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Fabrication of bioactive scaffolds for angiogenic biomedical application using biocompatible bacteriophage

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Background: Combined 3D cell culture *in vitro* assay with microenvironments mimicking systems are effective for cell based drug and chemicals toxicity screening test to close tissue mimicking micro-environmental systems that was contributed in single or multiple compounds to check cell migration, angiogenesis, metastasis and morphogenesis. The angiogenesis structure of endothelial cells in the ECM was confirmed as 3D and regulated by surface treatment of the microfluidic channels. Filamentous bacteriophages are a member of the family Inoviridae. These are used for material science, drug delivery, tissue engineering, energy and biosensor. Genetically modified bacteriophages could deliver therapeutic molecules or genes to specific cancer tissues or organs.

Objectives: In this research, multi-functionalized biocompatible bacteriophage and ECM were applied for mimicking angiogenic micro-environmental systems.

Materials & Methods: *E. coli* MC1061 and K91BK were used for plasmid and phage amplification respectively. Phage preparation was performed by PEG/NaCl precipitation. The function of bacteriophages was tested by RT-qPCR, ELISA assay. The angiogenesis factors (e.g. CD31 and VE-cadherin) were confirmed by using confocal microscopy on commercialized lab-on-a-chip.

Conclusion: In this study, we demonstrated that endothelial cells contacted biocompatible bacteriophages which are found to migrate and spout into the ECM at the tube like structures. The function of angiogenesis was confirmed by angiogenesis factor of CD31 and VE-cadherin staining images. Our results suggested that biocompatible bacteriophage and ECM might continuously contribute to stimulate microenvironment for *in vitro* angiogenesis models. Also, we described that the functionalized bacteriophages can be used for feasible biomaterials on biomedical engineering fields. In the future, these studies are potentially applied for angiogenic matrix at the tissue engineering *in vitro* assay.

Biography

In Hyuk Baek studied Biotechnology in Saarland University in Saarbrücken, Germany. Currently, he is doing his PhD course under supervision of Prof. Dr. Helms and working with Dr. Youngjun Kim in the environmental safety group in the Kist-Europe (Korea Institute of Science and Technology Europe branch). His main topic of his Master's thesis is metagenomic analysis of the viral communities in human feces: molecular approaches to discovery and characterization of novel viruses. He has also participated in several topics followings with 3 SCI (+1 submitted), 3 SCIE papers, 2 presentations and 4 registered patents.

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