ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-6, ISSUE-5

TOG‘AY VA SUYAK TO‘QIMASI O‘RTASIDAGI ANATOMIK BOG‘LIQLIK

Bozorova Shahzoda Raxmatulla qizi
bozorovashahzoda006@gmail.com
Toshkent davlat tibbiyot universituti Termiz filiali 2-bosqich talabasi.

Annotatsiya. Ushbu maqolada tog‘ay va suyak to‘qimalarining anatomik, gistologik hamda funksional jihatdan o‘zaro bog‘liqligi yoritilgan. Tog‘ay va suyak organizm tayanch-harakat tizimining asosiy tarkibiy qismlari bo‘lib, ular bir-biri bilan uzviy aloqada rivojlanadi va faoliyat yuritadi. Maqolada tog‘ay to‘qimasining turlari, hujayraviy tarkibi, oziqlanish xususiyatlari hamda suyak to‘qimasining tuzilishi va biologik vazifalari ilmiy jihatdan tahlil qilingan. Shuningdek, embrional rivojlanish jarayonida tog‘ay asosida suyak hosil bo‘lishi, ya’ni endoxondral osteogenezning mohiyati ochib berilgan. Bo‘g‘imlarda tog‘ay va suyakning o‘zaro anatomik moslashuvi, amortizatsion vazifasi hamda harakat jarayonidagi ahamiyati batafsil bayon etilgan. Bundan tashqari, tog‘ay va suyak to‘qimalarida yoshga bog‘liq degenerativ o‘zgarishlar, osteoartroz va osteoxondroz kabi kasalliklarning rivojlanish mexanizmlari haqida ma’lumot berilgan. Maqola davomida ushbu to‘qimalarning gistologik xususiyatlari, regeneratsion imkoniyatlari va klinik ahamiyati yoritilgan.

ANATOMICAL RELATIONSHIP BETWEEN CARTILAGE AND BONE TISSUE

Bozorova Shahzoda Raxmatulla qizi
bozorovashahzoda006@gmail.com
2 st-year student of the Termez branch of Tashkent State Medical University.

Abstract.This article highlights the anatomical, histological, and functional relationship between cartilage and bone tissues. Cartilage and bone are the main structural components of the musculoskeletal system and develop in close interrelation with each other. The article analyzes the types of cartilage tissue, its cellular composition, nutritional characteristics, as well as the structure and biological functions of bone tissue. Particular attention is paid to endochondral osteogenesis, the process of bone formation based on cartilage during embryonic development. The anatomical adaptation of cartilage and bone in joints, their shock-absorbing function, and their role in movement are discussed in detail. In addition, age-related degenerative changes in cartilage and bone tissues and the mechanisms of diseases such as osteoarthritis and osteochondrosis are described. The article also explains the histological features, regenerative capacity, and clinical significance of these tissues.

АНАТОМИЧЕСКАЯ ВЗАИМОСВЯЗЬ ХРЯЩЕВОЙ И КОСТНОЙ ТКАНИ

Бозорова Шахзода Рахматулла кизи
bozorovashahzoda006@gmail.com
Студент 2 курса Термезского филиала Ташкентского государственного медицинского университета.

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-6, ISSUE-5

Аннотация.В данной статье освещена анатомическая, гистологическая и функциональная взаимосвязь хрящевой и костной тканей. Хрящевая и костная ткани являются основными компонентами опорно-двигательной системы организма и развиваются в тесной взаимосвязи друг с другом. В статье проанализированы виды хрящевой ткани, её клеточный состав, особенности питания, а также строение и биологические функции костной ткани. Особое внимание уделено эндохондральному остеогенезу — процессу образования кости на основе хрящевой ткани в период эмбрионального развития. Подробно рассмотрены анатомическая адаптация хряща и кости в суставах, их амортизационная функция и значение в процессе движения. Кроме того, описаны возрастные дегенеративные изменения хрящевой и костной тканей, а также механизмы развития таких заболеваний, как остеоартроз и остеохондроз. В статье также раскрыты гистологические особенности, регенераторные возможности и клиническое значение данных тканей.

Introduction

The musculoskeletal system is one of the most important systems of the human body, providing support, protection, and movement. Cartilage and bone tissues are the main structural components of this system and are closely interconnected both anatomically and functionally. Cartilage tissue is characterized by elasticity and flexibility, while bone tissue provides strength and mechanical support to the body. Their interaction ensures normal movement and stability of the skeleton.

Cartilage tissue plays an essential role in reducing friction between bones, absorbing mechanical pressure, and maintaining the flexibility of certain organs. Bone tissue, on the other hand, serves as the primary supportive structure of the body and participates in mineral metabolism and hematopoiesis. During embryonic development, many bones initially form as cartilage models and later transform into bone tissue through the process of endochondral osteogenesis. This demonstrates the strong biological relationship between cartilage and bone tissues.

The study of the anatomical and histological relationship between cartilage and bone is important in medicine, histology, orthopedics, and traumatology because many degenerative and inflammatory diseases affect these tissues simultaneously.

Main Part

Cartilage tissue is a specialized type of connective tissue composed mainly of chondroblasts and chondrocytes. Chondroblasts are young active cells responsible for producing the extracellular matrix, while chondrocytes are mature cartilage cells located within lacunae. The extracellular matrix contains collagen fibers, elastic fibers, and proteoglycans, which provide elasticity and resistance to pressure.

One of the most important characteristics of cartilage tissue is the absence of blood vessels and nerves. Therefore, nutrients are delivered through diffusion from surrounding tissues. Due to this feature, cartilage regeneration occurs slowly compared to other tissues.

There are three main types of cartilage tissue: hyaline cartilage, elastic cartilage, and fibrocartilage. Hyaline cartilage is the most common type and is found in the ribs, trachea, bronchi, and articular surfaces of bones. Elastic cartilage is present in the auricle and some parts of the larynx, while fibrocartilage is located in intervertebral discs and areas exposed to strong mechanical stress.

Bone tissue is also a specialized connective tissue with a highly mineralized extracellular matrix. Its main cells are osteoblasts, osteocytes, and osteoclasts. Osteoblasts synthesize new bone matrix, osteocytes maintain bone metabolism, and osteoclasts are responsible for bone resorption. The

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-6, ISSUE-5

matrix of bone tissue contains collagen fibers and large amounts of calcium phosphate, which provide hardness and strength.

The anatomical relationship between cartilage and bone tissues is especially evident during embryonic development. Most bones initially develop as cartilage models. Later, cartilage tissue is gradually replaced by bone tissue in a process known as endochondral osteogenesis. During this process, cartilage cells degenerate, the matrix becomes calcified, and osteoblast activity increases, resulting in the formation of mature bone tissue.

The epiphyseal plate of long bones is composed of hyaline cartilage and plays a crucial role in longitudinal bone growth. During childhood and adolescence, the epiphyseal plate remains active, allowing bones to increase in length. With age, this cartilage is replaced by bone tissue, and skeletal growth stops.

The connection between cartilage and bone is also clearly observed in joints. Articular cartilage covers the ends of bones, reducing friction and facilitating smooth movement. In addition, cartilage acts as a shock absorber, distributing mechanical pressure evenly across the joint surfaces. Damage or degeneration of articular cartilage may lead to diseases such as osteoarthritis, characterized by pain, stiffness, and reduced mobility.

Histologically, both cartilage and bone tissues originate from mesenchymal cells. Cartilage is covered by the perichondrium, while bone is covered by the periosteum. These connective tissue layers are important for growth, nutrition, and regeneration. However, bone tissue regenerates more rapidly because it has a rich blood supply.

Age-related changes affect both cartilage and bone tissues. Cartilage gradually loses elasticity and becomes thinner, while bone tissue may lose mineral density and strength. Such changes increase the risk of osteoporosis, osteochondrosis, and osteoarthritis. Therefore, understanding the structure and function of these tissues is important for diagnosing and treating musculoskeletal diseases.

Conclusion.**Cartilage and bone tissues are closely interconnected structural components of the musculoskeletal system. Cartilage provides flexibility, shock absorption, and smooth joint movement, whereas bone tissue ensures support, protection, and mechanical stability. Their relationship is particularly important during embryonic development, bone growth, and joint function. Histological similarities and functional cooperation between these tissues demonstrate their significance as a unified biological system. A deeper understanding of the anatomical and histological relationship between cartilage and bone tissues is essential for modern medicine, especially in the fields of histology, orthopedics, and traumatology.**

References.

1. Axmedov A. *Odam anatomiyasi*. — Toshkent: Ibn Sino nashriyoti, 2020.
2. Hamidov X. *Gistologiya asoslari*. — Toshkent: Tafakkur, 2021.
3. Rasulov S. *Odam anatomiyasi va fiziologiyasi*. — Toshkent, 2019.
4. Yo‘ldoshev Q. *Tibbiy biologiya va gistologiya*. — Toshkent, 2022.
5. Karimov B. *Tayanch-harakat tizimi anatomiyasi*. — Toshkent, 2021.
6. Junqueira L.C., Carneiro J. *Basic Histology: Text and Atlas*. — New York: McGraw-Hill Education, 2022.
7. Ross M.H., Pawlina W. *Histology: A Text and Atlas*. — Philadelphia: Wolters Kluwer, 2021.
8. Moore K.L., Dalley A.F. *Clinically Oriented Anatomy*. — Philadelphia: Lippincott Williams & Wilkins, 2023.

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

VOLUME-6, ISSUE-5

9. Standring S. *Gray's Anatomy: The Anatomical Basis of Clinical Practice*. — London: Elsevier, 2021.