

Guest lecture

New strategies for tissue engineering and their applications in cell therapy and regenerative medicine

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Abstract: Through the development of tissue engineering, cell therapy has been gaining great attention in the field of regenerative as the promising radical treatment for a variety of degenerative diseases. Tissue-engineered constructs fabricated from tissue-derived cells such as bone marrow-derived mesenchymal stem cells, chondrocytes and synovium-derived have been proven to have regenerative effects on cartilage defects, diabetes mellitus, cardiovascular diseases, neuronal diseases and other degenerative diseases through transplantation. Here, I will provide an overview of two different scaffold-free techniques: (i) cell sheet engineering and (ii) the high density suspension system (HDSS), a novel manufacturing method. Both HDSS and cell sheet engineering can be used to fabricate artificial tissues such as pancreatic islets as well as complex cellular constructs as treatment for various degenerative diseases. Also, these biomimetic constructs can be used for in vitro evaluation for the physiological or chemical processes that occur in an in vivo condition as alternatives for animal models.

On the other hand, drug repositioning or drug repurposing studies have been recently increasing since it offers not only tremendous economic but also medical values of the existing approved therapeutic drugs. Recently, we successfully manufactured cellular aggregates by incorporating Heparin/protamine micro-particle (H/P MPs) into the cellular transplants. Therefore, repositioning H/P MPs may enhance the efficiency of various stem cell therapies in regenerative medicine. In addition, a modified cell culture medium, the medical fluid-based culture medium (FCM), by using various injectable fluids and liquid drugs which are already currently permitted for use in clinical medicine. Hence, FCM is highly beneficial since it is cheap, can be used as a conditioned medium for various therapeutic cells and safe especially for culturing cells intended for human cell transplantation.

Hosts: Associate professor Stephen J. Fey and associate professor Krzysztof Wrzesinski, BMB, SDU.