SYNOVIAL TISSUE IN THE FUNCTIONING OF SYNOVIAL JOINTS AND THE OCCURRENCE OF OSTHEOARTHRITIS

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Synovial joints have traditionally been interpreted through a cartilage-centric framework, with synovial tissue often viewed primarily as a secondary responder to cartilage damage. However, increasing experimental and clinical evidence indicates that the synovium functions as a dynamic regulatory interface integrating mechanical, immune, metabolic, vascular, and neural signals within the joint environment.

The presentation reviews the developmental origin and cellular organization of synovial tissue, including fibroblast-like synoviocytes and tissue-resident macrophages that establish and maintain the synovial lining. Recent findings suggest that these macrophage populations contribute to compartmental integrity at the synovial–joint cavity interface and participate in maintaining joint homeostasis. In physiological conditions, synovial tissue regulates synovial fluid composition, supports lubrication through production of hyaluronan and lubricin, and facilitates metabolic exchange for avascular joint structures such as articular cartilage. The synovium is also richly vascularized and innervated, allowing integration of systemic metabolic, inflammatory, and neuroendocrine signals with local mechanical demands. In osteoarthritis, synovial tissue becomes an active participant in disease processes, contributing to inflammatory signaling, altered tissue cross-talk, and changes in joint microenvironment that may influence cartilage degradation and symptom generation. Imaging approaches, including musculoskeletal ultrasound and contrast-enhanced MRI, increasingly demonstrate that synovial changes can be detected early and may precede or accompany structural joint damage. Recognizing the synovium as a functional and regulatory organ within the joint expands current concepts of OA pathophysiology and highlights new opportunities for diagnostic assessment and therapeutic targeting. Integrating synovial biology into clinical and research perspectives may improve understanding of joint disease mechanisms and support the development of more comprehensive treatment strategies.