

Your body's tissues contain stem cells and growth factors that naturally promote healing. New cutting-edge techniques are being performed where these cells are extracted from your own body and applied to an injured area. Scientific evidence supports the effectiveness and reliability of these procedures.

## How biologic augmentation works:

When there is damaged tissue in your body, stem cells and healing factors are sent to the area to encourage healing. Stem cells are the only type of cell in body that is undifferentiated, and able to replicate themselves into various types of tissues. They also are able to repeatedly divide, therefore rapidly multiplying the concentration of cells present to provide a healing response. It is believed that biologic augmentation improves healing through the direct application of these agents to an area of injury or surgical location.

## Specific healing factors include:

**Mesenchymal Stem Cells (MSC):** A very potent progenitor cell that becomes activated when an injury occurs, to help with regeneration. These cells are found at a very high concentration in bone marrow, and stimulate the healing process.

**Platelet Rich Plasma (PRP):** A liquid concentrate that includes components of platelets and plasma that regulate the healing of muscle, tendon, ligament and bone. PRP releases bioactive factors that assist with inflammation proliferation and remodeling, and cause MSCs to replicate themselves.

**Bone Marrow:** Spongy tissue found in the hollow spaces inside of human bones, often referenced for its production of blood cells. Bone marrow is very rich in MSCs.

## Possible benefits of biologic augmentation:

Applying regenerative techniques to injured or surgical areas may help prevent progression of degenerative changes, reduce post-operative symptoms, and optimize functional outcomes. Recent studies have suggested a decrease in pain, bruising and swelling immediately after surgery. Other potential benefit following application of biologic procedures may include reduced occurrences of surgical complications, such as fracture non-unions, graft failures, chronic tendonitis, incision healing, and rapidly progressing osteonecrosis.

Currently there is no consensus or standard of care regarding the use of biologic augmentation. However, interest in this area has increased in terms of research and clinical application, specifically in professional athletics where there is urgency for expedited recovery.

Previous research studies have supported successful outcomes when used for:

- **Ligamentous Injury:** Football and soccer athletes returned to athletic participation 25% earlier time when receiving PRP injections within 72 hours from time of injury.<sup>1</sup>
- **Hip Arthroscopy:** When administered at the end of arthroscopic hip surgery, PRP decreased inflammation, bruising, swelling, and pain.<sup>2, 3</sup>
- **Osteoarthritis:** Individuals with hip and knee osteoarthritis reported increased function and decreased pain following BMC and PRP injections.<sup>4-7</sup>
- **Shoulder Arthroscopy:** PRP treatments administered during arthroscopic shoulder surgery decreased pain and positively affected healing, based on postoperative MRI data.<sup>8, 9</sup>
- **Rotator Cuff Repair:** At 6 months post repair, complete rotator cuff healing was observed RC in 100% of patients that underwent BMC treatment, versus 67% in the control group. At 10 years follow-up 87% of the rotator cuffs from the BMC group remained intact, compared with 44%.<sup>10</sup>
- **Articular Cartilage Repair:** Previous studies have suggested PRP may play a role in improved and expedited cartilage regeneration.<sup>11-13</sup>

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10. LaFrance, R., et al. (2015). "The Effect of Platelet Enriched Plasma on Clinical Outcomes in Patients with Femoroacetabular Impingement Following Arthroscopic Labral Repair and Femoral Neck Osteoplasty."  
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12. Randelli, P., et al. (2011). "Platelet rich plasma in arthroscopic rotator cuff repair: a prospective RCT study, 2-year follow-up." *Journal of Shoulder and Elbow Surgery* 20(4): 518-528.  
13. Sánchez, M., et al. (2011). "Ultrasound-guided platelet-rich plasma injections for the treatment of osteoarthritis of the hip." *Rheumatology*: ker303.

## **Procedures offered:**

Various techniques can be performed; your surgeon will discuss which procedure may be best for your individual case.



**PRP Injections** can be performed as an isolated non-operative treatment, or supplement to surgical treatment.

- **Autologous Conditioned Plasma (ACP) System:** 15 ml of your own blood is drawn and placed in a centrifuge system, specially designed to separate different types of blood cells. The PRP cells are isolated, and then extracted. The concentrated PRP solution is injected into the location of injury/surgical site. A series of 3 injections, each one week apart, are often performed.
- **Angel System:** 60-100 ml of your own blood is drawn, and placed in a 2<sup>nd</sup> generation centrifuge system. The *Angel System* is designed to deliver up to 18x the baseline platelet concentration. Most often only one injection is performed.

Risks associated with PRP injections: local bleeding (increased for patients on blood thinners or with bleeding conditions), infection, temporary pain, soreness and discoloration at sites of blood withdrawal and injection.

**Bone Marrow Concentrate (BMC)** can be performed as an isolated procedure, or during an orthopaedic surgical procedure.

- Under visualization from ultrasound or x-ray, a needle is inserted into a bone donor site, and bone marrow is extracted. It is then processed in a centrifuge to separate unnecessary cells from the stem cell concentrate. This concentrate then will be applied into the surgical location.
- During surgical procedures, the concentrate can be injected into the injured area, or used as an incubator for a surgical graft.

Risks associated with BMC: local bleeding (increased for patients on blood thinners or with bleeding conditions), infection, temporary pain, soreness and discoloration at site of bone marrow removal.

## FREQUENTLY ASKED QUESTIONS

### **Will this just mask my symptoms?**

The purpose of biologic treatments is to provide your body with an improved framework to optimize healing. While these treatments are believed to reduce inflammatory related pain, they will not prevent your body from experiencing discomfort if you push your body beyond tolerable limits.

### **Does insurance cover biologic augmentation during surgical procedures?**

In some cases, your insurance company may cover all or part of the fees associated with biologic augmentation, but it may require out of pocket expenses. You may also be responsible for additional copays (office visit, imaging, etc). It is important to discuss coverage with your individual insurance company.

### **Can these treatments harm me and cause more damage?**

Aside from the risks mentioned above that you are exposed to during an injection, there are no reported harmful effects of biologic augmentation. These treatments involve reapplication of cells from your own body; therefore there is minimal risk.

### **Does this regrow my cartilage?**

Scientific studies reveal promising results concerning cartilage regeneration, however, this has not been confidently proven in living human subjects.

### **Is there anything that would prevent me from being a candidate for Biologic Augmentation?**

Individuals with anemia, low platelet count, abnormal platelet function, ongoing or recurrent infections may not be able to receive biologic treatments. If you currently are undergoing treatments for cancer or are pregnant or breast feeding you should discuss biologic treatment with your primary care physician and medical team.

Non-steroidal anti-inflammatory drugs (NSAIDs; Ibuprofen, Advil, Aleve) should be discontinued for a short period of time (typically 7 days) prior to, and immediately following, receiving biologic treatments. If you are currently prescribed a daily NSAID and are unable to discontinue its use for a short duration, you should consult your primary care physician for further approval.

### **Will I need to undergo repeat treatments?**

At times maintenance biological treatments are performed 6 months after your initial treatment, if you have ongoing pain. In addition to being incorporated at the time of surgery, biological augmentation can be utilized as an adjunct to pain management for ongoing conditions.

*If you are interested in biological augmentation, please discuss appropriate options with your surgeon.*