第76回
日本矯正歯科学会学術大会

The 76th Annual Meeting of the Japanese Ortho[illegible]ociety

知の蓄積と技との連関

プログラム・抄録集

2017.10.18(水)～20(金)

会場 さっぽろ芸文館(ニトリ文化ホール・ホテルさっぽろ芸文館)
ロイトン札幌、札幌市教育文化会館

AE-005 Effect of masticatory hypofunction on orthodontic tooth movement in adult rats

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【Objective】To investigate the effect of botulinum toxin (BTX)-induced masticatory hypofunction on velocity of orthodontic tooth movement (OTM), and bone density of condyle, alveolar bone of rats.【Materials and Methods】30 samples of 56-day-old male Sprague-Dawley rats were divided into control and experimental groups. After 7 days of acclimatization, the experimental group was bilaterally injected with 5U BTX in the masseter muscles, and the control group was injected with the same amount of 0.9% normal saline. After 14 days, the maxillary left first molars (ULs) were pulled forward from the maxillary incisors by using an orthodontic appliance with a 25g force. The total experimental duration was 28 days. Alveolar bone density was further evaluated through microscopic computed tomography. Comparison between the two groups were analyzed by independent Sudent's t-test and Pearson correlation test was applied in order to detect correlation.【Results and Discussion】The experimental group had a significantly larger amount and higher velocity of tooth movement in the first 7 days. The experimental group also exhibited significantly lower bone mineral density, bone volume fraction, trabecular thickness, and higher trabecular separation in the alveolar bone under the UL.【Conclusion】The masticatory hypofunction induced by the BTX led to a smaller weight increase in adult rats, was associated with faster OTM in the first 7 days, and reduced the bone density and quality in the underlying alveolar bone.

AE-006 Evidence for the bone structure change and osteocytes' biorhythm during orthodontic tooth movement

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【Objective】To detect the functional periodicity of osteocytes and the morphological change of bone structure during orthodontic tooth movement.【Materials and Methods】Expression of sclerostin were investigated by immunofluorescence staining in mouse tooth movement model (20 mice). A region of interesting from the boundary of periodontal ligament were measured in both compression and tension side. Averaged curve of spatial distribution of fluorescence intensity (CSD) along the orthodontic force direction were produced from each side at each time point. Converted all CSD to power spectrum density graph by fast Fourier transform. Subtracted all peak power frequency of 4',6-diamidino-2-phenylindole (DAPI) from original sclerostin CSD to reduce bone structure influence. Then the morphological change of bone structure (DAPI CSD), spatial distribution of sclerostin in bone matrix (original sclerostin CSD) and biorhythm of sclerostin expression (filtered sclerostin CSD) were statistically tested (Multiple *t* test).【Results and Discussion】During orthodontic tooth movement: frequency of DAPI signal was increased on compression side, while decreased on tension side; original and filtered sclerostin CSD was changed in a certain pattern; and this pattern could be independent of sclerostin expression level. The percentage of sclerostin positive cells had association with frequency of original sclerostin CSD; the 95th and 5th percentile of fluorescence intensity of sclerostin had positive association with frequency of DAPI and negative association with filtered sclerostin CSD respectively. 【Conclusion】Our results indicated that orthodontic force can induce the morphological change of bone structure (extend and compress), and maybe osteocytes' biorhythm induced the periodic change of sclerostin expression level.