

# Bone Marrow Aspirate Concentrate (BMAC): Advanced Regenerative Therapy



## What is BMAC?

Our bone marrow is naturally rich in mesenchymal stem cells, platelets, and growth factors. These components play a critical role in tissue regeneration and reducing inflammation. Bone Marrow Aspirate Concentrate (BMAC) is an advanced regenerative therapy, similar to PRP therapy, that harnesses the natural healing effect of these elements to repair damaged tissues in musculoskeletal conditions such as osteoarthritis and tendon and ligament injury.

## How BMAC Injection Works and the Role of MSCs

Using a minimally invasive technique, BMAC involves extracting a small sample of bone marrow, typically from the iliac crest or hip bone. The extracted sample is then processed with a centrifuge to concentrate its regenerative components and injected directly into the damaged area to promote healing.

Stem cells are at the core of the regenerative potential of BMAC. Mesenchymal stem cells (MSCs), in particular, are abundant in bone marrow and play a unique role in healing by:

1. **Promoting Tissue Regeneration:** MSCs help rebuild damaged tissues by transforming them into the specific cells needed for repair, such as fibroblasts for collagen, chondrocytes for cartilage, and osteoblasts for bone.
2. **Reducing Inflammation:** MSCs release bioactive molecules that regulate inflammation, creating an optimal environment for healing and reducing pain.
3. **Releasing Growth Factors:** These factors stimulate the repair process by attracting additional cells to the injury site, promoting the proliferation of these cells, and enhancing cell-to-cell communication for faster recovery.

Essentially, by delivering a concentrated dose of these potent cells directly to the affected area, BMAC amplifies the body's natural healing processes, offering significant potential for treating various injuries and degenerative conditions.

# Common Conditions Treated with BMAC Therapy

BMAC therapy offers a minimally invasive, regenerative solution tailored to various types of musculoskeletal pain and injury. Because of this, it is used to treat many common conditions, including:

- **Osteoarthritis:** BMAC therapy is often used to treat joint pain and stiffness caused by osteoarthritis. The stem cells and growth factors help regenerate cartilage, reduce inflammation, and improve joint function.
- **Tendon Injuries:** Conditions such as tendonitis or tendon tears, including the rotator cuff, gluteal tendons (“bursitis”), tennis elbow, and Achilles tendon benefit from BMAC’s ability to promote tissue repair and reduce recovery time.
- **Ligament Injuries:** BMAC can help heal ligament sprains or tears, such as those in the knee (e.g., ACL) and other joints, by enhancing ligament regeneration and helping reduce the need for surgical intervention.
- **Spinal Conditions:** BMAC addresses disc degeneration, disc annular tears, and facet joint pain in the spine, offering an alternative to invasive surgical procedures for managing back pain.
- **Musculoskeletal and Sports Injuries:** Chronic or acute injuries, such as meniscus tears, labral injuries, and plantar fasciitis, are commonly treated with BMAC to promote faster recovery and restore performance.
- **Bone Injuries or Fractures:** BMAC accelerates bone healing and is used to treat bone marrow edema and fractures that are slow to heal or nonunion fractures that are not appropriate for surgery thanks to the osteogenic properties of stem cells.

## The BMAC Injection Procedure: What to Expect

Like with any new procedure, understanding the step-by-step process can help you prepare for the procedure and recovery afterward. Here is a general breakdown of what you can expect from a BMAC procedure:

1. **Consultation and Assessment:** Before the procedure, the patient undergoes a thorough evaluation to confirm that BMAC is an appropriate treatment. Imaging studies, such as X-rays or MRIs, may be performed to assess the extent of the injury or condition.
2. **Preparation:** On the day of the procedure, the patient is positioned comfortably on their stomach, and the target area (the back of the hip) is identified with fluoroscopic or X-ray guidance and then sterilized. Local anesthesia is administered to minimize discomfort.
3. **Bone Marrow Extraction:** Under fluoroscopy, a specialized needle is inserted into the iliac crest (hip bone), and a small amount of bone marrow is aspirated. This step typically takes about 10–15 minutes and is minimally invasive.
4. **Processing the Bone Marrow:** The aspirated bone marrow is immediately processed using a centrifuge to separate and concentrate the stem cells, platelets, and growth factors. This step ensures a high-quality concentrate for injection and takes approximately 30 minutes.
5. **Injection of BMAC:** Using fluoroscopic or ultrasound guidance, the concentrated BMAC is precisely injected into the targeted area, such as a joint, tendon, or ligament, to ensure efficacy. The injection and the process takes approximately 15-30 minutes.

The entire procedure, start to finish, typically lasts 90-120 minutes. In most cases, patients receiving BMAC can resume normal activities quickly while benefiting from enhanced tissue regeneration.

# Benefits of BMAC Therapy

BMAC therapy is a minimally invasive form of non-surgical treatment that offers many benefits to its patients, including faster recovery times and fewer complications post-procedure. The other primary benefits of BMAC therapy include:

- **Natural and Autologous Treatment:** Since BMAC is derived from the patient's own bone marrow, it minimizes the risk of allergic reactions, immune rejection, and disease transmission.
- **Reduces Inflammation and Pain:** BMAC's concentrated stem cells and growth factors help regulate inflammation, which reduces pain in injured or degenerated tissues.
- **Long-Term Benefits for Joint and Musculoskeletal Health:** Unlike temporary pain-relief options, BMAC works at the cellular level to regenerate damaged tissue, providing sustainable and long-lasting benefits for joint and musculoskeletal health.
- **High-Potency Regenerative Properties:** BMAC includes mesenchymal stem cells, which have the unique ability to differentiate into various cell types. This makes BMAC a more comprehensive option for treating severe injuries or advanced degeneration.
- **Improved Quality of Life:** By reducing pain, improving mobility, and supporting the regeneration of healthy tissue, BMAC enables patients to return to daily activities without the risks or recovery time associated with surgery.

By offering a natural, minimally invasive, and effective treatment option, BMAC stands out as a cutting-edge therapy for individuals seeking long-term solutions to joint and musculoskeletal challenges.

## BMAC vs. PRP Therapy: Understanding Their Key Differences

While BMAC and Platelet-Rich Plasma (PRP) therapy are both regenerative treatments, their primary difference lies in their composition and potential applications. PRP is derived from blood and primarily contains concentrated platelets and growth factors, making it most effective for stimulating healing in osteoarthritic joints and soft tissues like ligaments and tendons.

BMAC, on the other hand, includes a broader range of regenerative components, such as mesenchymal stem cells, which differentiate into various tissue types and promote more healing in more complex scenarios. This makes BMAC particularly beneficial for more severe injuries or conditions where stem cells play a pivotal role in tissue repair.

PRP and BMAC are often used together to treat conditions including moderate to severe osteoarthritis, larger tendon tears, hip and shoulder labral tears, meniscus tears, disc degeneration, disc annular tears, and bone injury (e.g., bone marrow edema). In addition, if a patient has two or more large structural injuries, the higher volume of regenerative therapy with BMAC and PRP together can be used to treat a greater expanse of injury.

## Is BMAC Therapy Right for You?

Anyone seeking a minimally invasive, regenerative treatment for musculoskeletal pain and injury is an ideal candidate for BMAC therapy. Eligibility factors include overall health and lifestyle.

Typically, those with severe medical conditions, active infections, or blood disorders may not be eligible and should consult a healthcare provider for alternative treatment options.

To learn more and to see if BMAC, PRP, or a combination is right for you, schedule a consultation with our Arizona spine and sports physicians today.

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