2,5]

Abstract

Introduction:

The cartilage injuries demand novel therapeutic approaches as the success rates of the current conventional strategies for the repair of injured articular cartilages are not that encouraging. Earlier we have reported that the Thermoreversible Gelation Polymer (TGP) is an ideal scaffold for human chondrocyte expansion in vitro. In this study, we report the preliminary results of the in vitro expansion, characterization and experimental in vivo transplantation of chondrocytes in a rabbit model of cartilage injury

Materials & Methods:

Nine rabbits were included in this study scheduled for two years, after approval by the ethics committee. In the first animal, Chondrocytes were isolated from the weight bearing area of patellar groove in the left hindlimb and cultured in TGP Scaffold and maintained at 37°C in 5% carbon dioxide incubator for 64 days without growth factors. Then the TGP-Chondrocyte construct was transplanted into an experimental defect created in the knee of the right forelimb of the same rabbit. After a period of 10 weeks, a biopsy was taken from the transplanted region and subjected to morphological analysis, characterization by histopathology (H&E stain) and Immunohistochemistry (S-100 staining).

Results:

The chondrocytes in the 3D TGP culture had round to oval shaped morphology without any de-differentiation which is otherwise observed in Conventional 2D cultures. A macroscopic structure which resembled cartilage was appreciated in the TGP construct in vitro after 64 days which was then transplanted to the rabbit. The H&E and Immunohistochemistry studies confirmed the presence of chondrocytes in the biopsy tissue.

Conclusion:

Based on the results, we conclude that the TGP significantly supports the in vitro expansion of chondrocytes for a longer period and the 3D culture using TGP preserves the phenotype of the articular chondrocytes. The tissue thus grown when implanted with the TGP has engrafted well without any adverse reactions and upon confirmation of safety following completion of the entire study with adequate follow-up, human applications could be considered.

1. Dept. of Arthroscopy & Sports Medicine, Sri Ramachandra University, Chennai, India 2. Nichi-In Centre for Regenerative Medicine, Chennai, India 3. Central Laboratory, Sri Ramachandra University, Chennai, India 4. Waseda University, Tokyo, Japan 5. Yamanashi University-School of Medicine, Chuo, Japan

Proceedings of Annual Symposium & Plenary Session on Regenerative Medicine (PASRM);
Published online 30Oct 2011