

2-Connective tissue proper

There are two classes of connective tissue proper:

a-Loose (areolar) connective tissue

It is the most widely distributed and commonest connective tissue found in the body. This tissue characterized by abundant of ground substance and loose arrangement of fibers.

This tissue has viscous to gel-like ground substance. Scattered throughout the ground substance are collagen fibers which present in bundles running in different directions. The elastic fibers are branching forming network within ground substance, also found small proportion of reticular fibers (Figure 1).

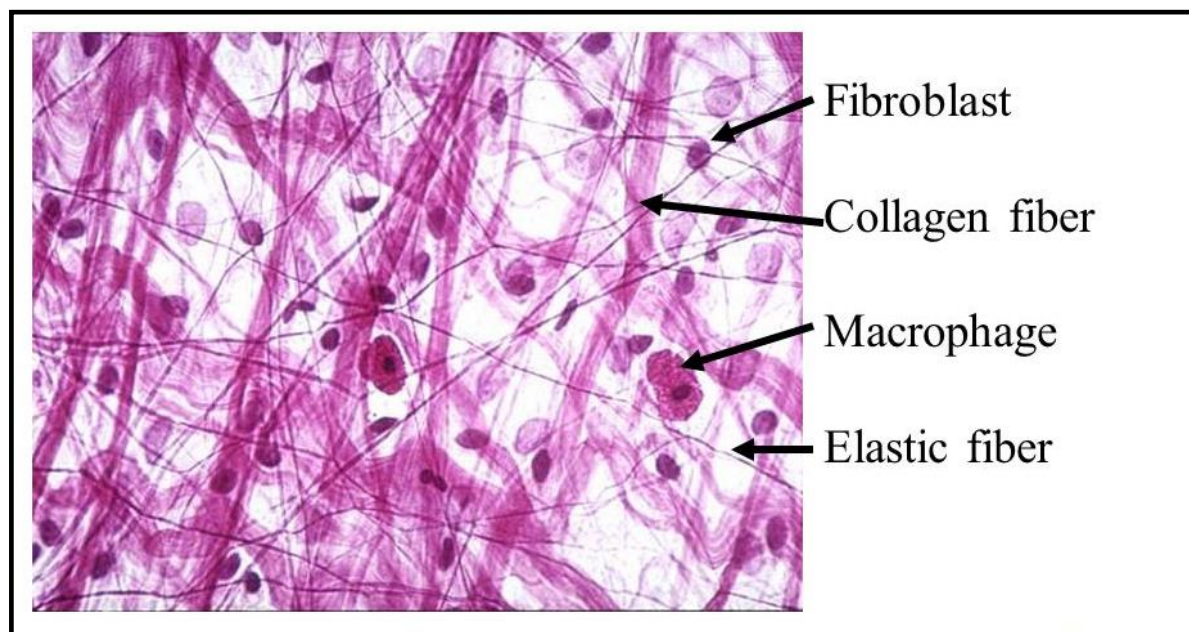


Figure (1): Loose connective tissue

Also found in this tissue different types of cells, where the most numerous cells are fibroblasts, macrophages and mast cells (Figure 2). The other types of connective tissue cells also present that migrate from blood

vessels into loose connective tissue in response to specific stimuli. These cells responsible for inflammation, and the immune response.

This tissue widely distributed through the body, it fills spaces between groups of muscle cells and it forms a layer that sheaths the lymphatic and blood vessels. Loose connective tissue also found in hypodermis of the skin. Also it found around the glands, and the mucous membranes of elementary canal. This tissue is flexible, very well vascularized where the matrix containing blood vessels and nerve fibers which supply the cells oxygen and nutrients, and not very resistant to stress. The function is loose packing, support, nourishment for the structures that associated with this tissue.

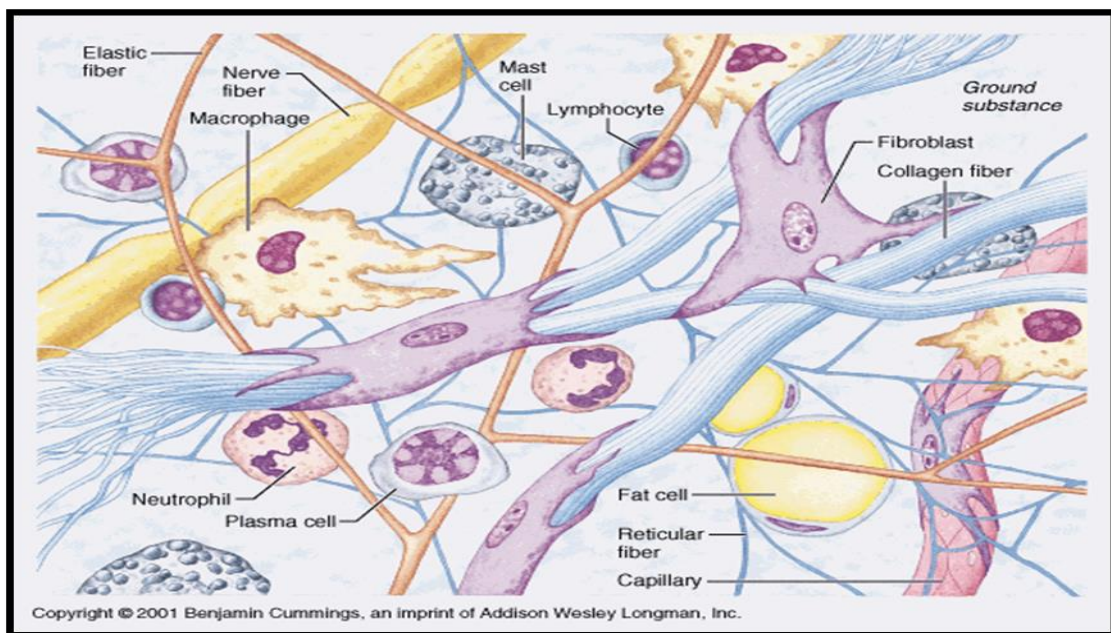


Figure (2): Different types of cells in loose connective tissue.

b-Dense connective tissue

It consists of the same components that found in loose connective tissue, but there are a greater abundant of fibers and fewer cells. These fibers are close packing, which are mainly collagen fibers and there is little ground

substance. Fibroblasts are usually the most numerous cells in both forms of connective tissue. They are responsible for the synthesis of collagen and extracellular matrix. They are present close to the collagen fibers and appear as flattened, fusiform or spindle shaped cells. This tissue is less flexible and more resistant to stress than loose connective tissue. There are two types of tissue according to organization of the fibers include: Dense irregular connective tissue and Dense regular connective tissue.

1-Dense irregular connective tissue

The collagen fibers in dense irregular connective tissue are arranged in bundles oriented in various directions without definite orientation. The collagen fibers form a three-dimensional network in this tissue and provide resistance to stress from different directions. Elastic fibers and reticular fibers are present also in this tissue in small numbers. Fibroblasts are the most abundant cells in this tissue and are located between collagen bundles (Figure 3). This type of tissue is found in the dermis of the skin, submucosa of the digestive tract, capsule of some organs as liver, spleen, kidney, and lymph nodes. The collagen fibers have good tensile strength which gives a great strength in all directions in dense irregular connective tissue.

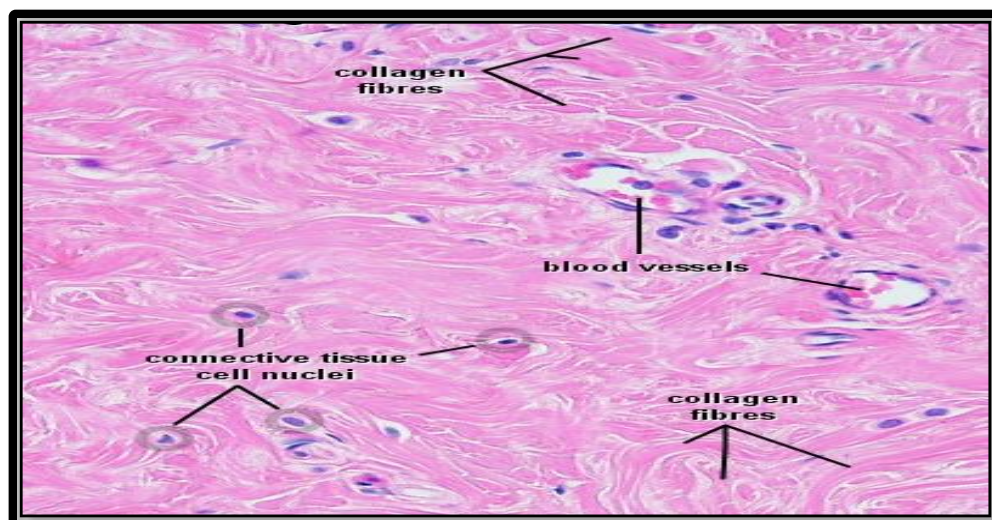


Figure (3): Dense irregular connective tissue

2-Dense regular connective tissue

This tissue contains fibers which are densely packed in the same direction and arranged in parallel array to forming structures of great tensile strength. This tissue found in structure subject to tension in one direction and offer great resistant to different forces. This tissue includes two types: dense regular collagenous connective tissue and dense regular elastic connective tissue.

a-Dense regular collagenous connective

This tissue consists of collagen fibers densely packed and running in parallel bundles in definite or one direction. Between these bundles small quantity of ground substance containing fibroblasts (also called tendon cells or tendinocytes) which are spindle or satellite in shape containing elongated nuclei aligned in rows parallel to the collagen fibers (Figure 4).

Tendons are the most common example of this tissue. Tendon are elongated cylindrical structures that attach striated muscle to bone. This structure has parallel, closely packed bundles of collage separated by a small quantity of ground substance. The collagen bundles of the tendon (also called primary bundles) aggregate into larger bundles which called (secondary bundles) that are enveloped by loose connective tissue which containing blood vessels and nerves. This tissue give great strength combined with flexibility and resistance to a stretching forces.

b-Dense regular elastic connective tissue

In this tissue elastic fibers are predominant where there are bound together by a small amount of loose connective tissue, between these fibers the fibroblasts are scattered in the matrix (Figure 5).

This tissue confers great elasticity and capable of stretching and recoiling in the directions of fiber orientation. This tissue includes ligaments between the vertebrae and along the dorsal aspect of neck and in the vocal cord.

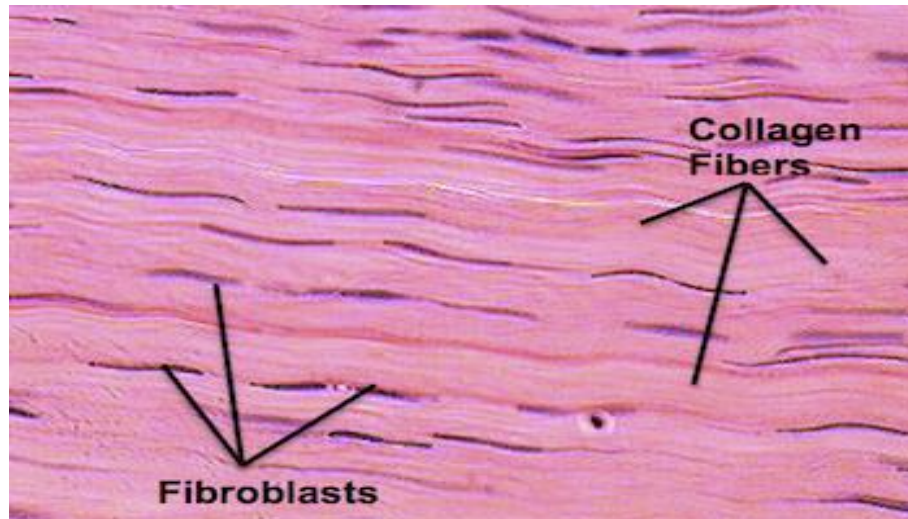


Figure (4): Dense regular collagenous connective tissue.

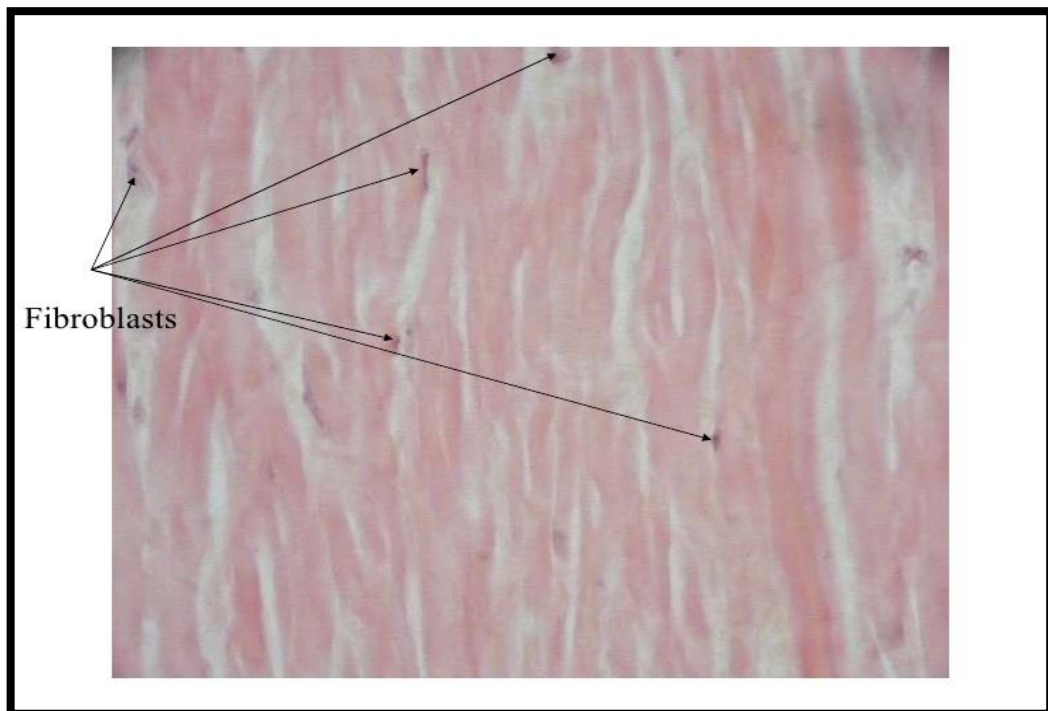


Figure (5): Dense regular elastic connective tissue

3- Specialized connective tissue

a-Reticular connective tissue

This tissue consists of matrix that containing branching reticular fibers forming fine network with a small quantity of ground substance. It is also containing reticular cells which have long cytoplasmic extensions which appear to join with those of other cells. Also found fibroblasts and macrophages in this matrix (Figure 6).

Reticular tissue forms the architectural framework of the liver, spleen, lymph nodes and bone marrow. The functions are in forming the supporting framework of the organs, protect and provides superstructure for the tissues as hematopoietic tissues.

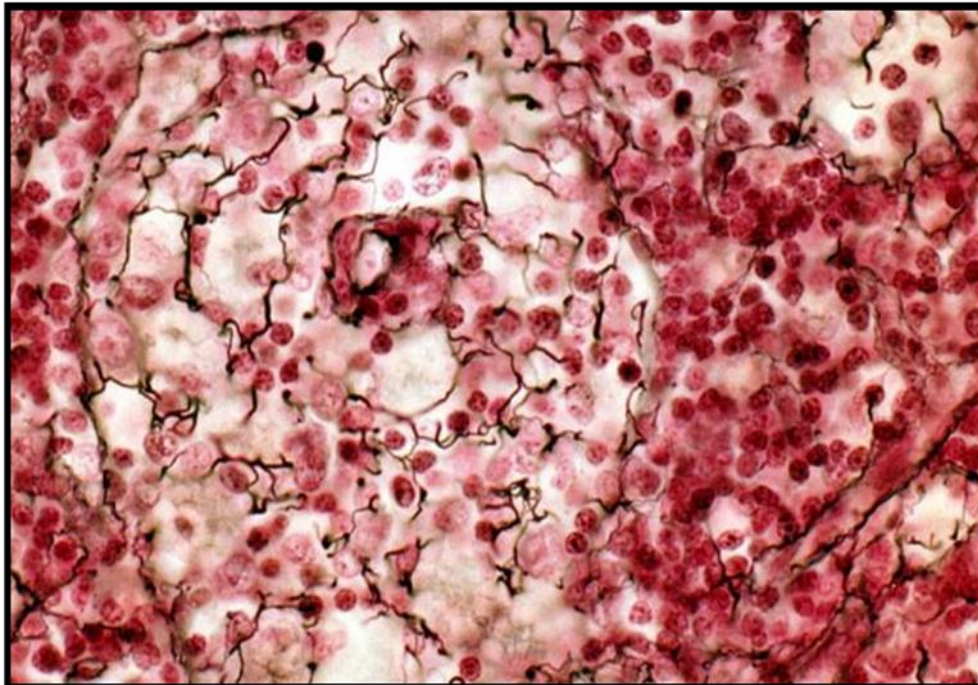


Figure (6): Reticular connective tissue.

b-Adipose connective tissue

It special type of connective tissue and is classified into two types:

1-Unilocular (white) adipose tissue

It is widely distributed in the body. This tissue composed of large cells (called adipocytes) which are basically spherical, but are appear polyhedral in adipose tissue. Each cell contain single large lipid droplet surrounded by thin rim of cytoplasm and eccentric flattened nucleus. There was little extracellular matrix between adipose cells that containing fibroblasts (Figure 7). Adipose tissue is subdivided into lobules by septa of connective tissue which containing rich network of blood capillaries. The richness of blood supply is indicative of high metabolic activity of adipose tissue.

This tissue is widely distributed in the body especially found in bone marrow, mesenteries, subcutaneous layer under the skin and around the kidney. The main functions of this tissue is storage and metabolic of lipid where act as a reserve energy source and as an insulator from heat loss where prevent excessive heat loose through the skin. Also it is structurally supports of organs.

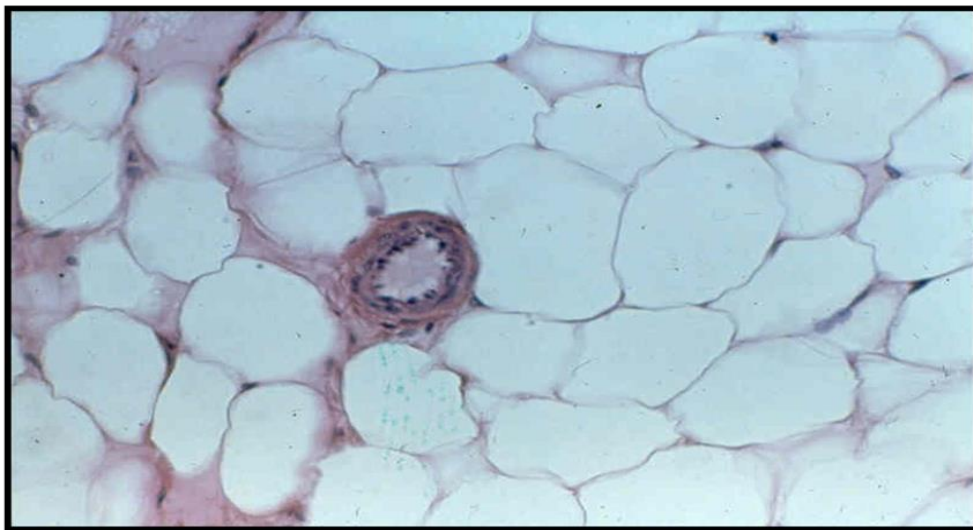


Figure (7): Unilocular white adipose tissue.

2-Multilocular (brown) adipose tissue

It is common in the first month of postnatal life. In adult is restricted in its distribution where found around the shoulder girdle. This tissue is composed of smaller cells in which there are many small lipid droplets (Figure 8) . This tissue has rich blood supply much more than in white adipose tissue. This type is much darker color than white adipose tissue. Its color results from the cytochrome pigments in the numerous mitochondria and its abundant blood supply.

This tissue correlate with function of heat production and its play important role in body temperature regulation in newborns to protects them against cold.

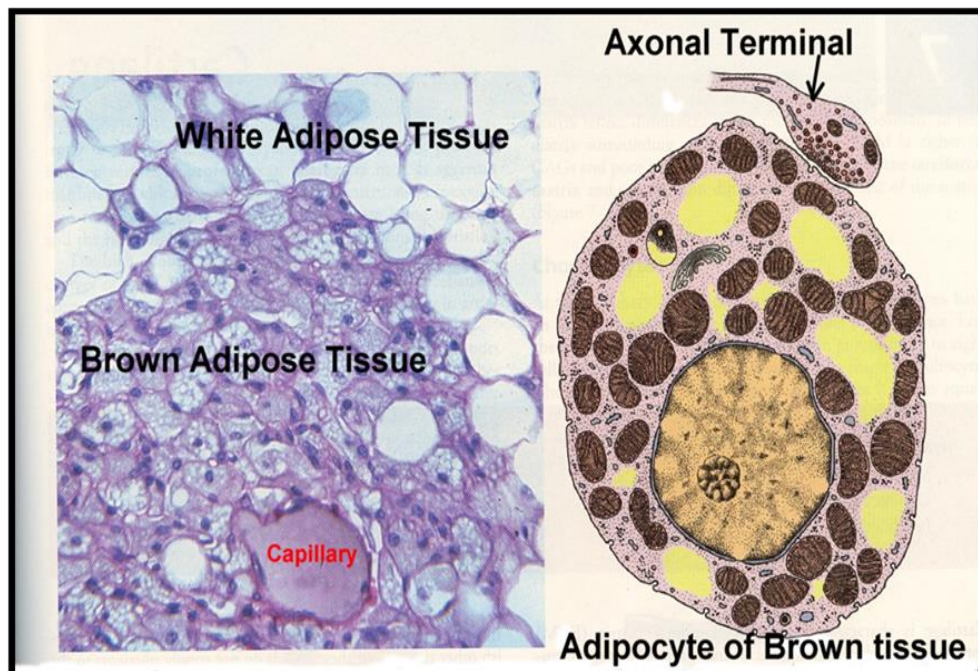


Figure (8): Multilocular (brown) adipose tissue