OP23 A POTENTIAL ROLE FOR SEMAPHORIN 3A IN THE REGULATION OF ORTHODONTIC TOOTH MOVEMENT

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AIM: Besides various cytokines and growth factors, neuronal guidance molecules (NGM) gained attention for their roles in bone homeostasis and thus potential roles during orthodontic tooth movement (OTM). Among the NGMs recently implicated in the regulation of bone remodelling Semaphorin 3A (SEMA3A) is the most interesting as it concurrently induces osteogenic differentiation in osteoblasts and disturbs osteoclast differentiation. To analyse potential functions of NGM in OTM and to elucidate the underlying mechanisms, the objectives of this study were (i) to investigate if different mechanical forces modulate the expression of SEMA3A and its receptor Neuropilin1 (NRP1) in periodontal fibroblasts and osteoblasts of the alveolar bone, (ii) to investigate the effects of SEMA3A stimulation on alveolar bone osteoblasts differentiation.

MATERIALS AND METHOD: Periodontal fibroblasts and alveolar bone osteoblasts were stimulated mechanically by applying compressive and tensile forces. The expression of SEMA3A and its receptor were analyzed by means of quantitative polymerase chain reaction (qPCR) and Western blot analysis. Moreover, alveolar osteoblasts were stimulated by recombinant human SEMA3A and its impact on osteogenic differentiation was analyzed by monitoring the expression of different osteoblast differentiation markers by qPCR.

RESULTS: While mechanical strain in osteoblasts of the alveolar crest did not significantly alter the expressions of SEMA3A and NRP1, compressive forces significantly reduced SEMA3A and NRP1 expressions. The combination of compression forces and proinflammatory stimuli resulted in a significant reduction of the mRNA expression of SEMA3A and NRP1.

CONCLUSIONS: These data on SEMA3A suggest that the role of NGMs in the regulation of OTM might have been underestimated. Thus, this study might have identified additional cellular and molecular events which might be useful as targets for pharmacological manipulations aiming for a side effect free and accelerated orthodontic tooth movement.