Chondrogenic

Chondrogenic refers to the ability of a cell or tissue to differentiate into cartilage, which is a type of connective tissue that provides support and cushioning in the body. Chondrogenesis is the process by which cartilage is formed during embryonic development, and chondrogenic cells can continue to generate new cartilage throughout life.

Chondrogenic cells are commonly used in tissue engineering and regenerative medicine applications, as they have the potential to form new cartilage tissue to repair damaged or diseased joints. Chondrogenic cells can be derived from various sources, including mesenchymal stem cells (MSCs), chondrocytes (cartilage cells), and induced pluripotent stem cells (iPSCs).

There are several factors that can influence chondrogenic differentiation, including growth factors, mechanical stimuli, and the presence of extracellular matrix components such as collagen and hyaluronic acid. Researchers are actively exploring methods to optimize chondrogenic differentiation protocols to enhance the formation of functional cartilage tissue.

Chondrogenic differentiation is an active area of research, and ongoing studies are focused on developing new cell-based therapies for cartilage repair and exploring the potential of chondrogenic cells in tissue engineering and regenerative medicine applications.

Koo et al. used a rat tail nucleotomy model to develop mechanically stable collagen-cryogel and fibrillated collagen with shape-memory for use in minimally invasive surgery for effective treatment of IVDD. The collagen was loaded with hyaluronic acid (HA) into a rat tail nucleotomy model.

The shape-memory collagen structures exhibited outstanding chondrogenic activities, having completely similar physical properties to those of a typical shape-memory alginate construct in terms of water absorption, compressive properties, and shape-memorability behavior. The treatment of rat tail nucleotomy model with shape-memory collagen-cryogel/HA alleviated mechanical allodynia, maintained a higher concentration of water content, and preserved the disc structure by restoring the matrix proteins.

According to these results, the collagen-based structure could effectively repair and maintain the Intervertebral disc matrix better than the controls, including hyaluronic acid only and shape-memory alginate with hyaluronic acid [1)]

1)
Koo YW, Lim CS, Darai A, Lee J, Kim W, Han I, Kim GH. Shape-memory collagen scaffold combined with hyaluronic acid for repairing intervertebral disc. Biomater Res. 2023 Mar 29;27(1):26. doi: 10.1186/s40824-023-00368-9. PMID: 36991502.