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Review

Biology of platelet-rich plasma and its clinical application in cartilage repair

Xuetao Xie[1,2], **Changqing Zhang**[1] and **Rocky S Tuan**[2*]

* Corresponding author: Rocky S Tuan rst13@pitt.edu

For all author emails, please log on.

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Abstract

Platelet-rich plasma (PRP) is an autologous concentrated cocktail of growth factors and inflammatory mediators, and has been considered to be potentially effective for cartilage repair. In addition, the fibrinogen in PRP may be activated to form a fibrin matrix to fill cartilage lesions, fulfilling the initial requirements of physiological wound healing. The anabolic, anti-inflammatory and scaffolding effects of PRP based on laboratory investigations, animal studies, and clinical trials are reviewed here. *In vitro*, PRP is found to stimulate cell proliferation and cartilaginous matrix production by chondrocytes and adult mesenchymal stem cells (MSCs), enhance matrix secretion by synoviocytes, mitigate IL-1β-induced inflammation, and provide a favorable substrate for MSCs. In preclinical studies, PRP has been used either as a gel to fill cartilage defects with variable results, or to slow the progression of arthritis in animal models with positive outcomes. Findings from current clinical trials suggest that PRP may have the potential to fill cartilage defects to enhance cartilage repair, attenuate symptoms of osteoarthritis and improve joint function, with an acceptable safety profile. Although current evidence appears to favor PRP over hyaluronan for the treatment of osteoarthritis, the efficacy of PRP therapy remains unpredictable owing to the highly heterogeneous nature of reported studies and the variable composition of the PRP preparations. Future studies are critical to elucidate the functional activity of individual PRP components in modulating specific pathogenic mechanisms.