

CONNECTIVE TISSUE:

Connective tissue (CT) is one of the four types of biological tissue that supports, connects or separates different types of tissues and organs in the body. It develops from the mesoderm. The other three types are epithelial, muscle, and nervous tissue. Connective tissue is found in between other tissues everywhere in the body, including the nervous system. In the central nervous system, the three outer membranes (the meninges) that envelop the brain and spinal cord are composed of connective tissue.

This is the most widespread and abundant type of tissue in the human body. Its function is primarily to support, anchor and connect various parts of the body. Although connective tissue exists in a number of forms, all types have three basic structural elements -- cells, fibres and intercellular substance (ground substance).

The most common cell types are fibroblasts, which produce fibres and other intercellular materials. The two most common types of fibres are: collagen (collagenous) and elastic. Collagen fibres are for strength while the elastic ones are for elasticity of the tissue. Both the cells and the fibres are embedded in the intercellular substance. The consistency of this substance is highly variable from gelatin-like to a much more rigid material.

The proportions of the cells, fibres, and intercellular substance vary, depending on a particular nature and function of the connective tissue. For example, a strong connective tissue needs a greater proportion of the collagen fibres and fewer cells. An example would be a dense regular connective tissue, which is found in tendons and ligaments. On the other hand, a connective tissue composed of mostly cells would not be very strong. An example would be an adipose (fat) connective tissue.

Classification of Connective Tissue

I. Connective Tissue Proper -- encompasses all organs and body cavities connecting one part with another and, equally important, separating one group of cells from another. This is a very large and

diverse group of tissues and includes adipose tissue (fat), areolar (loose) tissue, and dense regular tissue, among others.

II. Specialized Connective Tissues -- this group includes cartilage, bone, and blood. Cartilage and bone form the skeletal framework of the body while blood is the vascular (transport) tissue of human.

Areolar (Loose) Connective Tissue

Areolar connective tissue is the most widespread connective tissue of the body. It is used to attach the skin to the underlying tissue. It also fills the spaces between various organs and thus holds them in place as well as cushions and protects them. It also surrounds and supports the blood vessels.

The fibres of areolar connective tissue are arranged in no particular pattern but run in all directions and form a loose network in the intercellular material. Collagen (collagenous) fibres are predominant. They usually appear as broad pink bands. Some elastic fibres, which appear as thin, dark fibres are also present.

The cellular elements, such as fibroblasts, are difficult to distinguish in the areolar connective tissue. But, one type of cells - the mast cells are usually visible. They have coarse, dark-staining granules in their cytoplasm. Since the cell membrane is very delicate it frequently ruptures in slide preparation, resulting in a number of granules free in the tissue surrounding the mast cells. The nucleus in these cells is small, oval and light-staining, and may be obscured by the dark granules.

Adipose Connective Tissue

The cells of adipose (fat) tissue are characterized by a large internal fat droplet, which distends the cell so that the cytoplasm is reduced to a thin layer and the nucleus is displaced to the edge of the cell. These cells may appear singly but are more often present in

groups. When they accumulate in large numbers, they become the predominant cell type and form adipose (fat) tissue.

Adipose tissue, in addition to serving as a storage site for fats (lipids), also pads and protects certain organs and regions of the body. As well, it forms an insulating layer under the skin which helps regulate body temperature.

Dense (Fibrous) Regular Connective Tissue

Dense connective tissue is characterized by an abundance of fibres with fewer cells, as compared to the loose connective tissue. It is also called fibrous or collagenous connective tissue because of the abundance of collagen (collagenous) fibres. Little intercellular substance is present. Furthermore, in this tissue type, the fibres are organized in a regular, parallel pattern. Hence, the name – dense regular (fibrous or collagenous) connective tissue.

In addition to the tendons, this type of tissue is also found in ligaments. Hence, the function of this tissue is to anchor skeletal muscle to bone, to attach bone to bone as well as to stabilize the bones within a joint. On your slide, note that the collagen fibres are parallel to one another. Fibroblasts are the only cells visible, and are arranged in rows between the fibres. These fibroblasts function to lay down or create the fibres of the tissue.

Cartilage

Cartilage is a somewhat elastic, pliable, compact type of connective tissue. It is characterized by three traits: lacunae, chondrocytes, and a rigid matrix. The matrix is a firm gel material that contains fibres and other substances. There are three basic types of cartilage in the human body: hyaline cartilage, elastic cartilage and fibrocartilage. In this laboratory, you will examine the most common type of cartilage, the hyaline cartilage. Most of the skeleton of the mammalian

fetus is composed of hyaline cartilage. As the fetus ages, the cartilage is gradually replaced by more supportive bone. In the mammalian adult, hyaline cartilage is mainly restricted to the nose, trachea, bronchi, ends of the ribs, and the articulating surfaces of most joints. The function of the hyaline cartilage is to provide slightly flexible support and reduce friction within joints. It also provides structural reinforcement.

RESUMEN:

Loose Connective Tissue

In vertebrates, the most common type of connective tissue is loose connective tissue.

It holds organs in place and attaches epithelial tissue to other underlying tissues.

Loose connective tissue is named based on the "weave" and type of its constituent fibers. There are three main types:

- * Collagenous Fibers

Collagenous fibers are made of collagen and consist of bundles of fibrils that are coils of collagen molecules.

- * Elastic Fibers

Elastic fibers are made of the protein elastin and are stretchable.

- * Reticular Fibers

Reticular fibers join connective tissues to other tissues.

Dense Connective Tissue

Another type of connective tissue is dense or fibrous connective tissue, which is found in tendons and ligaments. These structures help attach muscles to bones and link bones together at joints. Dense connective

tissue is composed of large amounts of closely packed collagenous fibers.

Much of the dermis layer of the skin is composed of dense irregular connective tissue.

Specialized Connective Tissues

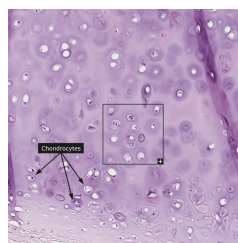
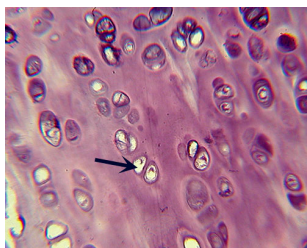
Adipose

Adipose tissue is a form of loose connective tissue that stores fat. Adipose lines organs and body cavities to protect organs and insulate the body against heat loss.

Adipose tissue also produces endocrine hormones.

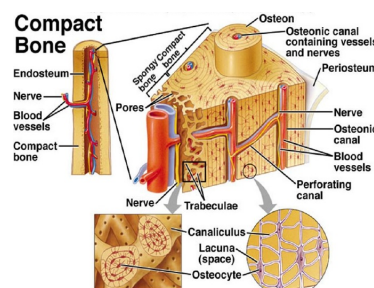
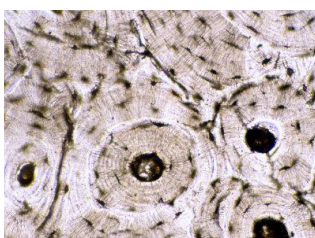
Cartilage

Cartilage is a form of fibrous connective tissue that is composed of closely packed collagenous fibers in a rubbery gelatinous substance called chondrin. The skeletons of sharks and human embryos are composed of cartilage. Cartilage also provides flexible support for certain structures in adult humans including the nose, trachea, and ears.



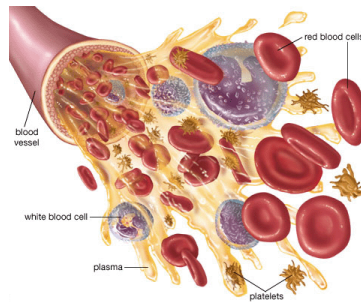
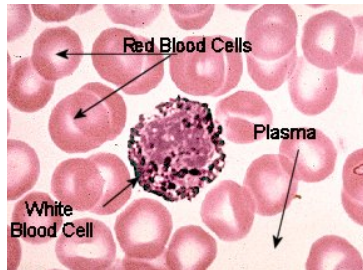
Bone

Bone is a type of mineralized connective tissue that contains collagen and calcium phosphate, a mineral crystal. Calcium phosphate gives bone its firmness.



Blood

Interestingly enough, blood is considered to be a type of connective tissue. Even though it has a different function in comparison to other connective tissues it does have an extracellular matrix. The matrix consists of the plasma, while red blood cells, white blood cells, and platelets are suspended in the plasma.



Lymph

Lymph is another type of fluid connective tissue. This clear fluid originates from blood plasma that exits blood vessels at capillary beds. A component of the lymphatic system, lymph contains immune system cells that protect the body against pathogens.

