

The reaction of Human Fetal Osteoblast cells on Laser-irradiated Titanium implant fixtures

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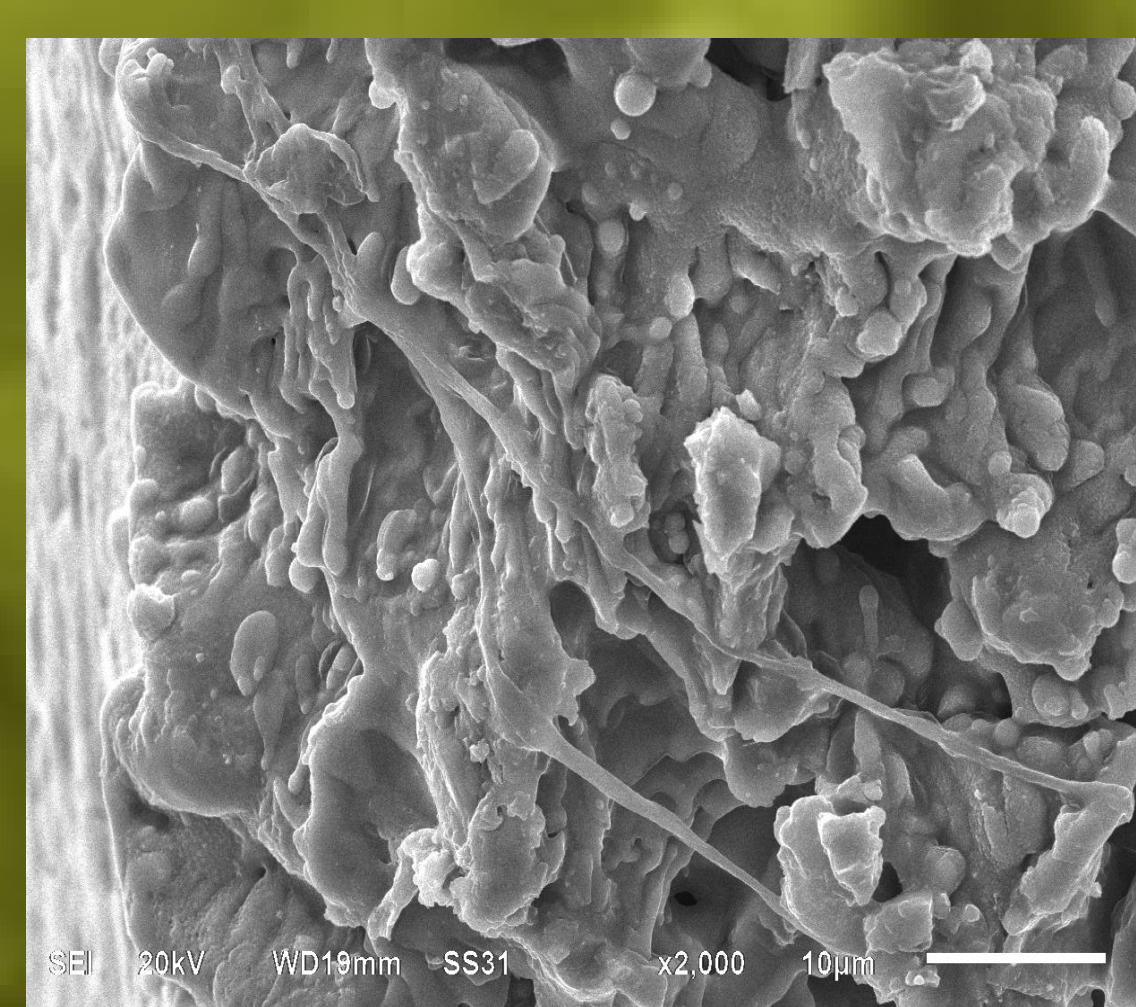
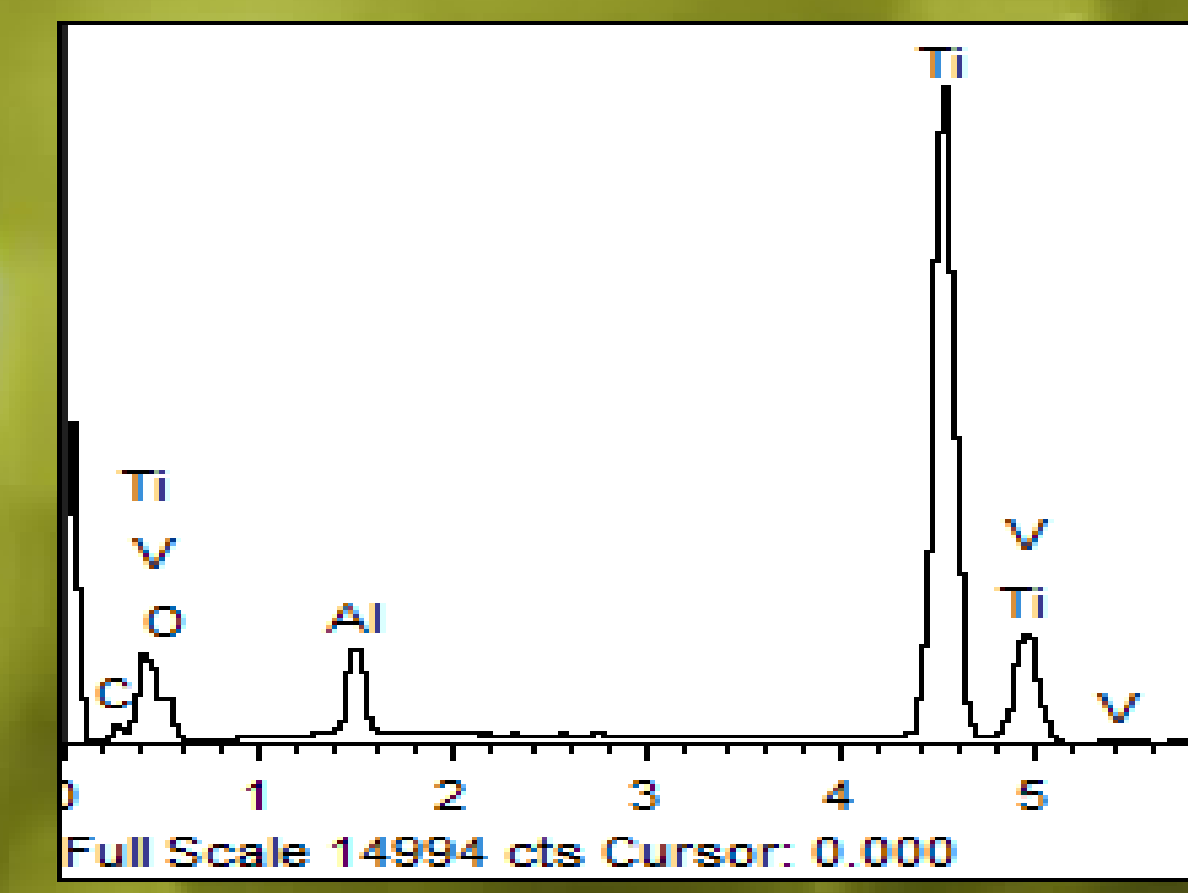
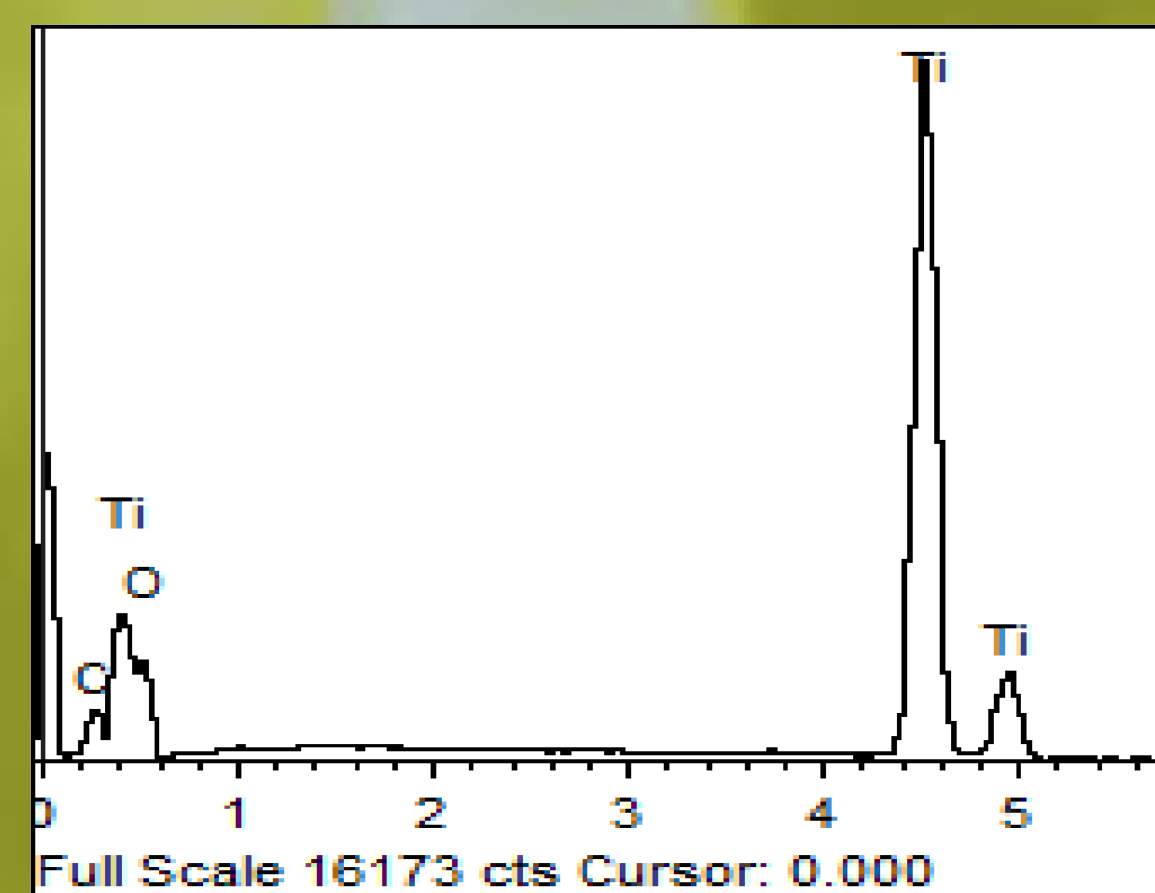


INTRODUCTION

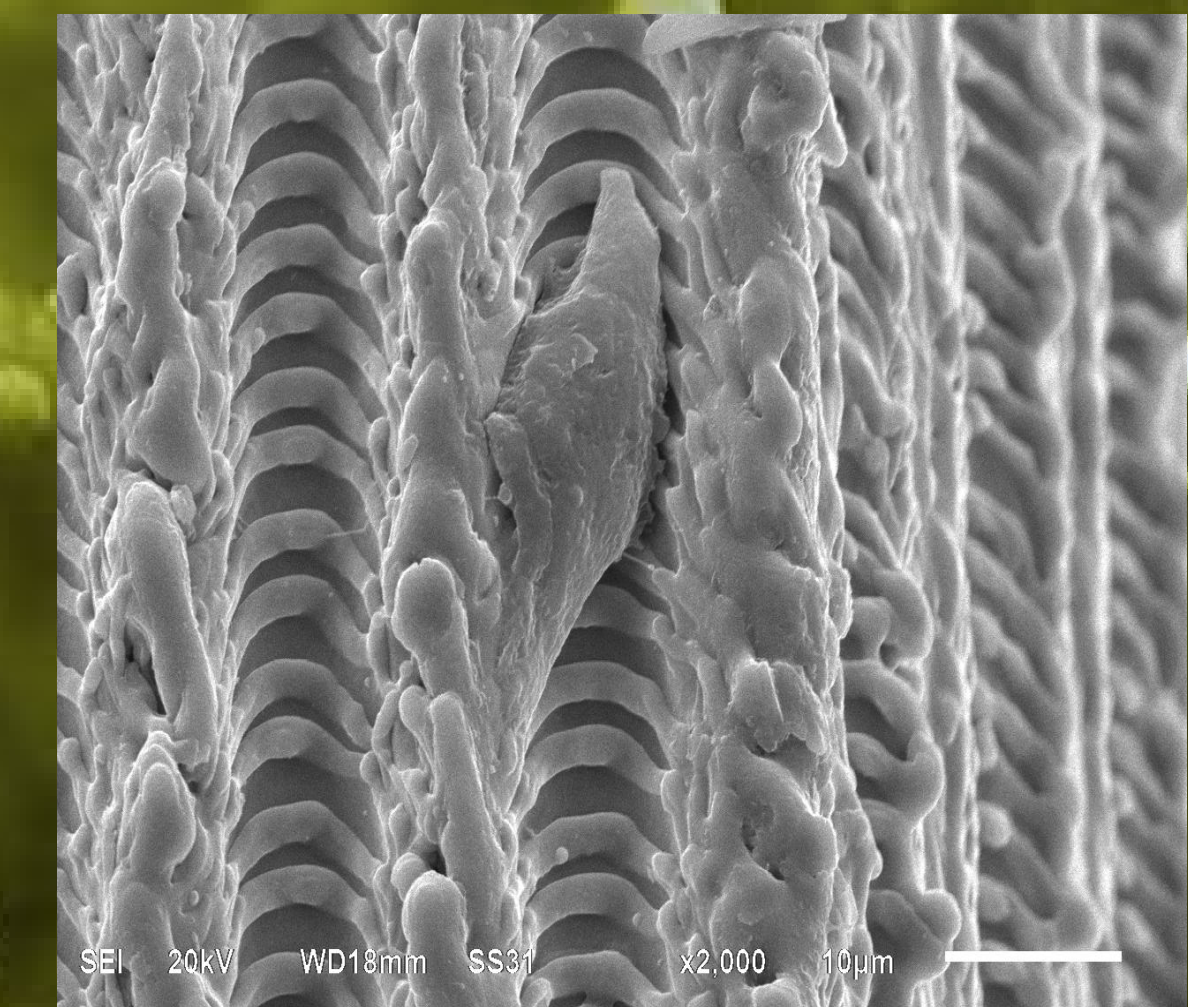
Implant surface modification methods are employed for enhancing Osseointegration. Recently, lasers have been used to achieve the desired implant surface characteristics. This study is designed to analyze the surface chemistry and topography of laser-irradiated Titanium implants and to evaluate the cell morphology and cell adhesion of Human Fetal Osteoblasts (HFOB) that were seeded on the implants.

METHODS AND MATERIALS

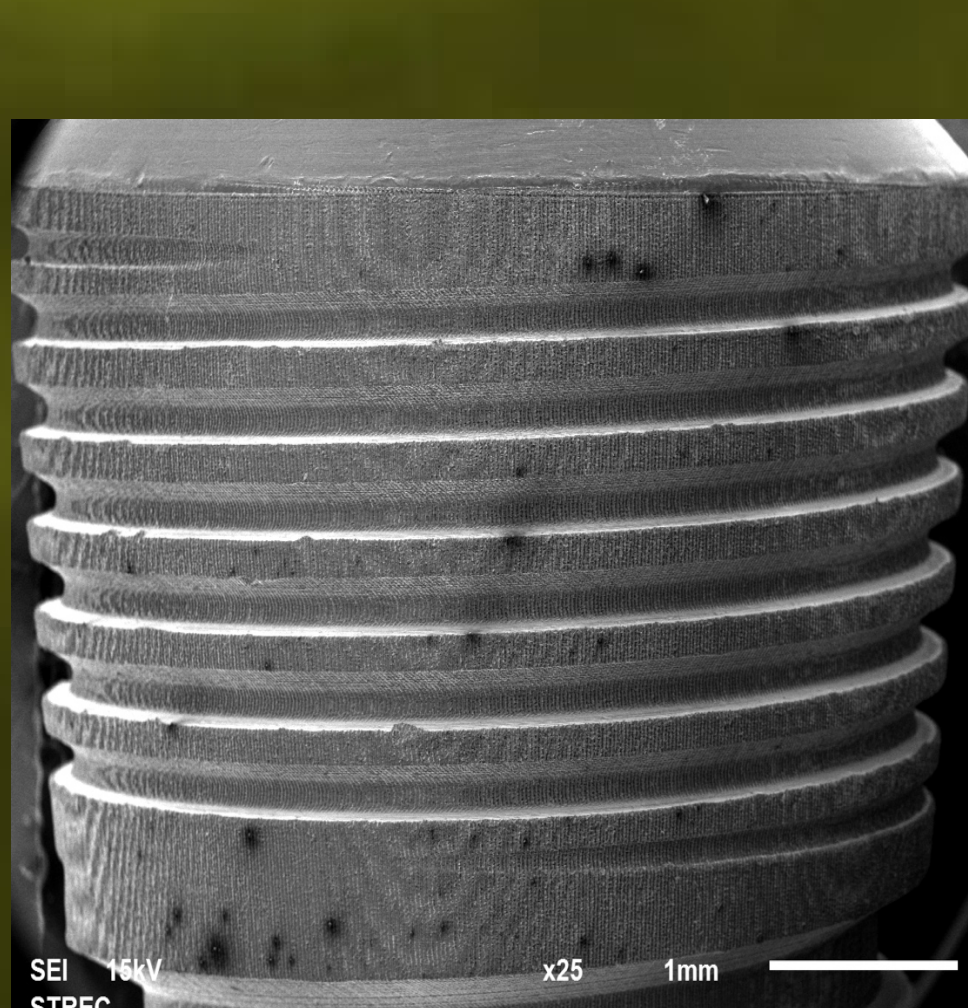
BIOMATE n=3; BIOHORIZON n=3, were purchased for this experiment. The surface topography and surface chemistry of these implants were analyzed via Scanning Electron Microscope (SEM) and Electron Dispersive Spectroscopy (EDS) respectively. HFOB were seeded onto the implants and incubated for 48 hours before visualization under SEM.



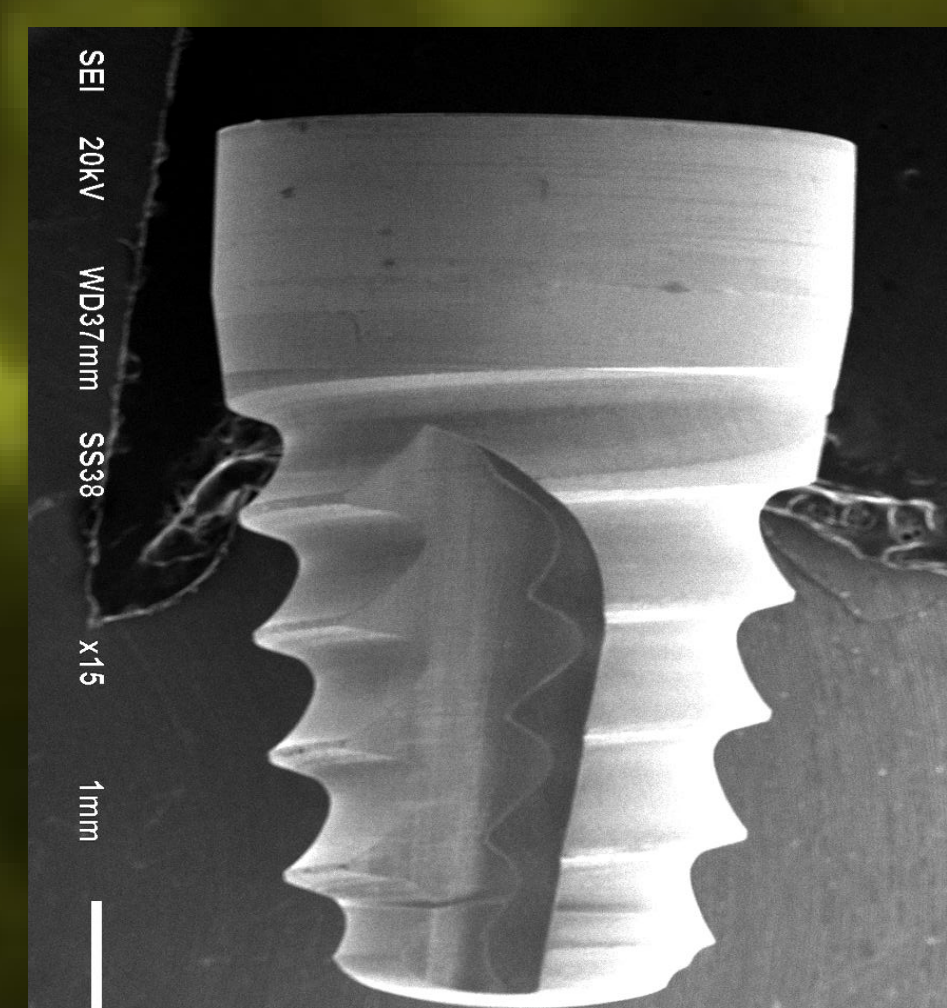
BIOMATE: EDS and HFOB under SEM



BIOHORIZON: EDS and HFOB under SEM



BIOMATE



BIOHORIZON

RESULTS

2 out of 3 samples from BIOMATE displayed dark areas under SEM that were consistent with organic matter. All BIOHORIZON samples were free of dark areas. The HFOB cell experiments revealed cell adhesion with filipodia on BIOMATE samples which is consistent with cell maturation. The cells on BIOHORIZON samples were morphologically round and lacked projections.

DISCUSSION and CONCLUSIONS

HFOB cell adhesion is possible after 48 hours in laser-irradiated titanium. However, the reason for the lack of cell maturity and cell adhesion in Biohorizon samples is still unknown. Although the presence of organic particles on the BIOMATE implants did not deter cell maturation in this in-vitro experiment, animal or human studies could illicit a different response such as failure of osseointegration.

REFERENCES

1. Duddeck, D.U. and J. Neugbauer, Surface analysis of sterilepackaged implants - SEM examination and qualitative/quantitative elemental analysis of 65 implant systems (intermediate report).
2. Subramaniam M, Jalal SM, Rickard DJ, Harris SA, Bolander ME, Spelsberg TC. Further characterization of human fetal osteoblastic hFOB 1.19 and hFOB/ER alpha cells: bone formation in vivo and karyotype analysis using multicolor fluorescent in situ hybridization. *Journal of cellular biochemistry*. 2002;87(1):9-15.