Hydrogenated TiO_2 nanotubes regulate osseointergration via influencing macrophage polarization

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Introduction

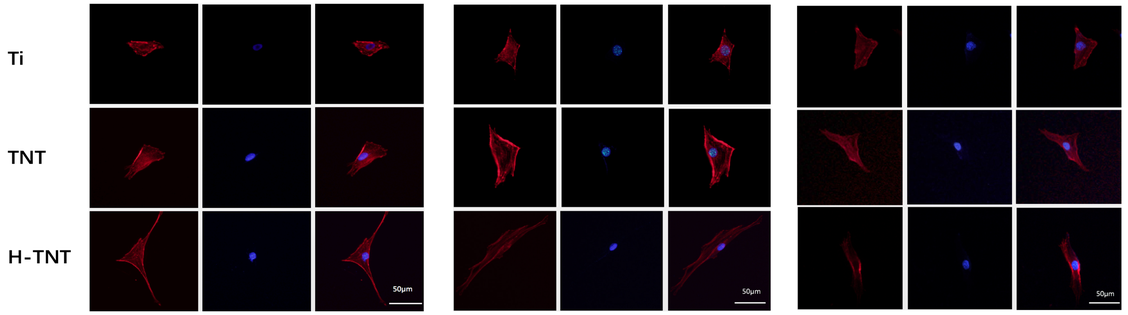
The hydrogenated TiO_2 nanotubes（H-TNT）, with superhydrophilic surface, were prepared by anodic oxidation and hydrogenation. H-TNT can promote M2 polarization of macrophage, so as to promote the proliferation and osteogenesis of MC3T3-E1 cells

Methods

RAW264.7 cells were incubated on the surface of three groups, and the secretion of cytokines was detected by ELISA. The supernatants in Ti, TNT, and H-TNT were harvested for the subsequent incubation of MC3T3-E1 cells. The morphology of MC3T3-E1 cells were observed by fluorescence staining; cell adhesion and proliferation were measured with CCK-8; the osteogenic differentiation were measured by ALP kit 、Alizarin red S staining and RT-PCR.

Results

The results of enzyme-linked immunosorbent assay showed that the expressions of anti-inflammatory factors such as IL-4 and IL-10 increased, and the expressions of pro-inflammatory factors such as TNF-α and IL-6 decreased in H-TNT group. After indirect co-culture. Fluorescence staining of MC3T3-E1 cells showed that the morphology of the cells in H-TNT group were more spread and elongated. CCK-8 detection revealed that the H-TNT group promoted the adhesion and proliferation of MC3T3-E1 cells. ALP activity, alizarin red S staining, and RT-PCR demonstrated that the H-TNT group promoted osteogenic differentiation of MC3T3-E1 cells.



The morphology of MC3T3-E1 cells with MCM

Conclusion

The hydrogenated TiO2 nanotubes promoted M2 polarization of macrophages, thereby promoting the proliferation and osteogenic differentiation of MC3T3-E1 cells.

References

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