

3D culture and function of immune cells in nanofibrous scaffold

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Currently, many techniques have been developed to construct engineered human tissues in the laboratory levels. Nanofibrous scaffolds (NFS) have been exploited in various fields because of the fascinating advantages of nanofibers. In general, native extracellular matrix (ECM) is composed of nanofibers that offer structural integrity to tissues. In this regard, NF structure mimicking ECM structures can be one of the most viable candidates for biomaterials in bioengineering applications. NFS are able to provide not only mechanical support for the cells but also the chemical cues for organization, growth, differentiation and migration of cells. Especially, electrospinning generate fibers similar to the fibrous structures of ECM. Therefore, NFS has a great potential for application in various biomedical fields, including three dimensional cell and tissue culture, regeneration of tissues, drug delivery to cells and screening devices. Biophysical modification of NFS and medical applications of electrospun NFS will be introduced. Recently, we developed various assay kits consisting of nano and submicron hybrid fibrous scaffold to detect migration and activation of immune cells, including dendritic cells (DCs) and neutrophils in response to anticancer drug-treated cancer cells and bacteria. Our assay system is one of functional immune-network chip using bio-mimetic 3D structures.