Synovial cells are specialized cells found in the synovial membrane, a thin layer of connective tissue that lines the inner surface of joint cavities. The primary function of synovial cells is to produce synovial fluid, a lubricating and nourishing fluid that fills the joint space, facilitating smooth movement between the articulating surfaces of the bones in a joint.

Key points about synovial cells include:

Location:

Synovial cells are primarily located in the synovial membrane, which lines the joint cavities of synovial joints. Synovial joints include the knee, shoulder, hip, and other joints characterized by a fluid-filled cavity. Synovial Membrane:

The synovial membrane, also known as the synovium, consists of two main layers: the intima and the subintima. The intima contains the synovial cells, and the subintima contains blood vessels and other connective tissue elements. Synovial Fluid Production:

The primary function of synovial cells is to produce and maintain synovial fluid. Synovial fluid is a clear, viscous fluid that serves several important functions in the joint, including lubricating the joint surfaces, providing nutrients to the avascular cartilage, and acting as a shock absorber. Composition of Synovial Fluid:

Synovial fluid is composed of water, hyaluronic acid, lubricin, and other substances. Hyaluronic acid contributes to the viscosity of the fluid, aiding in lubrication, while lubricin helps reduce friction between joint surfaces. Nutrient Supply:

Synovial cells contribute to the nourishment of avascular structures within the joint, such as cartilage. While cartilage lacks direct blood vessels, nutrients can diffuse through the synovial fluid to reach the chondrocytes (cartilage cells). Synovial Membrane Inflammation:

In conditions such as rheumatoid arthritis and other forms of inflammatory arthritis, the synovial membrane can become inflamed. This inflammation can lead to changes in synovial fluid composition and increased production of inflammatory mediators. Understanding the role of synovial cells and the properties of synovial fluid is important for comprehending the normal function of joints and the changes that occur in joint diseases. Disorders affecting the synovium can impact joint health and contribute to conditions characterized by pain, swelling, and decreased joint function.

Anethole, a prominent compound derived from fennel (Foeniculum vulgare), possesses a spectrum of therapeutic properties, including anti-arthritic, anti-inflammatory, antioxidant, and tumor-suppressive effects. However, its specific impact on RA remains underexplored. A study sought to uncover the potential therapeutic value of anethole in treating RA by employing an H2O2 -induced inflammation model with HIG-82 synovial cells. The results demonstrated that exposure to H2O2 induced the inflammation and apoptosis in these cells. Remarkably, anethole treatment effectively countered these inflammatory and apoptotic processes triggered by H2 O2 . Moreover, they identified the aquaporin 1 (AQP1) and protein kinase A (PKA) pathway as critical regulators of inflammation and apoptosis. H2O2 stimulation led to an increase in the AQP1 expression and a decrease in p-PKA-C, contributing to cartilage degradation. Conversely, anethole not only downregulated the AQP1 expression but also activated the PKA pathway, effectively suppressing cell inflammation and apoptosis. Furthermore, anethole also inhibited the enzymes responsible for cartilage degradation. In summary, the findings highlight the potential of anethole as a therapeutic agent for mitigating H2O2 -

induced inflammation and apoptosis in synovial cells, offering promising prospects for future RA treatments [1].

1)
Huang TL, Chang YC, Tsai BC, Chen TS, Kao SW, Tsai YY, Lin SZ, Yao CH, Lin KH, Kuo WW, Huang CY. Anethole mitigates H2 O2 -induced inflammation in HIG-82 synoviocytes by suppressing the aquaporin 1 expression and activating the protein kinase A pathway. Environ Toxicol. 2023 Nov 21. doi: 10.1002/tox.24023. Epub ahead of print. PMID: 37987213.