

## POSTER 21

### **DEVELOPMENT AND FUNCTION OF THE MANDIBULAR SYMPHYSIS IN MAMMALS**

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The mandibular symphysis is the midsagittal articulation between left and right dentaries that is the third jaw joint of the mammalian feeding complex. There is remarkable evolutionary diversity in symphyseal anatomy that characterizes postnatal growth. It varies from the primitive mammalian condition of smooth joint surfaces loosely connected by a fibrocartilage pad and ligaments to a more tightly bound joint with greater sutural complexity and numerous variably calcified ligaments to an ossified joint. Unfortunately, load-induced responses of jaw-joint connective tissues are incompletely documented in growing mammals. To address this gap we investigated the proportions and composition of symphyseal tissues in growing rabbits subjected to diet-induced variation in masticatory stresses. White rabbits were obtained as weanlings and raised on different diets until adulthood. Symphysis dimensions were obtained via calipers. Using microCT, tissue biomineralization was measured in the coronal plane for five joint regions. Subsequently, symphyses were fixed, decalcified and embedded, with sections from similar locations as those for microCT. Histology and immunohistochemistry of the fibrocartilage pad were employed to identify extracellular matrix composition. Rabbits raised on a tougher diet exhibit larger and more biomineralized joints. Such over-use rabbits also exhibit less intense safranin-O and type-II collagen staining indicative of lower cartilage viscoelasticity. Tough-diet rabbits also show more intense matrix-metalloproteinase staining associated with degradation of type-II collagen. Therefore, postweaning variation in symphyseal connective tissues appears due to changes in joint loads. Such analyses facilitate long-term research on adaptive plasticity in multiple tissue types and joint integrity in the same organismal model.