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## Force magnitude effects upon osteoprogenitor cells during premaxillary expansion in rats

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### ABSTRACT

To study the effects of force magnitude on osteoprogenitor cell activity during premaxillary expansion, stainless steel helical springs were attached to the maxillary central incisors of 45 3-month-old male rats. The animals were randomly divided into force levels (0,50, 100, 150,200 gm) and were injected intraperitoneally with tritiated thymidine (1.0 uc/g wt.) 1 hour prior to sacrifice which occurred at 27, 40, and 60 hours. In order to examine cell activity within different regions of the suture, each premaxilla was divided into three geographic areas. Quantitative results were obtained by comparing the percent of labeled cells observed at different force levels, geographic areas, and observation times. The greatest number of labeled cells at each force level was found at 27 hours. Increased forces were correlated with increased numbers of labeled cells up to 100 gm, with decreased cell numbers at higher forces. The numbers of labeled cells at 200 gm were not significantly different from the controls. Histological observations of early bone formation at 60 hours supported the quantitative labeling results at 27 hours. The results also demonstrate a significant correlation between the geographic location of the labeled cells and force magnitude, with maximal cell stimulation occurring more superiorly in the suture as forces increased. The results suggest that early bone formation within the expanded suture can be maximized by varying force magnitude and distance from the point of force application.

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