

How does energy metabolism affect synovial osteogenic transformation?

In contrast, metabolomic analysis revealed that high energy metabolism (TCA cycle) expression provides the energy required for synovial osteogenic transformation. Alterations in energy metabolism, cartilage repair, and osteogenic mechanisms are critical.

What is the role of synovial ECM in tissue homeostasis?

In conclusion, the role of synovial ECM in tissue homeostasis is to mediate appropriate cellular responses and phenotypes and to guide physiologically and pathologically related cellular behavior to maintain the mechanical integrity and function of synovial membranes.

What reflects a high-energy metabolic state in the synovium and synovial fluid?

Elevated TCA cycle activity in the synovium and synovial fluid reflects a high-energy metabolic state. Arginine is a semiessential amino acid that serves as a precursor for various molecules, including urea, nitric oxide, proline, glutamate, creatine, and agmatine.

Why are synovial ECMs important?

Synovial ECMs are highly plastic, providing biochemical and necessary structural support to cells while regulating organ development and maintaining body balance. Arthritis occurs when the balance of the ECM components in the synovium is disrupted.

Do synovial fluid mesenchymal stem cells attract MSCs?

Morphological aspects of synovial fluid mesenchymal stem cells isolated from (A) healthy persons and (B) patients with osteoarthritis. Cell cluster (arrowhead) is observed in synovial fluid mesenchymal stem cells from patients with osteoarthritis. SF seems to have a role in attracting MSCs whether from BM or other sources on the synovial joint.

Are synovium and synovial fluid involved in KOA pathology?

GO enrichment analysis revealed that the differentially expressed proteins in both the synovium and synovial fluid were involved in cell adhesion, extracellular matrix organization, and collagen fibril organization, suggesting a shared biological function between these tissues in KOA pathology.

Calcium pyrophosphate dehydrate (CPPD) crystals are found in the synovial fluid of patients with articular chondrocalcinosis or sometimes with osteoarthritis. In inflammatory conditions, the synovial membrane (SM) is ...

In this work, we aim to systematically investigate the lipid compositions derived from EVs existing in the synovial fluids. The most applied EV isolation methods including ...

ECM in synovium not only supports the structural integrity of synovium, but also plays a crucial role in regulating homeostasis and damage repair response in synovium.

At 2000 s, the energy storage is 191.34 Ah with energy flow control and 146.00 Ah without energy flow control, and the difference between the two is 45.34 Ah. The results show that the energy storage system with energy flow management has better energy storage effect.

Rheumatoid arthritis (RA) is a progressive autoimmune disease accompanied by joint swelling, cartilage erosion and bone damage. Drug therapy for RA has been restricted due to poor therapeutic effect, recurrence and adverse effects. Macrophages and synovial fibroblasts both play important roles in the pathology of RA. Macrophages secrete large amount of pro ...

Here we found that RA T cells abundantly express the podosome scaffolding protein TKS5, which enables them to form tissue-invasive ...

Dynamics of a Self-Excited Vibrating Thermal Energy Harvester with Shape Memory Alloys and PVDF Cantilevers ... Zhu, H. Sliding Mode Backstepping Control of Excavator Bucket Trajectory Synovial in Particle Swarm Optimization Algorithm and Neural Network Disturbance Observer. ... 2025. "Sliding Mode Backstepping Control of Excavator Bucket ...

Relationships between differential proteins and osteogenesis: FN1 and TGFBI are closely associated with synovial osteogenesis, while the upregulation of energy metabolism ...

Temporomandibular joint osteoarthritis (TMJOA) is a multifaceted degenerative disease characterized by progressive cartilage degradation, chronic pain, and functional ...

Osteoarthritis (OA) is a degenerative joint disease that mainly occurs due to the cellular inflammatory response and the destruction of joint cartilage. Natural eggshell membrane (NEM), a byproduct of egg processing, ...

Synovial variable structure control is a nonlinear control based on the control switching rule. Through the mutual switching between different control states, the current state quantity of the system moves according to the set ...

The application of omics technologies for specific joint tissues, such as cartilage, bone, meniscus, and synovial membrane, is a promising research perspective. With the use of ...

Finally, the membrane, or more precisely, the chemical gradients across the membrane, is an important energy source for the cell. 7.3.1: Membrane Structure and Composition Since most cells live in an aqueous environment and the contents of the cell are also mostly aqueous, it stands to reason that a membrane that

separates one side from the ...

The synovial membrane lining layer is the principle site of inflammation in RA. Here the resident cells are the fibroblast-like synoviocytes (FLS) and the synovial tissue macrophages (STM), ...

The lubrication of the cartilaginous structures in human joints is provided by a fluid from a specialized layer of cells at the surface of a delicate tissue called the synovial lining. Little is known about the characteristics of the ...

The membrane's lipid bilayer structure provides the first level of control. The phospholipids are tightly packed together, and the membrane has a hydrophobic interior. This structure causes the membrane to be selectively permeable. A ...

[19] proposes that the application of fast terminal synovial membrane control in PMSM control can effectively solve the singular problem, but it has dependence on the mathematical model of the ...

Background: Knee osteoarthritis is a common degenerative joint disease involving multiple pathological processes, including energy metabolism, cartilage repair, and osteogenesis. To investigate the alterations in critical metabolic pathways and differential proteins in osteoarthritis patients through metabolomic and proteomic analyses and to explore the ...

Classically, lipids have been described as the main components of cell membranes, and also used as fuel and energy storage. In the recent years, studies have shown that lipids are bioactive molecules and function as ...

Designed Nanoarchitectures by Electrostatic Spray Deposition for Energy Storage C. Zhu\*, Y. Fu and Y. Yu\*, Advanced Materials, 2019, 31, 1803408. 169. 2D Material as Anode for Sodium Ion Batteries: Recent ...

The synovial membrane, made of macrophages and synovial fibroblasts in a collagen-rich matrix, regulates exchanges with nearby blood capillaries. Articular cartilage, composed of chondrocytes within a collagen-proteoglycan matrix, is critical for joint function. SF, a hyaluronic acid-rich fluid secreted by the synovial membrane, lubricates ...

Synovial fluid MSCs have been studied in healthy persons and osteoarthritic patients in order to explore its potential for treatment of some orthopedic disorders. Here, we briefly review the ...

RA T cells upregulate the locomotion program. A key pathogenic property of RA T cells is their ability to rapidly invade the synovial membrane, maneuver through extravascular space and polarize into pro-inflammatory effector cells 11,32. Tissue infrastructure and chemokine milieu contribute to the attraction and retention of T cells 32,33. We explored whether RA T cells have ...

There is a lack of in vitro models able to plausibly represent the inflammation microenvironment of knee osteoarthritis (OA). We analyzed the molecules released from OA tissues (synovial membrane, cartilage, ...

Synovium-derived mesenchymal stromal cell (Sy-MSC) is a newer member of the mesenchymal stromal cell families. The first successful demonstration of the mesenchymal stromal cell from ...

Understand the role of the lactate system in energy production for exercise and sports performance; Anaerobic, Process of anaerobic glycolysis (glucose converted to lactic acid), Recovery time, Contribution to energy - duration and intensity Understand the role of the aerobic energy system in energy production for

Osteoarthritis (OA) is a chronic degenerative joint disease that causes chronic pain, swelling, stiffness, disability, and significantly reduces the quality of life. Typically, OA is treated using painkillers and non-steroidal anti ...

The quality of the lubricant between cartilaginous joint surfaces impacts the joint's mechanistic properties. In this study, we define the biochemical, ultrastructural, and tribological signatures of synovial fluids (SF) ...

Osteoarthritis (OA) is a multifactorial disease depending on molecular, genetic, and environmental factors like mechanical strain. Next to the cartilage and the subchondral bone, OA also affects the synovium, which is ...

Wear tests of joint prostheses are usually performed using bovine calf serum. The results from different laboratories are hardly ever comparable as, for example, the protein concentration and the protein composition of the ...

(1) Background: Synovial tissue plays a fundamental role in inflammatory processes. Therefore, understanding the mechanisms regulating healthy and diseased synovium functions, as in rheumatic diseases, is crucial ...

Defect of the tendon sheath after tendon injury is a main reason for tendon adhesions, but it is a daunting challenge for the biomimetic substitute of the tendon sheath after injury due to its multi-layer membrane-like structure ...

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