

牙科矯正用靜磁場對細胞生長影響機制之探討

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Abstract

Static magnet has been used in the dental field for about 20 years. Clinical studies showed that magnets could not only offer force control and treatment convenience, it could also increase the rate of tooth movement in orthodontic treatment. However, the effect of orthodontic static magnetic field on growth stimulation of cell remains unclear and still need further study. In this study, our objective is to determine how the static magnet affects cell cycle and its mechanism. Cell number and viability of fibroblast (NIH-3T3) were tested under static magnetic field (SMF) exposure. Results showed that both cell number and viability of cells decreased when exposed to SMF. However, no statistically significant difference was found between each cell cycle phase when the cells were exposed to various strengths of SMF. In the growth factor experiments, all growth factors IGF-I, TGF- β and PDGF were found to increase the cell number of the cells. However, when the cells were exposed to SMF, the effects of the IGF-I, TGF- β and PDGF on cell number significantly decreased by 14.0%, 15.4% and 12.4% ($p < 0.01$) respectively. In contrast, TNF- α did significantly increase the cell number of the cells with a percentage of 18.0% ($p < 0.01$) when exposed to SMF. The SEM images showed that no significantly changed when compared to control group after they were exposed to 4000 Gauss SMF within a period of 48 hours. According to these findings, we arrived at a hypothesis that SMF were effected of cell membrane. This interaction may affect the status of various transmembrane growth factor receptors. When the growth factors cannot bind to its receptor, the proliferation rates of the cell decrease.