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Ion channels in osteoarthritis: emerging roles and potential targets

Renpeng Zhou [1], Wenyu Fu [1], Dmytro Vasylyev [2], Stephen G Waxman [2], Chuan-Ju Liu [3]

Affiliations
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Abstract

Osteoarthritis (OA) is a highly prevalent joint disease that causes substantial disability, yet effective approaches to disease prevention or to the delay of OA progression are lacking. Emerging evidence has pinpointed ion channels as pivotal mediators in OA pathogenesis and as promising targets for disease-modifying treatments. Preclinical studies have assessed the potential of a variety of ion channel modulators to modify disease pathways involved in cartilage degeneration, synovial inflammation, bone hyperplasia and pain, and to provide symptomatic relief in models of OA. Some of these modulators are currently being evaluated in clinical trials. This review explores the structures and functions of ion channels, including transient receptor potential channels, Piezo channels, voltage-gated sodium channels, voltage-dependent calcium channels, potassium channels, acid-sensing ion channels, chloride channels and the ATP-dependent P2XR channels in the osteoarthritic joint. The discussion spans channel-targeting drug discovery and potential clinical applications, emphasizing opportunities for further research, and underscoring the growing clinical impact of ion channel biology in OA.

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