Bone Marrow Aspirate Concentrate (BMAC)

What?

BMAC stands for Bone Marrow Aspirate Concentrate, a regenerative therapy that uses the patient's own bone marrow to promote healing of damaged tissues, especially in joints, tendons, and bones. Bone marrow is a soft spongy tissue found in the center of our large bones. In adults, morrow produces stem cells (mesenchymal stem cells), growth factors, and platelets. Bone marrow harnesses the body's natural healing process through the aid of growth factors within the marrow, as well as regenerative cells, known as mesenchymal signaling cells. These cells are considered "pluripotent", meaning they are undifferentiated and can replicate themselves into various tissue and cell types. By introducing these pluripotent cells into the injured area, marrow is able to initiate healing response by the body, repairing damaged tissue and growing new and healthy tissue.

When? Who? Am I a Candidate?

BMAC is indicated for patients with arthritis, tendon or ligament injuries, muscle tears, or cartilage injuries.

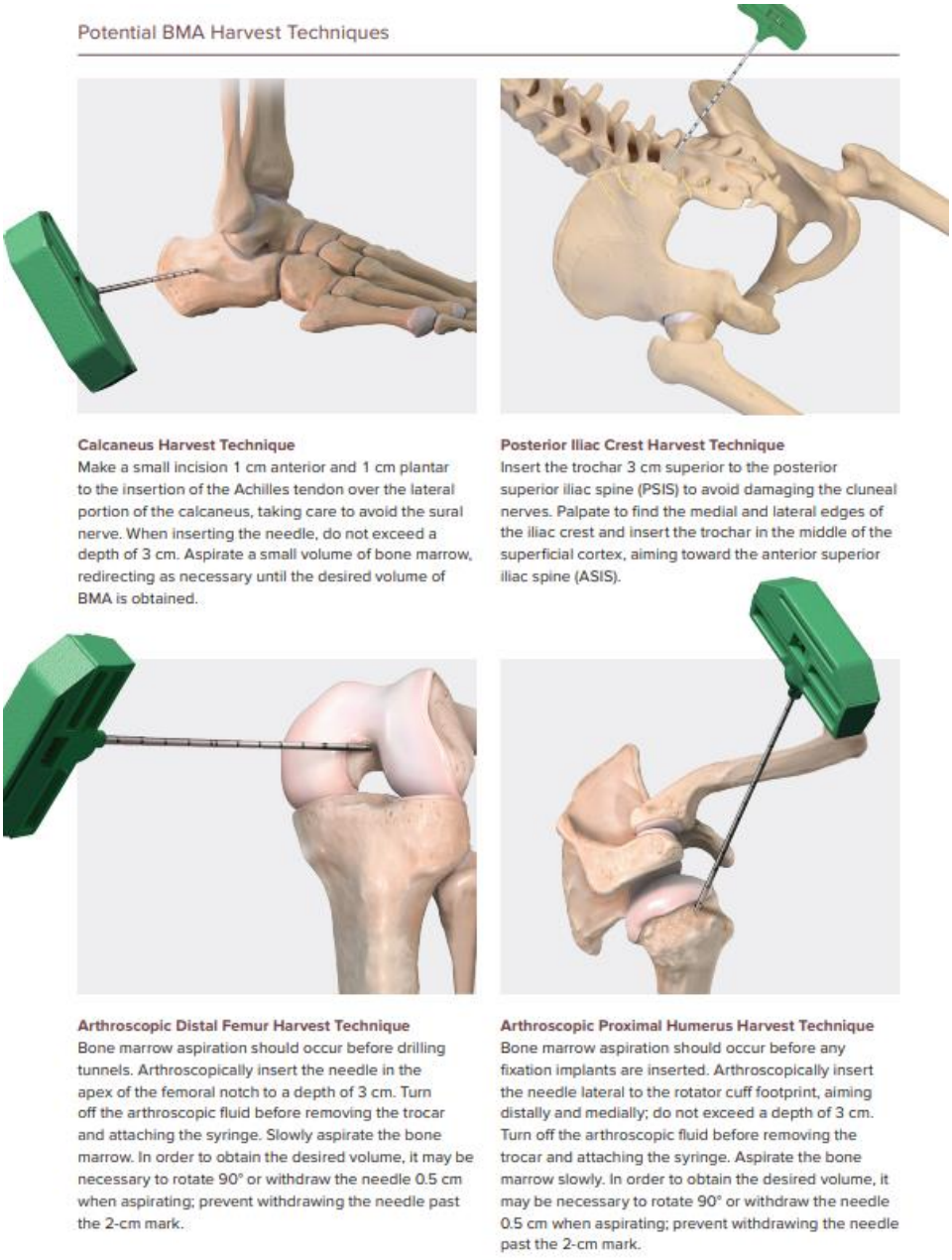
Where?

BMAC is performed in the Operating Room. The aspiration is performed under general anesthesia or with an Epidural. Please arrive 15 minutes early to sign consent forms. Please plan for 3-4 hours (depending on how you handle anesthesia), the procedure itself takes about 90 minutes.

How?

Peachtree Orthopedics uses Arthrex Angel cPRP and Bone Marrow Processing System. The Angel system uses a proprietary platelet sensor and 1-button automation to prepare customized platelet-rich plasma (PRP) concentrate (cPRP) from bone marrow aspirate (BMA). Your physician is able to customize and adjust the platelet concentrations and white blood cell concentrations based on your diagnosis. The system is able to deliver platelet-rich plasma (PRP), platelet-poor plasma (PPP) and red blood cells (RBCs) into separate, sterile compartments. You will arrive at the Surgery Center with nothing to eat after midnight the night before your procedure. You will be prepped with an IV and then given general anesthesia or an Epidural. Your surgeon will prep/clean the area of the harvesting site. During the procedure, your surgeon will extract the bone marrow from one of the following sites: Iliac

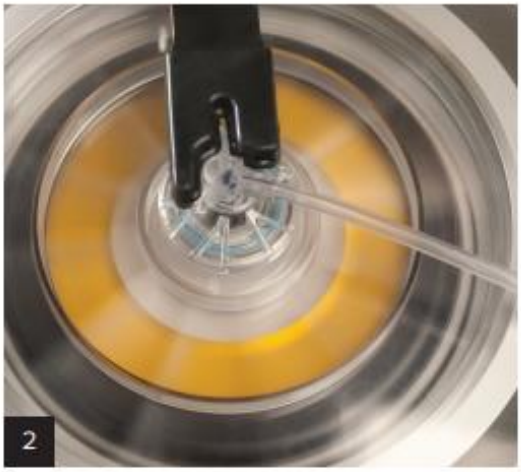
Crest (Pelvis/Hip, anterior or posterior), calcaneus (heel bone), Proximal tibia (shinbone), or proximal humerus (shoulder). **The most common site is the Iliac Crest/Pelvis (Hip).** After collecting the bone marrow, your surgeon will place it into the Angel machine, which spins it at high speed to separate out the concentrated platelet-rich plasma (PRP). Once the machine is finished, the surgeon will inject the PRP into the injured area.



If you have any questions or concerns following the procedure, please call 404-355-0743 ext. 1332.

Angel® cPRP System Processing

After the Angel system has been assembled and the operator has connected the heparin-flushed bone marrow filter to the "whole blood in" compartment, introduce the citrated BMA. The ratio of citrate anticoagulant to whole blood, BMA, or a mixture of both is 1:7.



The Angel system can process 40 mL to 180 mL of whole blood, BMA, or a mixture of both in a single cycle. The approximate spin time for a 40-mL sample is 15 minutes. The approximate spin time for a 180-mL sample is 26 minutes.

PRP collection is automated. No manual steps are required for preparation and there are no syringes to change, buffy coats to resuspend, or plasma to decant. The automated process is driven by the 3-sensor technology employed by the Angel system centrifuge.

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The Angel® system first collects PPP. Collection will stop when the 470 nm wavelength of light is absorbed by platelets. The Angel system will adjust the valve position to collect PRP until red blood cells are detected by the absorption of the 940 nm wavelength of light.

The PRP will be dispensed into the PRP collection syringe after the PPP is collected. To increase the volume of the PRP syringe by diluting with PPP, simply pull back on the plunger of the syringe. If PPP is desired, it may be withdrawn from the port on the PPP compartment.

The Angel system can process up to 180 mL in 1 cycle or a total of 3 cycles for the same patient with the same disposable.

Note: If BMA and peripheral blood will be processed separately, it is recommended that peripheral blood is processed first.

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Bone Marrow Aspirate Concentrate (BMAC) Instructions

Pre-Procedure

- **Discontinue the use of NSAIDS 7 days before the procedure**.
- A friend or family member must be in attendance on the day of your appointment to drive you home.
- Wear comfortable and loose-fitting clothing.
- There are no dietary restrictions leading up to the date of the procedure, **but no food or drink after midnight the day of the procedure**.

Post-Injection

- Some discomfort is expected following the BMAC procedure.
    - Use of Tylenol (acetaminophen) is acceptable if harvest site or injection site has pain, stiffness, or discomfort.
    - **Avoid NSAIDS for 14 days following the procedure**.
- You will likely experience an inflammatory response following the injection which may include complaints of stiffness and/or swelling at the injection site.
- You may experience hip swelling, bruising, and/or soreness
- Waterproof dressings will be applied to the hip at the site of the bone marrow harvest.
    - Showering is acceptable 24 hours following the procedure. Please avoid use of pools or bathtubs for 5 days.
    - Abdominal dressings may be removed 48 hours following the procedure.
- Please refrain from strenuous activity for 2 weeks following the BMAC procedure.
    - After 2 weeks, gradually return to activity as tolerated.
- Physical therapy can be a beneficial treatment following administration of BMAC. Inquire with your physician to see if physical therapy is appropriate for your diagnosis and treatment plan.

Bone Marrow Aspirate Concentrate (BMAC) FAQs

- What is Bone Marrow Aspirate Concentrate?
  - Bone marrow aspirate concentrate (BMAC) can focus your own body's ability to heal. Your bone marrow is a rich source of mesenchymal stem cells (MSCs). These cells bind to an injury site and initiate and organize repair to the damaged tissue. Precisely placing BMAC into the injury site can initiate the healing process by activating the damaged cartilage or tendon. This is an inflammatory process, but don't worry. Inflammation is the vital first phase of healing.
- Where and how long is the procedure performed?
  - The procedure performed in a surgery center and lasts approximately 90 minutes
- What is the procedure?
  - First, your bone marrow is aspirated or drawn out of the back part of the pelvis. To make the procedure more comfortable and to numb the bone marrow cavity, you will have a procedure called a caudal epidural or given general anesthesia. Once the skin is numb, your provider will use a special needle to enter the bone marrow cavity in the hip bones near your lower back and remove the bone marrow aspirate. After using a centrifuge, your provider will then inject the BMAC into the injury site.
- Are there any side effects from BMAC?
  - There is a very low risk factor for infection from the procedure.
  - You may be sore over the area of the harvest site or develop bruising.
- Is there anything the patient needs to do to prepare for the procedure?
  - Avoid NSAIDS for 7 days before the procedure
- What is the down time after the procedure?
  - Patient will feel sore/stiff for 24-72 hours post injection
  - The patient can take Tylenol and ice the site if there is any discomfort after the procedure
  - Patient should not drive for 12 hours after the procedure
  - Can resume NSAIDS two weeks post injection
  - Brief heat or ice therapy will not disrupt your regenerative therapy but should not be used for more than 10 minutes.
- When will the patient start to feel better from the injection?
  - Gradual improvements in pain and function should be expected 8 to 12 weeks after injection.

If you have any questions or concerns following the procedure, please call 404-355-0743 ext. 1332.