Cell Proliferation Activated by Micro-Spot Atmospheric Pressure Plasma

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Atmospheric-pressure plasma is essential not only for sterilization, disinfection, decomposition of hazardous substances, and surface modification but also for exploration and development of new composite fields that are based on multifaceted nanotechnology, biotechnology, and medical sciences.[1,2] In recent research on modification and regeneration therapies using pulsed plasma, plasma exposure was found to have a healing effect on burns and cutaneous wounds caused by diabetic necrosis. However, although there are several hypotheses, the mechanism underlying the regeneration of tissues through short exposure to plasma has not yet been elucidated despite its increasing practical applications.[3,4] In order to improve the situation, it may be important to clarify the mechanism from multilateral standpoints including plasma science and engineering, molecular biology, and biochemistry. Therefore, we conducted a basic experiment on direct irradiation of cells by using a micro-spot atmospheric-pressure plasma generated from helium (He) gas, which is hardly harmful to living bodies both thermally and electromagnetically. Mice embryonic fibroblast cell line (NIH3T3), which is usually used for cell experiments, was used in this experiment, and the effect of plasma on the cultured cells was investigated. It was revealed that cell proliferation is activated by plasma exposure. In response to the result, we considered growth factors related to the proliferation. Although there are many factors involved in cell proliferation, we focused on angiogenesis considered vascular endothelial growth factor (VEGF) and basic fibroblast growth factors (bFGF and FGF-2). [5]

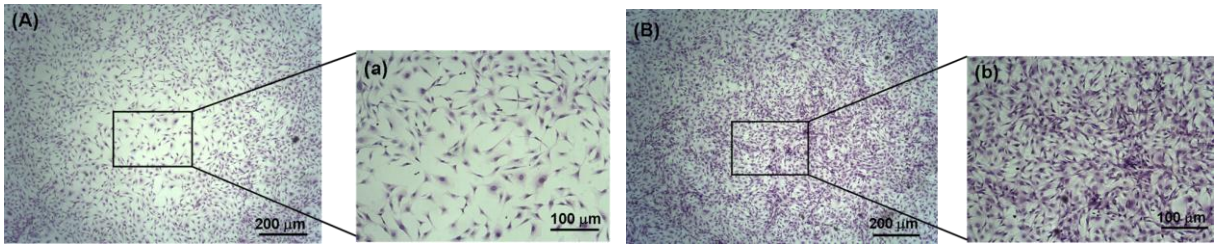

Figure 1: *HE staining of NIH3T3 cell line. (A)He gas flow only (×10), (a) He gas flow only (×40), (B) Plasma irradiation (×10), (b) Plasma irradiation (×40).*

References

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