

MAINTENANCE OF STEMNESS AND OPTIMIZATION OF DIFFERENTIATION POTENTIALS DURING IN VITRO EXPANSION OF HUMAN ADIPOSE-DERIVED STEM CELLS

EunAh Lee, Impedance Imaging Research Center, Kyung Hee University, Seoul, Republic of Korea
eunahlee@khul.ac.kr

Jungsun Lee, R&D Institute, Biosolutions Co. Ltd., Seoul, Republic of Korea
Tongin Oh, School of Medicine, Kyung Hee University, Seoul, Republic of Korea

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Adipose-derived stem cells (ADSCs) show similar characteristics to bone marrow-derived stem cells, the gold standard of MSCs, in terms of their characteristics and differentiation potentials. However, ADSCs show sub-optimal functionality compared with the gold standard. In our effort to secure enough number of allogeneic stem cells from healthy donor, FGF2 was pretreated during hADSCs in vitro expansion culture. FGF2 significantly increased the dimension of cell expansion as shown in Figure 1 and 2. Pre-treatment of FGF2 not only induced an increase of cell number – approx. 44-fold at passage 7 - but also potentiated the differentiation potentials of hADSCs. Differentiation potentials of hADSCs expanded in the presence of FGF2 was evaluated in vitro and in vivo. hADSCs pre-treated with FGF2 showed enhanced in vitro osteogenesis and chondrogenesis. Using in vivo ectopic bone model, in vivo osteogenic potential of hADSCs pretreated with FGF2 was also evaluated and abundant osteoid/bone matrix was formed in dose-dependent manner according to the concentration of pre-treated FGF2. Bone matrix formation by control hADSCs was virtually non-existent. FGF2-pre-treated hADSCs also showed enhanced in vitro chondrogenesis. hADSCs expanded with FGF2 showed increased expression of genes associated with early osteogenesis and chondrogenesis. These results shows that FGF2 can exert beneficial effect on in vitro expansion of hADSCs not only in the dimension of the expansion but also in functionality of the expanded cells.

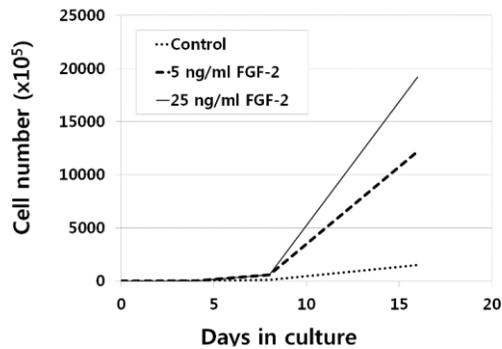


Figure 1 – FGF2 induced hADSCs growth in dose-dependent manner.

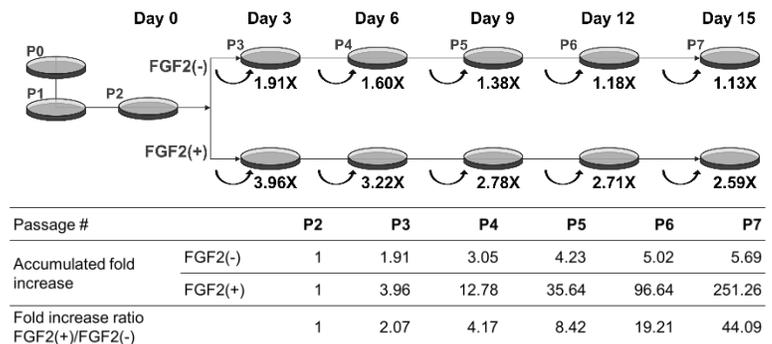


Figure 2 – Dimension of increased in vitro expansion induced by FGF2 pretreatment.

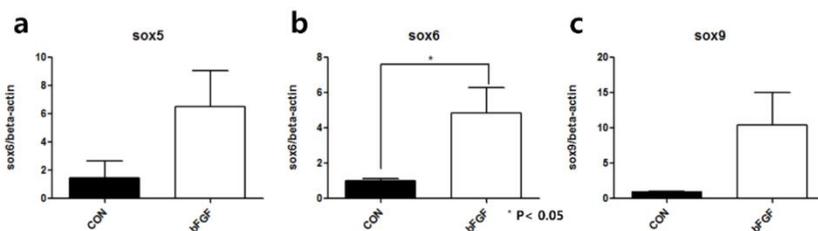


Figure 3 – Effect of FGF2-pretreatment on the expression of chondrogenesis-related genes.

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