Effect of the magnetic field on the fibronectin adsorption, cell attachment and proliferation of the titanium surface

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We studied the effect of various static magnetic fields on the adsorption of specific recombinant fibronectin peptide (hFNIII9-10) of the titanium surface. Furthermore, the responses of human osteosarcoma TE-85 cells in the static magnetic field were observed. Various magnetic fields 1, 2, 3, 5, 7, 10 mT- were established by controlling the distance from Nd-Fe-B magnet to the disks. For fibronectin adsorption experiment, machined titanium disks were incubated in 1μM hFNIII9-10 at 37℃ overnight under magnetic field. The adsorbed hFNIII 9-10 was measured as optical density (OD). For attachment study,TE-85 cells were incubated for 2hrs on the hFNIII9-10 coated machined titanium disks and OD values were measured. As for proliferation study, titanium disks were incubated for 48hrs after washing unattached cells in 2hrs. The amount of proliferated TE-85 cell was also measured as OD value. Attachments of TE-85 cells under various intensities of magnetic field were observed using a scanning electron microscope.

The amount of adsorbed hFNIII 9-10 showed no significant difference among control (0mT) and 6 experimental groups (1, 2, 3, 5, 7, 10mT). However, TE-85 cells attached significantly higher in groups of 1, 2, 5, 10 mT than in control group ($p<.05$). TE-85 cells were observed to attach through filopodia. Especially in 1mT, flattened cells were predominant. In proliferation assay, 1mT stimulated TE-85 cells showed significant proliferation than those in 2, 3 and 7mT ($p<.05$). In conclusion, magnetic fields under 10mT influence cell attachment and proliferation rather than fibronectin adsorption of the titanium surface.

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