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The use of microcapsule combined with mesenchymal stem cells for tissue engineering

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Background: Recently, cell-based approaches have been applied in tissue engineering. Stem cells are reported to produce growth factors including nerve growth factor, vascular endothelial growth factor and hepatocyte growth factor. Stem cells are usually applied after they are expanded and/or differentiated. In this approach, there is risk of immune reaction and possibility of rejection if host's own cells are not used, even though stem cells are reported to have immune modulatory function. Thus, the co-delivery of stem cells in immune protective device was suggested. The aim of this study is to fabricate the microcapsules loaded with stem cells and to test the stability and viability of the stem cells.

Materials & Methods: Microcapsulation of stem cells was performed using an electrostatic bead generator. The stability of the microcapsules was tested under mechanical stress. The viability of stem cells was determined by the Live/Dead[®] viability test kit.

Results: The capsule showed relatively uniform size with diameter of 350-500 μm . Light microscopy of encapsulated stem cells revealed that most cells were located toward the periphery with only a few cells located at the center. The shape of most microcapsules under mechanical stress was maintained up to the final evaluation point of two hours. The viability of stem cells was maintained up to two weeks of the culture as ascertained by Live/Dead[®] test.

Conclusions: This preliminary study gives the possibility of microencapsulation technology to deliver stem cells. Further study is needed to evaluate the feasibility of this approach.

Biography

Jun-Beom Park was graduated from Seoul National University, Republic of Korea with DDS degree. He has completed his PhD from Seoul National University. He has postdoctoral experience at University of Michigan. He is Clinical Assistant Professor at The Catholic University of Korea, Republic of Korea. His research focuses on the mesenchymal stem cells.

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