NEW INSIGHTS INTO THE MECHANISM OF PLATELET RICH PLASMA
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Pain and dysfunction associated with injuries to the musculoskeletal system such as tendonosis and osteoarthritis (OA) are associated with major loss of performance and expensive treatments that are often ineffective. Platelet rich plasma (PRP) has emerged as a treatment modality to address damage to tendons, ligaments, and joints. PRP is a relatively inexpensive, simple, efficient, and minimally invasive method of obtaining a natural concentration of autologous growth factors and other bioactive molecules that enhance tissue repair, diminish pain, and restore joint function.

Historically, PRP application and research has focused on platelets with the thinking that more is better because of the relationship between platelets and anabolic growth factors such as transforming growth factor-B and platelet derived growth factor. The importance of leukocytes in PRP then became apparent due to the inclusion of physiologically relevant concentrations of bioactive catabolic cytokines such as interleukin-1B (IL-1B) and tumor necrosis factor-alpha (TNF-alpha).

Most recently, it has been recognized that PRP can elicit anti-inflammatory and anti-nociceptive effects on injured musculoskeletal tissues including tendon and synovium. In addition, it might act as a chemotactic agent, recruiting local stem cells to the site of injury to aid in tissue repair. There have been several pathways investigated where PRP acts to decrease inflammation including suppression of matrix metalloproteinase (MMP)-3, MMP-13, cyclooxygenase-2 (COX-2), and chemokine receptor type 4 (CXCR-4) synthesis. In OA synoviocytes, PRP results in increased synthesis of hyaluronan which then leads to both decreased inflammation and increased anabolic activities in neighboring chondrocytes. Although decreasing inflammation can result in pain relief, PRP has also been shown to be more specific in pain modulation through its ability to decrease tumor necrosis factor-alpha (TNF-alpha) and nuclear factor-kappaβ (NF-κβ).

Finally, although PRP contains very few, if any, stem cells, emerging evidence supports its role as a chemotactic agent leading to the recruitment of the body’s natural store of stem cells in the target tissue being treated. In summary, PRP should be thought of as more than simply platelets. Although there are many putative positive effects of PRP, it is unclear if these effects are elicited by all preparations of PRP. Moving forward, it will be critical for clinical and laboratory investigators to fully document the contents of the PRP being delivered so that clinical outcome can be more fully assessed than it is in current practice.

References


