Gene array analysis of mandibular condyle under mechanical strain

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Previous studies have shown that a correlation existed between Mechanical strain produced by mandibular advancement and condylar growth. However, the factors regulating such a process were not yet identified. Objective: to detect the gene expression change of mandibular condyle under mechanical strain. Methods: Two hundred and eighty 35 days female Sprague-Dawley rats were randomly divided into 7 experimental and 7 control groups. The experimental groups were fitted with bite-jumping appliances. Each group of rats was sacrificed on the following experimental days: 1, 3, 7, 9, 14, 30 & 33. Immediately after sacrifice, condyles were dissected and total RNA was extracted to oligonucleotide microarray gene chips containing 15,923 genes. Initial analysis was carried out to determine whether a particular mRNA transcript was detectable, one-sided Wilcoxon's signed rank tests were performed to determine p-values for each gene expression at different time points. All genes with the detection call of absent across all time points in both groups were excluded. There were 10,485 genes left passing the above criteria. A one-step Tukey's Biweight analysis was employed for computation of signal log ratio algorithms on the 10,485 genes to determine the magnitude and direction of change. The genes that exhibited less than 2-fold change related to control group were excluded from the study. A total of 1,082 genes were induced finally. Results: This analysis resulted in the identification of increasing expression of 666 genes and decreaseing expression of 416 genes. This group of genes was further analyzed using hierarchical clustering and self-organizing maps and resulted in the identification of numerous genes previously unknown to be regulated during the growth of TMJ. Conclusions: By using microarray technology analyze the gene expression of mandibular condyle under mechanical strain, numerous genes were recognized. Many of these genes may well represent novel chondrogenic and osteogenic mediators.

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