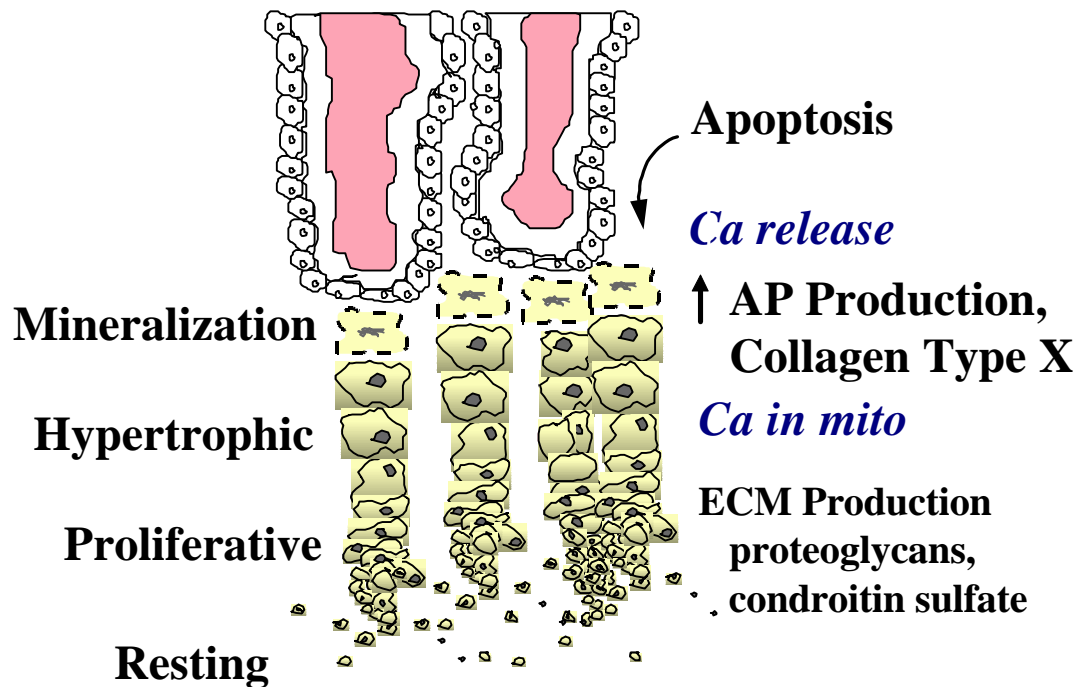


Ossification at the Cellular Level



Adapted from Orth and Cook, 1994.

Figure 1.5. Endochondral ossification at the cellular level of the articular-epiphyseal or the metaphyseal growth cartilage complexes. As chondrocytes mature, proliferate and hypertrophy, they produce the extracellular matrix (ECM), composed of proteoglycans, collagen and chondroitin sulfate. Chondrocytes store calcium in their mitochondria in the beginning of the hypertrophic zone and release the calcium in the bottom half of the zone. Calcification of the ECM occurs in the hypertrophic region, in chondrocytes near to areas of vascular penetration. Alkaline phosphatase (AP) releases phosphorus into the ECM. Proteoglycans and collagen are removed, and chondrocytes undergo apoptosis as vessels penetrate the cartilage. Osteoblasts then deposit bone in the calcified cartilage.