Cartilage Encyclopedia Article

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Cartilage

Cartilage is a fibrous and rubbery connective tissue found throughout the vertebrate skeletal system. As with other connective tissues, the general function of cartilage is to support and connect different parts of the body. Connective tissues originate from cells in the embryonic mesoderm, the middle layer of embryonic tissue.

Cartilage is made up of specialized cartilage cells called chondrocytes, which are suspended in an acellular matrix made up largely of a protein called collagen. All connective tissues have a **matrix**, and in the case of cartilage, the matrix is solid. A protective membrane named the perichondrium covers the surface of the cartilage and gives the subtance a shiny, cloudy-white appearance.

Early in development, cartilage makes up most of the vertebrate skeleton. As an individual grows older, calcium deposits form around the skeleton, and bone eventually replaces most of the cartilage. This process is called ossification. Ossification begins in humans when the fetus is still in the womb and is not complete until early adulthood. The skeleton of a young child tends to be less brittle than that of an adult because a certain amount of cartilage is still present.

This cartilage-to-bone conversion occurs in all vertebrates except for sharks, rays, and skates. These related "cartilaginous fishes" maintain a completely cartilaginous skeleton through adulthood. Cartilage is also found in branchiostomates such as tunicates, sea squirts, and **lancelets**, the closest relatives of the vertebrates. These animals have a cartilaginous rod called a notochord, which runs along the length of their back.

Cartilage is softer, more compressible, and more elastic than bone. In vertebrates whose skeletons do undergo ossification, cartilage is maintained in certain areas of the body that require this flexibility. Adults have cartilage in joints, in the nose, ears, breastbone, trachea, and larynx, and at the ends of bones.

Cartilage also helps to reduce friction between the bony elements of a joint. A lubricating liquid called synovial fluid helps the cartilage-covered bones of the shoulder slide over each other more easily. Cartilage found in joints with a large range of motion is called smooth cartilage. In joints that experience more limited motion, cartilage plays a different role. In this kind of joint, the cartilage that holds the bones together is called elastic cartilage. Immovable joints are held together by fibrous cartilage.

A photomicrograph of elastic cartilage. Cartilage is a fibrous and rubbery connective tissue that is found throughout the vertebrate skeletal system.

See Also

Bone; Skeletons.