Perspective

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Knee osteoarthritis and orthobiologics: A regenerative approach to joint health

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DESCRIPTION

Osteoarthritis (OA) is the most common joint disorder and a leading cause of chronic pain, loss of mobility, and disability worldwide. Traditional treatments often focus on symptom relief, but they may carry significant side effects—especially with repeated corticosteroid use. In advanced cases, joint replacement surgery becomes the only viable option. This underscores the need for safer, more effective alternatives. Orthobiologics have emerged as a promising frontier in the treatment of knee osteoarthritis, offering the potential not just for pain control, but also for biological joint preservation and tissue regeneration. These therapies include intra-articular injections of Platelet-Rich Plasma (PRP), bone marrow aspirate concentrate (BMAC), biofat, and expanded mesenchymal stem cells. Clinical studies have demonstrated that orthobiologic treatments—used alone or in combination—can be both safe and effective in improving joint function and reducing pain. Furthermore, laboratory (in vitro) studies have confirmed their regenerative potential at the cellular level. This paper aims to provide an updated overview of orthobiologic strategies for knee OA, highlighting their mechanisms of action, the most relevant clinical data, and practical considerations in daily orthopedic practice.

In recent years, there has been growing interest in orthobiologics—a class of biological therapies that utilize naturally derived substances to support the healing and regeneration of musculoskeletal tissues. In the context of knee OA, orthobiologics are gaining momentum as potential disease-modifying interventions. Rather than merely masking symptoms, these therapies are designed to harness the body's intrinsic repair mechanisms to restore joint homeostasis and delay, or even prevent, structural deterioration.

Key orthobiologic options under investigation and clinical application include Platelet-Rich Plasma (PRP), Bone Marrow Aspirate Concentrate (BMAC), adipose-derived biofat, and expanded Mesenchymal Stem Cells (MSCs). Each of these modalities offers unique regenerative properties. PRP, for example, is rich in growth factors that stimulate tissue repair and reduce inflammation. BMAC contains a heterogeneous mix of progenitor cells and cytokines, supporting both immunomodulatory and regenerative effects. Similarly, adipose-derived therapies and MSCs show promise in promoting cartilage repair and improving joint microenvironment conditions.

CONCLUSION

Orthobiologics represent a significant advancement in the non-surgical management of knee osteoarthritis, offering a biologically active approach that targets the underlying causes of joint degeneration rather than merely alleviating symptoms. By harnessing the body's own healing potential through components such as PRP, BMAC, biofat, and mesenchymal stem cells, these therapies contribute to improved joint function, pain reduction, and potentially slowed disease progression. The accumulating clinical and laboratory evidence supports their role as safe and effective alternatives or adjuncts to conventional treatments, especially for patients seeking to delay or avoid joint replacement surgery. While promising, the field still requires standardized protocols, long-term outcome data, and comparative studies to optimize patient selection and treatment efficacy. Moving forward, integrating orthobiologic treatments into clinical practice calls for a multidisciplinary approach, continuous education, and adherence to evidence-based guidelines. With further research and innovation, orthobiologics may redefine the therapeutic landscape of knee osteoarthritis, providing patients with more sustainable and personalized care options.