ENT and Stem Cell 2018, Volume 8
DOI: 10.4066/2250-0359-C1-003

Homogeneous distribution of hMSC in 3D PCL scaffold by electrical stimulation

Mi Hee Lee, Min Sung Kim, Byeong-Ju Kwon, Min-Ah Koo, Gyeung Mi Seon, Dohyun Kim, Seung Hee Hong, Jeong Koo Kim and **Jong-Chul Park**
Yonsei University College of Medicine, Republic of Korea

Tissue engineering has shown tremendous promise in creating biological alternatives for harvested tissues, implants, and prostheses. An ideal scaffold for tissue regeneration should possess large porosity and pore size for good infiltration of cells, high pore interconnectivity for tissue ingrowth. Cell culture in 3-D porous scaffolds is often impaired by the difficulty of achieving a homogeneous cell seeding and by the diffusion constraints within the cell-scaffold constructs. In the present study, we investigated the effect of electric stimulation on the migration of hMSCs and infiltration of hMSCs into 3D PCL scaffold by electric stimulation. To fabricate the porous scaffold, we simulated the current distribution in designed scaffold using comsol physics computer program. We designed lattice structure for difficult infiltration without any stimulation. Then, 3D PCL scaffolds was fabricated by 3D printing. During electrotaxis on 2D, hMSCs moved toward the anode or cathode under direct current electric fields. Cell seeded into PCL scaffold, incubated for 1day, and then treated 1000 μA electric for 3h using a customized agar-salt electrotaxis chamber. After electric current treatments, cell distribution on PCL scaffold were visualized by immunofluorescence staining. As a result, if there was no electric treatment, cell stayed near the surface of scaffold. However, electric stimulation enhanced the infiltration of cells into scaffold and hMSC distributed and proliferated on 3D scaffolds for 28d, homogenously. In conclusion, the infiltration of hMSCs into scaffold was enhanced by the control of migration using physical stimulations as electrical stimulation.

Speaker Biography

Mi Hee Lee is currently pursuing in the Yonsei University College of Medicine at Republic of Korea.

e: parkjc@yuhs.ac

Notes: