LbL coatings of tannic acid and arginine for improved biological sealing of dental implant abutments

How do gingival fibroblasts respond to tannic acid-arginine nanocoated titanium?

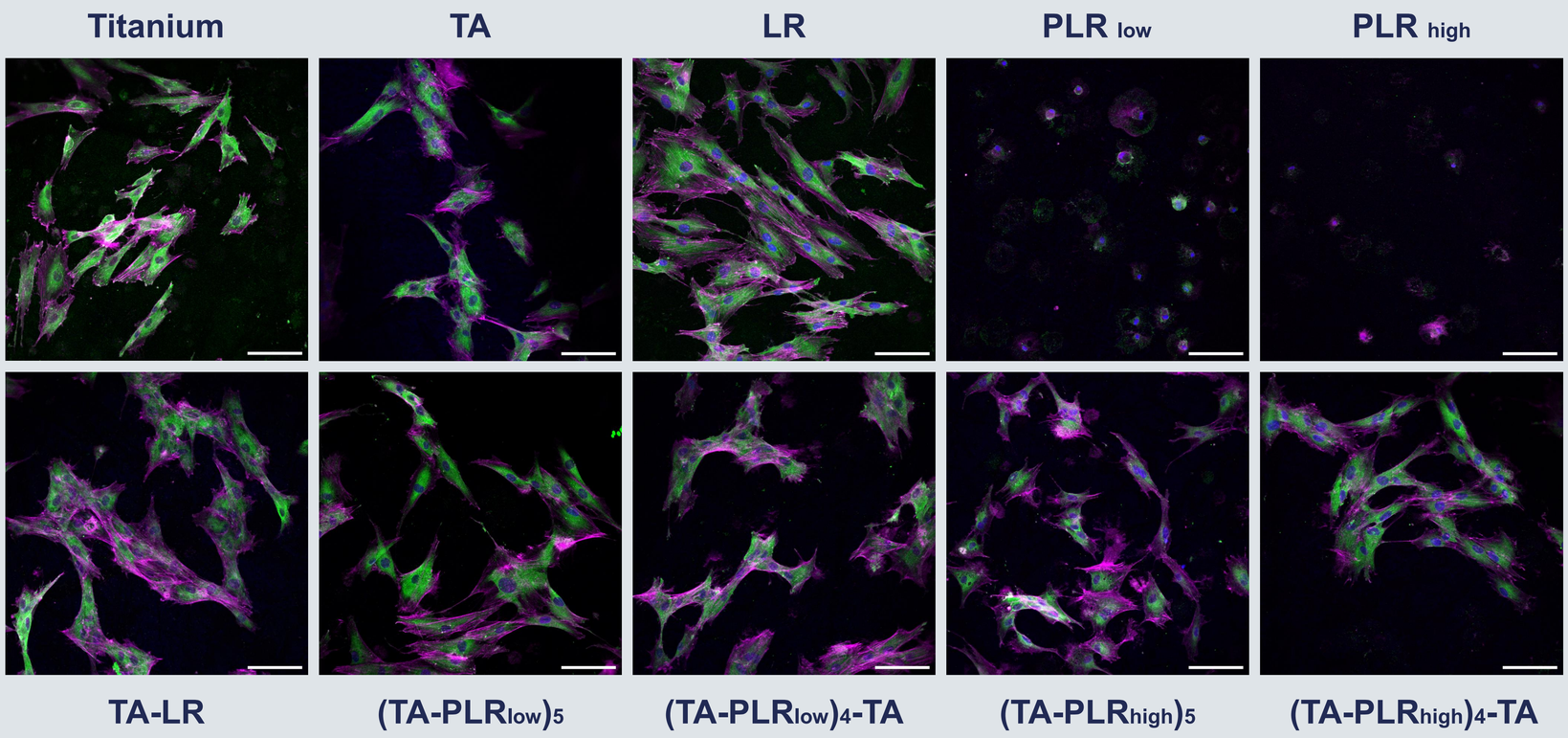
INTRODUCTION

Soft tissue integration of titanium dental implants is technically and clinically challenging. Modified bioactive implant surfaces can interact with contacting cells and suppress local inflammation to facilitate a tight mucosal seal.

METHODS

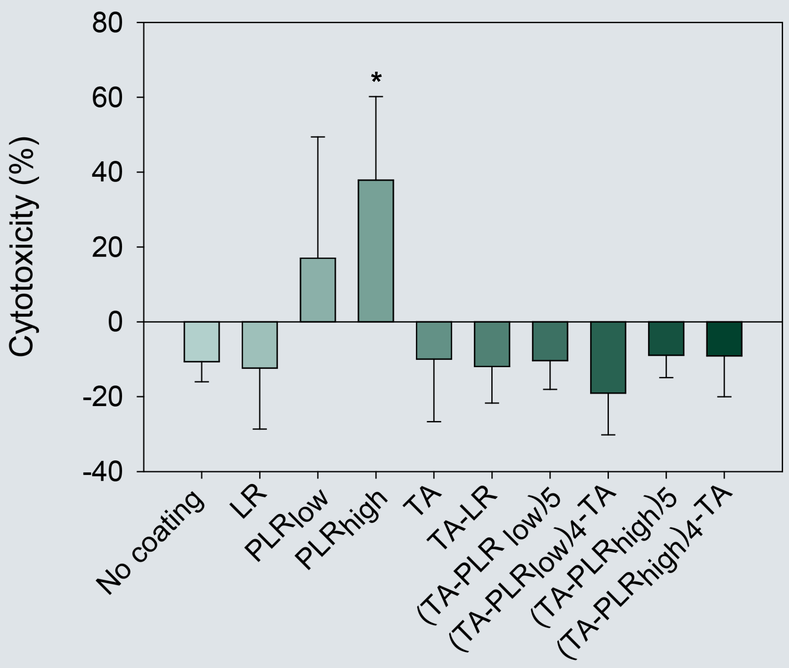
We coated titanium surfaces with mono- or layer-by-layer (LbL) deposited multilayers of tannic acid (TA), L-arginine (LR) or poly-L-arginine (PLR) and cultured human gingival fibroblasts (HGF) on these surfaces under both normal physiological conditions and induced inflammatory conditions.

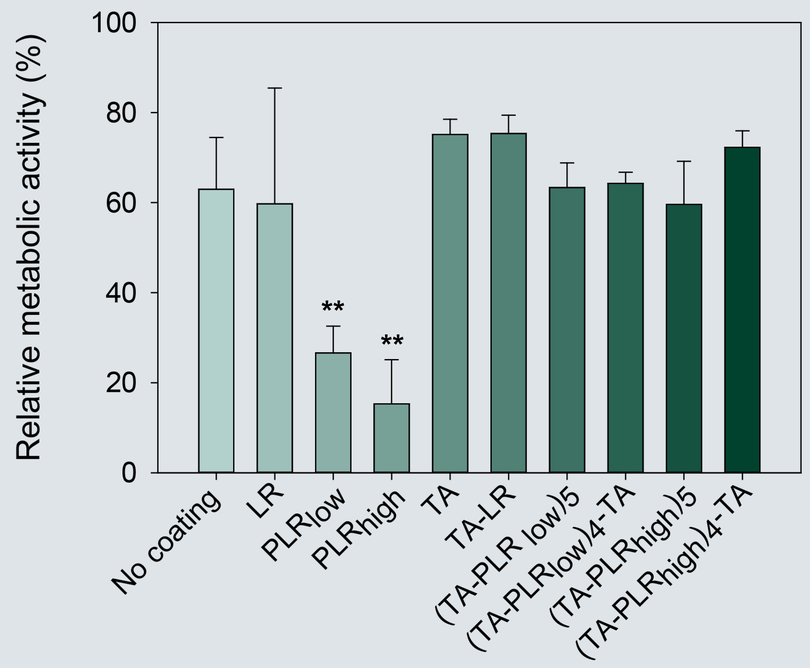
RESULTS



CELL MORPHOLOGY

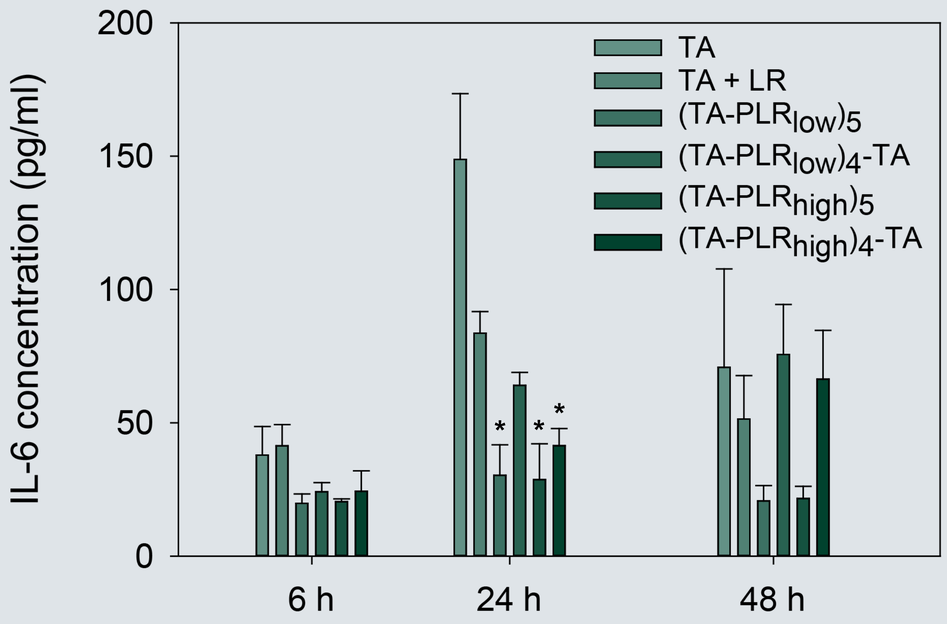
HGFs adhered to all coated surfaces and exhibited elongated fibroblast morphology except when cultured on PLR monolayers. Cells aggregated more when cultured on TA-containing coatings compared to uncoated titanium or surfaces coated with LR monolayer.





CELL VIABILITY

None of the coatings caused either cytotoxicity or significant decrease in metabolic activity of HGFs after 24 h of culture, apart from PLR monolayers deposited on titanium without TA.



INFLAMMATION

HGFs exposed to lipopolysaccharide (LPS) secreted less IL-6 when cultured for 24 hours on TA+LR, $(TA\text{-}PLR)_4TA$ and $(TA\text{-}PLR)_5$ coated surfaces compared to TA coatings.

CONCLUSION

Multilayered LbL-coatings of TA, LR and PLR on titanium surfaces have the potential to reduce inflammatory cytokine IL-6 release from HGFs without being cytotoxic or affecting cell viability.

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