

BMAC INJECTIONS

BMAC (BONE MARROW ASPIRATE CONCENTRATE) Injections are used to treat osteoarthritis. BMAC contains mesenchymal stem cells, some of the growth factors found in platelet-rich plasma and key plasma proteins. BMAC injections may provide greater and longer-lasting intervals of pain relief than other traditional injections, such as corticosteroid and hyaluronic acid injections.

WHY DOES BMAC WORK?

The regenerative mesenchymal stem cells and other contents of BMAC work together in the joint to reduce the pain and inflammation associated with arthritis, as well as improving cell-to-cell communication that results in improved function overall.

AM I A CANDIDATE FOR A BMAC INJECTION?

Because healthy bone marrow is required for BMAC to be effective, there are a number of medical conditions that prevent patients from having BMAC, including but not limited to:

- Chronic Lymphocytic Leukemia
- Hodgkin's and Non-Hodgkin's Lymphoma
- Hairy Cell Leukemia
- Myeloproliferative Disorders (CML, Polycythemia Vera, etc.)
- Myelodysplastic Syndromes (Anemia, Thrombocytopenia, Neutropenia)
- Multiple Myeloma
- Cytopenia, Thrombocytosis, Leukocytosis, Chronic Anemia of unknown cause
- Fungal Infections, TB and other Granulomatosis
- Previous radiation therapy to the pelvis
- Active Cancers

The alignment of the knee joint also determines whether or not the patient is a good candidate for BMAC. This is determined by evaluating an X-ray of the knee with the patient standing. The range of motion of the knee is an important factor as well. Ideally, a patient should have normal range of motion.

Patients who have mechanical symptoms with meniscus tears, loose bodies or unstable chondral/osteochondral lesions on MRI should have treatment of these problems via arthroscopy in conjunction with BMAC. Patients who have bone marrow lesions on MRI should have BMAC delivered via subchondral injection in the operating room under anesthesia.

HOW IS BMAC PERFORMED?

The patient is placed face down and made comfortable on an exam table. Some patients choose to take a mild sedative before the procedure for comfort. After prepping the back of the pelvis, the area of the bone marrow harvest is numbed with a local anesthetic. Bone marrow is harvested from the back of the pelvis with a large needle with a syringe attached. The needle is advanced deeper into the pelvis after drawing marrow with the syringe. Several punctures of the back of the pelvis are usually needed to obtain an adequate amount of marrow. Once an adequate volume is obtained, the puncture sites are covered with a sterile dressing and the patient is able to turn over. The bone marrow harvest usually takes 20-30 minutes.

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The harvested bone marrow is then processed to separate its various components. The plasma (fluid portion) contains many proteins that are very beneficial to the process. This fluid is filtered and condensed into what is called a general fluid concentrate (GFC). Similarly, the portion containing the mesenchymal stem cells is concentrated into what is called bone marrow concentrate. The processing takes about 20 minutes. Once processed, the BMAC and GFC are separately injected into the knee after a sterile prep and local anesthetic is applied. The injection site is dressed with a bandage. The entire procedure takes between 60–75 minutes.

IS THE PROCEDURE PAINFUL?

Most patients tolerate the procedure with little discomfort. When the anesthetic wears off, there may be mild to moderate pain. If needed, your doctor will discuss pain-management options with you.

DO PATIENTS HAVE ANY RESTRICTIONS AFTER THE BMAC INJECTION?

It is important to avoid anti-inflammatory medications (Advil, Motrin, ibuprofen, Aleve, Naprosyn, etc.) for 2 weeks after the procedure. These medications can interfere with the healing response that BMAC promotes. Tylenol is allowed. Your doctor will discuss pain-management options with you.

BMAC patients are restricted from squats and lunging activities to avoid overloading the joint. Similarly, BMAC patients should avoid running, jumping and other impact-loading activities for 3 months.

Patients that have BMAC via subchondral injection are further restricted to protected weight-bearing for the first week after the procedure. They may bear weight as tolerated but should use a walker or crutches for protection.

All BMAC patients should, however, ride a stationary bicycle with low tension 10–12 minutes a day. They will also be instructed in simple quadriceps and hamstring exercises to perform on a daily basis.

ARE THERE RISKS WITH BMAC?

Anytime a needle is placed anywhere in the body, even getting blood drawn, there is a risk of infection, bleeding, tendon damage or nerve injury. However, these are rare occurrences. The most common complication is mild bruising at the BMAC harvest site.

WHEN WILL A PATIENT START TO FEEL PAIN RELIEF FOLLOWING THE BMAC INJECTION?

Because BMAC works by changing the biochemistry of the joint that has been arthritic for a long time, improvement in pain and function may be slow. It may take up to 6 weeks to start feeling improvement, but most patients feel improvement by 3 months. BMAC patients may see further functional improvement for up to 2 years following the injection.

HOW OFTEN IS THE PROCEDURE PERFORMED?

BMAC is not routinely repeated. Successful procedures give good relief for long periods of time. If the patient fails to respond well, alternative treatments for arthritis, including total knee replacement, should be considered. Some patients may benefit from an additional, less-invasive platelet-rich plasma (PRP) injection following BMAC to aid in pain relief.

IS BMAC COVERED BY INSURANCE?

BMAC injections are not covered by most insurance plans in the state of Minnesota. The fee for the procedure is \$4,000 and is required at the time of service.