

Elastic properties of tissues

Elastic fibers are formed by a core of the protein elastin which is surrounded by a layer of fibrillin-rich microfibrils. They are responsible for elasticity of tissue, securing the skin to the underlying muscles, for example the lungs and the blood vessel wall.

There are three types of elastic fibers: oxytalan, elaunin and mature elastic fibers, each of which is a distinct phase of elastogenesis (formation of elastic fibers). The most superficial ones (oxytalan fibers) are very thin and are the precursors of the phenomenon of elastogenesis. The microfibrils of fibrillin are secreted by fibroblasts existing in the extracellular matrix and are arranged parallel to each other. The elaunin fibers are thicker than the previous, as they are a result of the junction between elastin and microfibrils.

Elastin builds up, forming thicker fibers, which are the mature elastic fibers. The amount of the three types of fibers varies in different tissues and appears to depend on the function of the aging process. Life expectancy and quality of life are influenced by changed in the mechanical properties of soft tissues. Unlike intracellular proteins, which are constantly replaced, extracellular matrix proteins are long lived, and are required to undergo loading cycles, which can eventually lead to the mechanical failure of dynamic tissues, such as the cardiopulmonary system, having a severe effect on human morbidity and mortality.

In the dermis, when the skin is pulled and then released, the elastic fibers are responsible for returning the skin to its original form. The breaking of the fibers in the skin leads to the appearance of striae.