

**Table 1. Development of the Incudomalleolar, Incudostapedial, Stapediovestibular and Mandibular Joints**

Joints	Findings	Initiation	Completion	Maturation
<b>Ossicular chain</b> Incudomalleolar & incudostapedial joints	v.p.11.d		v.p.20.d ~ b.2.d	b.5.d ~ b.6.d
<b>Stapediovestibular joint</b>	v.p.11.d		b.6.d	b.21.d
<b>Mandibular joint</b> Condylar cartilage Superior articular space Inferior articular space	v.p.13.d v.p.15.d v.p.17.d		b.10.d ~ b.12.d	Immature >>> b.28.d
<b>Specific events occurring:</b> *Pneumanization of the middle ear b.6.d *Eruption of incisors b.10.d?b.12.d *Eruption of molars b.19.d?b.23.d				

diarthrodial components remain united.<sup>7</sup> Another study observed that small joints of “blastemal origin” that do not include intra-articular tissues develop later than large joints and lack embryonic movements.<sup>34</sup> The present study revealed that the presumptive auditory ossicles comprise a continuous hyaline cartilaginous chain in mice from v.p.11.d to v.p.14.d. The subsequent appearance of interzones in the cartilaginous ossicular chain and fibrous tissue connecting the stapedial base and oval window is indicative of morphogenesis of the IMJ, ISJ and SVJ of v.p.18.d to v.p.20.d foetal mice. The simple diarthrodial IMJ and ISJ are then morphologically completed and commence endochondral ossification between v.p.20.d and b.2.d. Accompanying pneumanization of the middle ear, the articular cartilages of the IMJ and ISJ enter the non-hypertrophic stage, attaining morphological maturation between b.5.d and b.6.d. Transmission electron microscopy in the present study revealed that synovial fibrous tissue of mature IMJ and ISJ predominantly contain elastic fibers, as mature elastin fibers. Conversely, the fibrous SVJ, the embryonic mesenchymal tissue connecting the stapes and labyrinth, displays proliferation of chondroid tissues at the rims of

the stapedial footplate and the oval window between b.0.d and b.2.d stage. In b.6.d we identified that the SVJ is a morphologically completed joint, comprising hypertrophic articular cartilage with cellular zonation and the AL with palisading fibroblasts and spiral electron-dense ECM fibers. Some study observed that the articular cartilage of the SVJ was differentiated from the mesenchymal cells in the AL.<sup>14-16,35,36</sup> The present study revealed that the completed SVJ displays articular cartilages invested with the AL containing ECM fibers inserting into cartilages. SVJ articular cartilages become thin and non-hypertrophic, reaching maturity during the b.21.d late foetal stage. The syndesmotoc SVJ matures later than the IMJ and ISJ, which are morphologically defined as simple joints.

Synovia of diarthroses are typically classified as areolar, fibrous or adipose, according to the specific constituents in subsynovial connective tissues. It has been suggested that the synovial intima, lamina propria synovialis, is rich in cellular components but lacking in ECM fibers, containing very few oxytalan fibrils and little collagen.<sup>20,37,38</sup> The external fibrous layer of the joint capsule always contains numerous parallel and interlacing bundles of collagen fibers,