PLASTICITY OF THE TEMPOROMANDIBULAR JOIN IN RABBITS

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The temporomandibular joint (TMJ) is one of the most complex joints in the mammalian body. Major changes in diet during weaning and corresponding responses of connective tissues of the feeding apparatus are incompletely documented in growing mammals. This limits our ability to fully understand the evolutionary and clinical significance of variation in skull form. To address this gap we investigated the proportions, composition and organization of TMJ hard and soft tissues in growing rabbits subjected to diet-induced variation in masticatory stresses. New Zealand rabbits (*Oryctolagus cuniculus*), which have a feeding complex resembling that of higher primates, were obtained as weanlings and raised on different diets until adulthood. TMJ dimensions were obtained via calipers. Using microCT, tissue biomineralization was measured in the coronal plane for three regions of each TMJ condyle. Subsequently, TMJs were fixed, decalcified and embedded, with sections from similar locations as those for microCT. Histological and immunohistochemical analyses of TMJ articular cartilage were employed to identify extracellular matrix composition and organization. Rabbits raised on a tougher/harder diet exhibit less intense safranin-O and type-II collagen staining indicative of lower cartilage viscoelasticity. Tough-diet rabbits also show more intense MM13, MMP14, and MMP1 staining signifying the degradation of type-II collagen. H&E staining reveals that the hypertrophic region of the articular cartilage is slightly larger in tough-diet rabbits. Thus, postweaning variation in TMJ bony and connective tissues appears due to changes in masticatory loads. Such analyses facilitate long-term research on adaptive plasticity and aging in multiple tissue types from the same organism.