

## REGENERATIVE MEDICINE: THE USA EXPERIENCE

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Orthobiologics are an appealing option to elite athletes seeking to naturally accelerate the healing process following sport injury. Administering an autologous biologic agent to promote cellular homeostasis following knee ACL or meniscus trauma; may prevent secondary arthritis and potentially extend an athlete's career.

The first generation biologic injectables of Hyaluronic Acid (HA), have been successful in the treatment of pain for osteoarthritis of the knee with limited data on tendinosis. Platelet Rich Plasma (PRP) represented the second generation of biologic injectables, the first of which that are autologous. While both generations of injections have been shown to provide relief with cartilage disorders of the knee, they are ideally better suited for early intervention in active individuals. PRP has demonstrated superior results when compared to HA. There is likely a synergistic role of combining PRP with HA with their overlapping properties.

However limitations of PRP may include its non-differentiated blend of anti-inflammatory, pro-inflammatory, anabolic and catabolic mediators. While the replication of the body's natural balance of growth factors used synergistically may work best; recent studies have shown that isolating or blocking particular cytokines may be optimal for particular conditions. The third generation biologic injectable is Bone Marrow Concentration (BMC). While sufficient human safety and efficacy data is mounting; there is sparse data for the intra-articular and tendinous application of same day BMC therapy. BMC basic science will be briefly reviewed. Along with advanced orthobiologic therapies, diagnostic imaging and biomarkers will provide better monitoring of treated regions.

The Orthohealing Center's treatment protocols incorporate biologics from HA, PRP, and BMC with cutting edge adjuncts to facilitate recovery including Hyperbaric Oxygen (HBOT).

We utilise "quantitative biologics" to monitor platelets and monocytes from PRP & BMC in the office setting before injecting back into the patient. Questions raised include not only variability of baseline platelet count but more importantly, why do some patients platelets concentrate well and others not? Additionally, this quantitative approach may protect the physician and patient by screening for blood abnormalities (increased White Blood Cells, Platelets at baseline, etc...). Understanding baseline biologic profiles may explain why some patients respond favorably and others do not.

Unfortunately there is a lack of standardization and great variability in PRP cell constituents; which can make interpretation of clinical trials challenging. Previous authors have suggested various classification systems to promote standardization of PRP reporting with the goal of facilitating the interpretation of clinical studies. Unfortunately, none of these systems encompass all PRP elements that may influence PRP efficacy based on the current literature including: platelet concentration (number/volume, as well as concentration), white blood cell concentration, including neutrophils, red blood cell concentration, presence or absence of exogenous activation, and quantity of PRP delivered to target region. Consequently, the Orthobiologic Consortium proposes a contemporary nomenclature for PRP reporting in scientific presentations and publications that incorporates these important elements.