Arthrex Angel® cPRP and Bone Marrow Processing System

For Customized Cellular Concentrations of
Platelet-Rich Plasma From Bone Marrow Aspirate

Arthrex®

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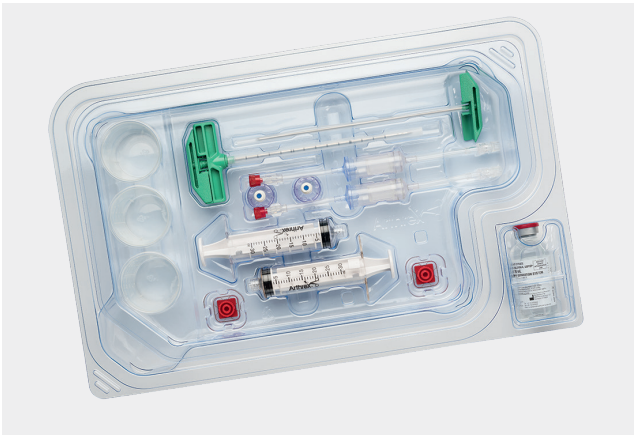
Product Features

Technology is what sets the Angel system apart from the competition. 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).

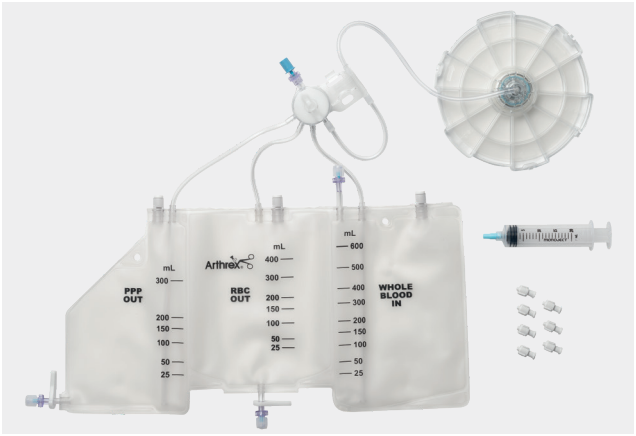
Bone marrow is a rich source of platelets, nucleated cells, and progenitor cells. The Angel device is the only option on the market to provide PRP concentrate from BMA with adjustable cellular levels.

Features and Benefits

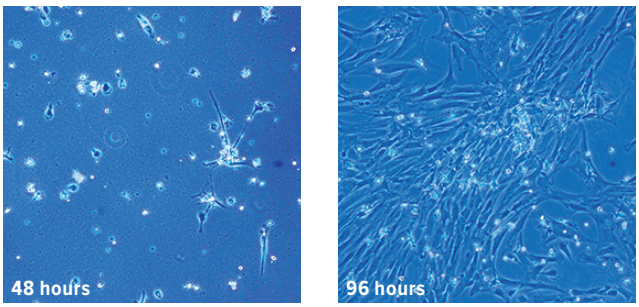
- Proprietary platelet sensor system
- Adjustable platelet concentrations
- Adjustable white blood cell (WBC) concentrations
- Flexible processing volume of 40 mL-180 mL
- Each processing kit can process, on the same patient, 3 cycles up to 180 mL
- Programmable; can store up to 30 custom processing protocols
- Closed system delivers PRP, platelet-poor plasma (PPP), and red blood cells (RBCs) into separate, sterile compartments



Angel cPRP and BMA Tray



Angel cPRP Processing Set



In vitro culture expansion of progenitor cells over 96 hours

ARTHREX angel SYSTEM

Advantages of 3-Sensor Technology (3ST)

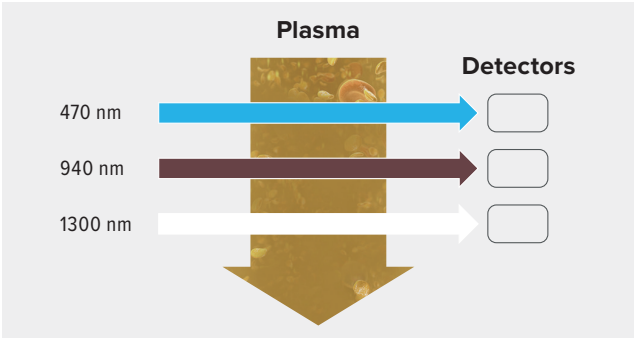
- No syringe switching
- No manual steps to prepare PRP
- Delivers PRP, PPP, and RBCs into separate, sterile compartments
- Ability to modulate platelet, leukocyte, and RBC content
- Consistent PRP output

High-specificity 3ST light sensor technology and automated valve actuation are the foundation of the Angel® cPRP system. The results of these features are the production of a high yield of PRP and PPP from whole blood.

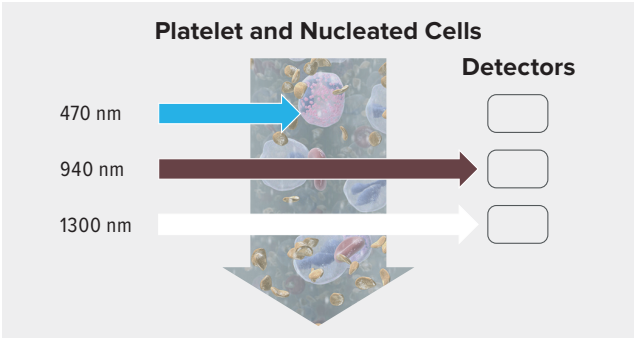
High-specificity 3ST light sensor technology

Three-Sensor Technology

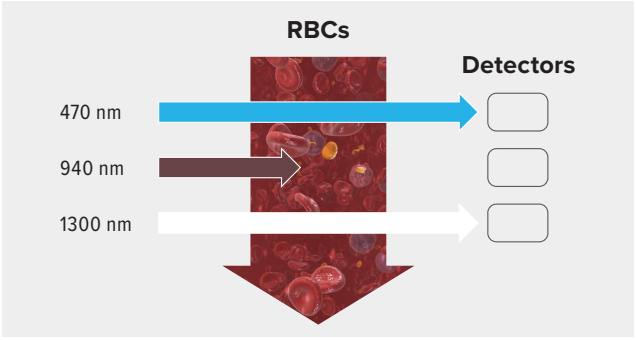
The Angel system incorporates 3 sensors to accurately separate blood components using cell-specific wavelengths of light to increase cellular yields. Absorption of 470 nm light detects platelets and leukocytes; 940 nm detects erythrocytes; and the 1300 nm wavelength corrects for ambient light and the presence of air bubbles.



When plasma is present, all 3 light beams pass through and contact the detector. The Angel device recognizes the presence of plasma and turns the valve to collect PPP. The PPP is deposited in the PPP collection reservoir.

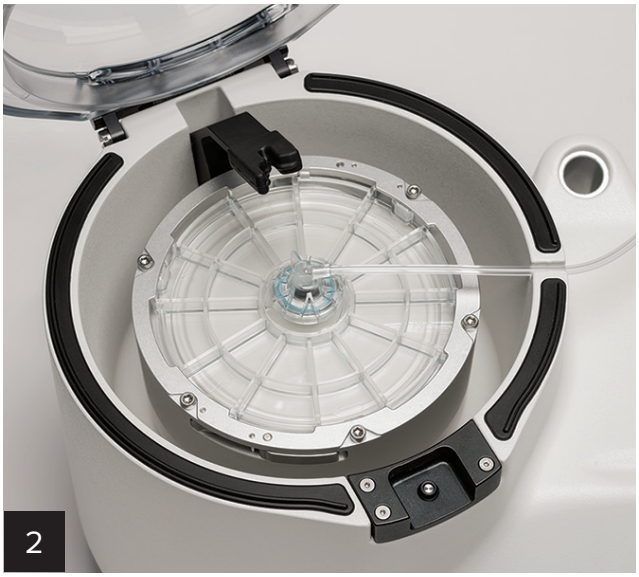


When platelets and nucleated cells are present, the 470 nm wavelength of light is absorbed. The absence of the 470 nm beam on the detector alerts the Angel system to stop collecting PPP; it will then actuate the valve to collect PRP. The PRP is directed into the collection syringe on top of the unit.

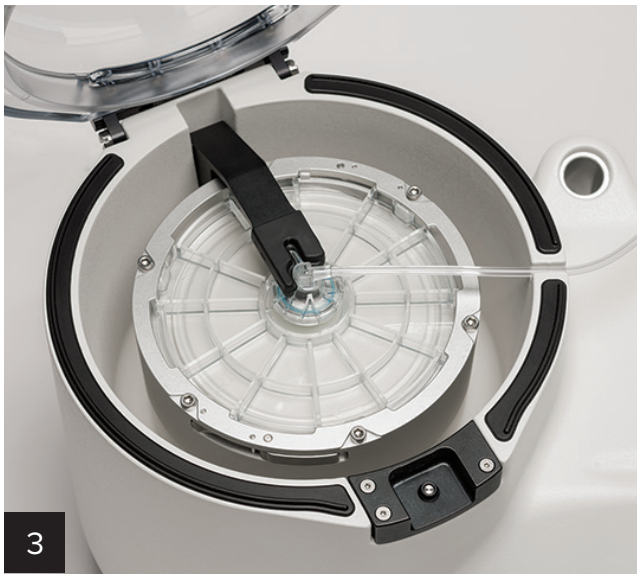


The 940 nm wavelength is absorbed by RBCs. When the detector no longer detects the 940 nm beam, the Angel system will allow a percentage of RBCs to pass through into the PRP collection syringe. The percentage of RBCs collected in the PRP syringe is determined by the hematocrit (HCT) setting selected by the operator.

Remove the Angel® cPRP processing set from the tray and place it on top of the machine.

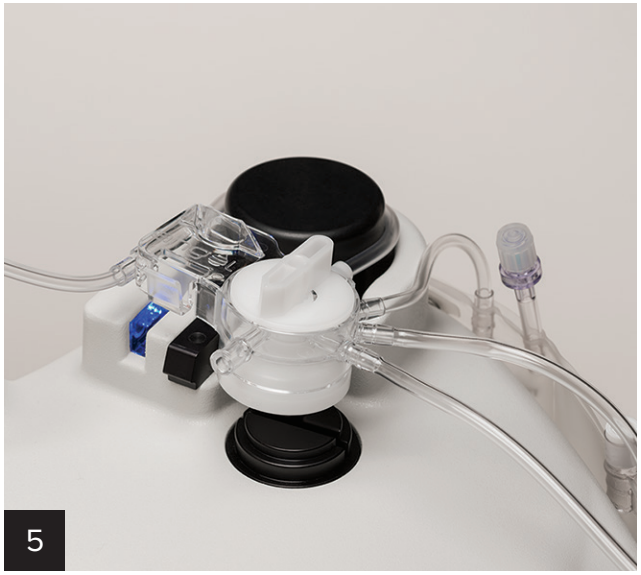


Insert the variable volume separation chamber into the centrifuge adapter by aligning the notches.



Once aligned, press down and turn clockwise until the position indicators snap into place. Place the tube leading from the separation chamber through the centrifuge well slot.

Lower the centrifuge stator arm and align it with the raised tab on top of the separation chamber. Close the centrifuge lid.



5

Place the pump loop tubing over the pump rotor. The pump loop will automatically load when the processing cycle is initiated.

6

Press down firmly on the back side of the platelet cuvette until the assembly is snapped in place.

Note: It is essential that the platelet cuvette/valve assembly seats fully on the machine to obtain proper sensing of blood components.

7

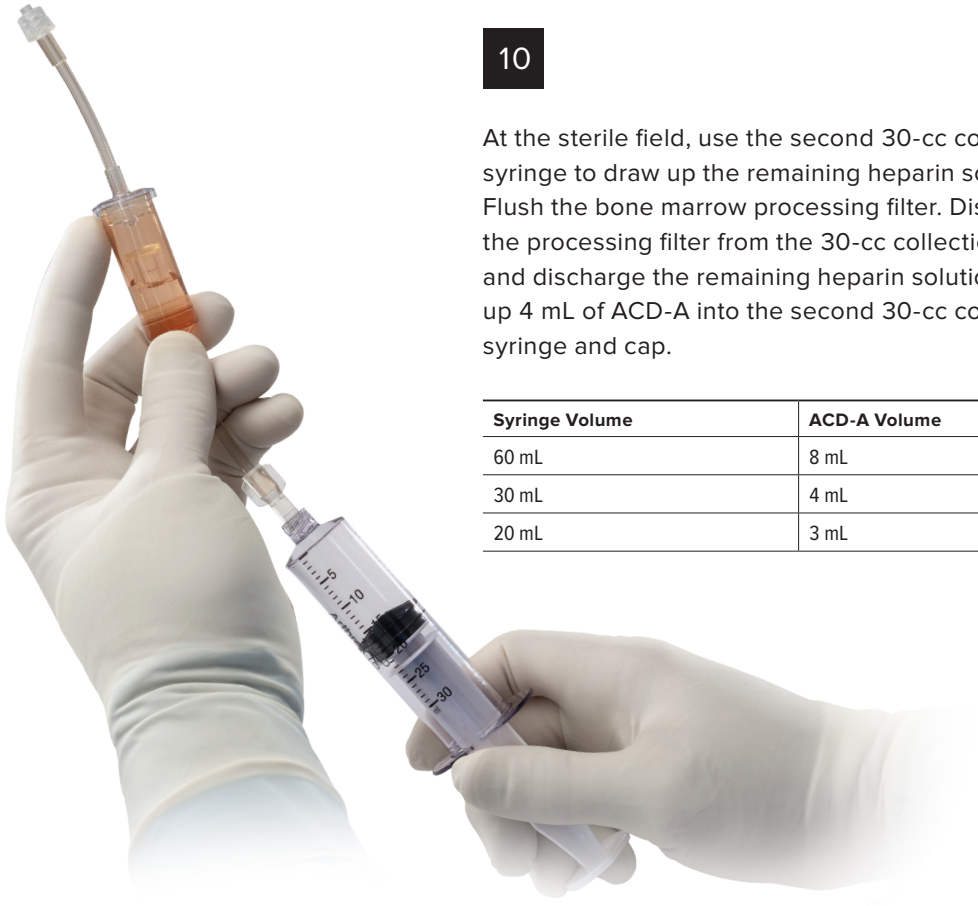
Hang the 3-compartment reservoir bag on the 2 support pins located on the side of the Angel® system.

8

Prepare the heparin flush. Dilute 5000 units of heparin (1000 units/mL) with 5 mL of sterile saline to achieve a final concentration of 500 units per mL. Transfer heparin flush to sterile field.

9

At the sterile field, draw up the heparin flush in the first 30-cc collection syringe. Flush the bone marrow harvest needle. Return the remaining heparin flush solution to the medicine cup. Draw up 4 mL of ACD-A into the first 30-cc collection syringe and cap.



10

At the sterile field, use the second 30-cc collection syringe to draw up the remaining heparin solution. Flush the bone marrow processing filter. Disconnect the processing filter from the 30-cc collection syringe and discharge the remaining heparin solution. Draw up 4 mL of ACD-A into the second 30-cc collection syringe and cap.

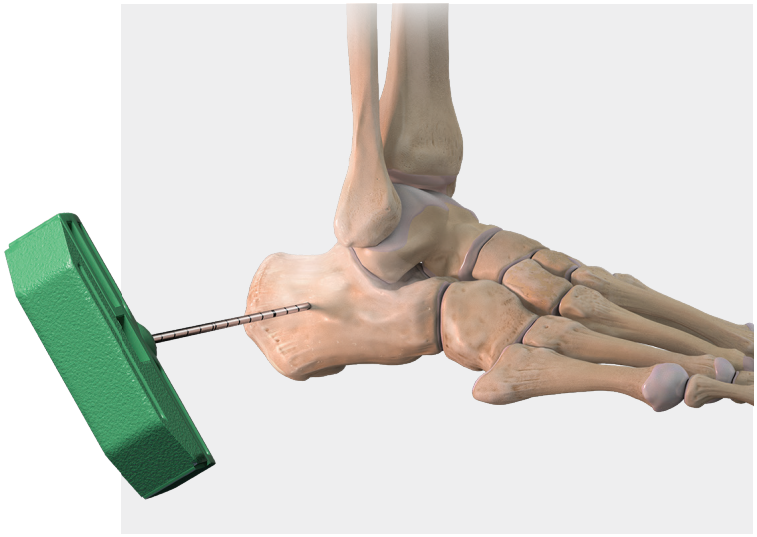
Syringe Volume	ACD-A Volume
60 mL	8 mL
30 mL	4 mL
20 mL	3 mL

Potential BMA Harvest Site Guidelines

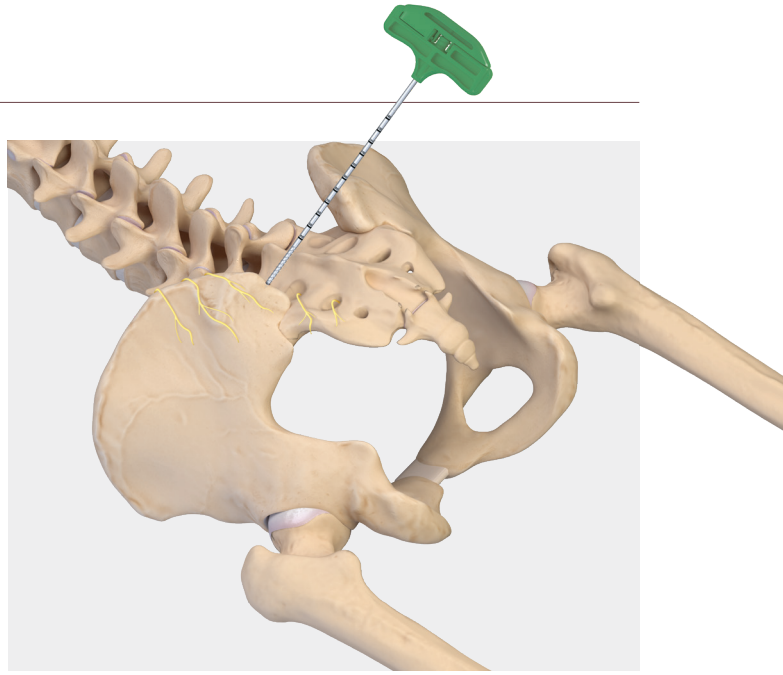
Harvest Site	Approximate BMA Harvest Volume
Iliac Crest	60 mL-100 mL
Distal Femur	60 mL-80 mL
Proximal Tibia	40 mL-60 mL
Proximal Humerus	20 mL-40 mL
Calcaneus	20 mL-40 mL

Guidelines only. Actual results may vary.

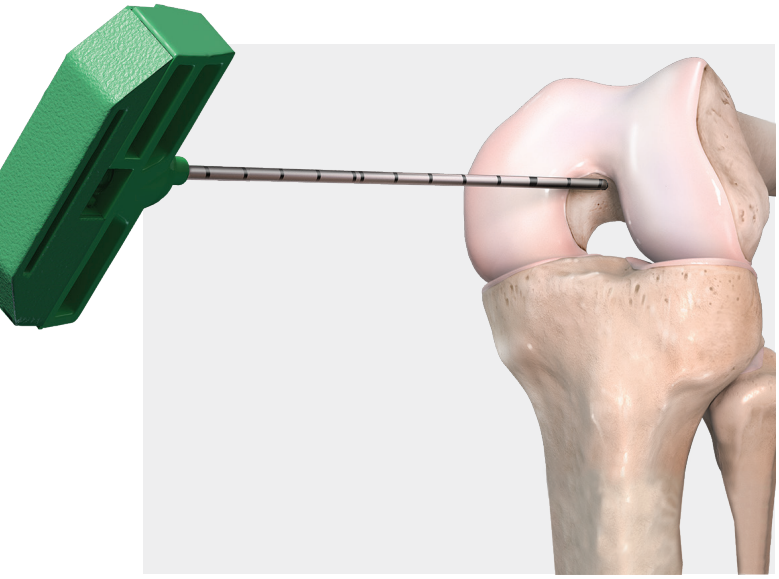
Potential BMA Harvest Techniques



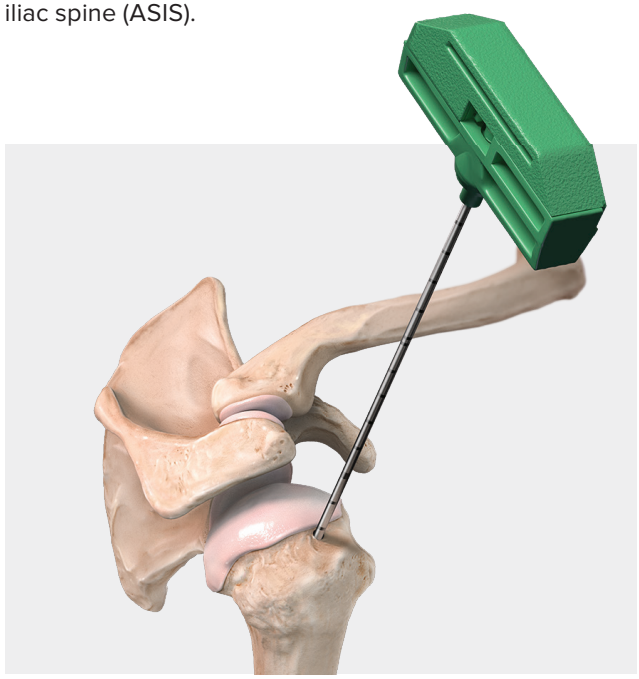
Calcaneus Harvest Technique
Make a small incision 1 cm anterior and 1 cm plantar to the insertion of the Achilles tendon over the lateral portion of the calcaneus, taking care to avoid the sural nerve. When inserting the needle, do not exceed a depth of 3 cm. Aspirate a small volume of bone marrow, redirecting as necessary until the desired volume of BMA is obtained.



Posterior Iliac Crest Harvest Technique
Insert the trochar 3 cm superior to the posterior superior iliac spine (PSIS) to avoid damaging the cluneal nerves. Palpate to find the medial and lateral edges of the iliac crest and insert the trochar in the middle of the superficial cortex, aiming toward the anterior superior iliac spine (ASIS).



Arthroscopic Distal Femur Harvest Technique
Bone marrow aspiration should occur before drilling tunnels. Arthroscopically insert the needle in the apex of the femoral notch to a depth of 3 cm. Turn off the arthroscopic fluid before removing the trocar and attaching the syringe. Slowly aspirate the bone marrow. In order to obtain the desired volume, it may be necessary to rotate 90° or withdraw the needle 0.5 cm when aspirating; prevent withdrawing the needle past the 2-cm mark.

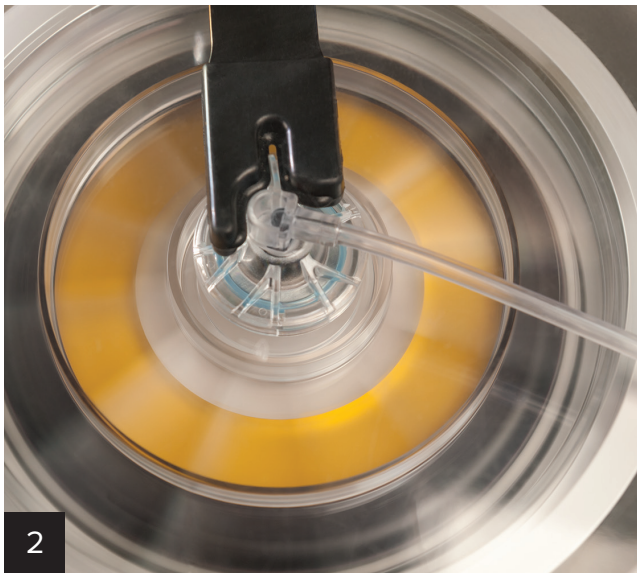


Arthroscopic Proximal Humerus Harvest Technique
Bone marrow aspiration should occur before any fixation implants are inserted. Arthroscopically insert the needle lateral to the rotator cuff footprint, aiming distally and medially; do not exceed a depth of 3 cm. Turn off the arthroscopic fluid before removing the trocar and attaching the syringe. Aspirate the bone marrow slowly. In order to obtain the desired volume, it may be necessary to rotate 90° or withdraw the needle 0.5 cm when aspirating; prevent withdrawing the needle past the 2-cm mark.

Angel® cPRP System Processing

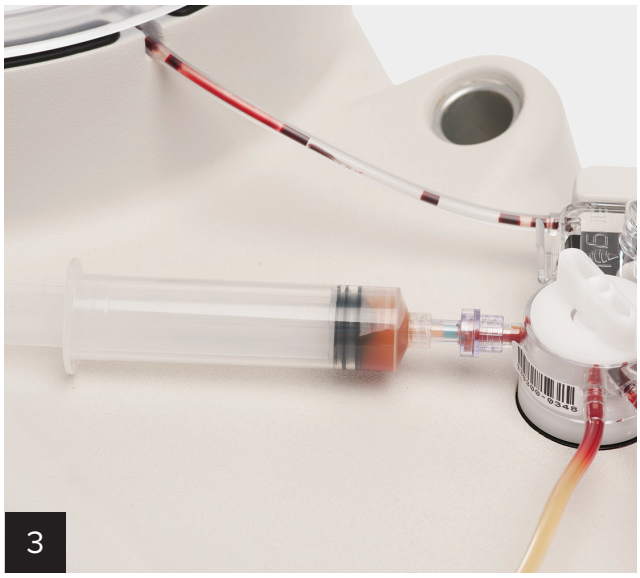
1

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.



2

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.



3

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.

4

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.

5

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.

6

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.

Angel® cPRP System

Allograft demineralized bone matrix (DBM) is optimal for combination with autologous, biologically active products. DBM putty, sponges, and cortical fibers provide a grafting material with excellent handling characteristics when hydrated with a biologically active fluid such as PRP concentrate from BMA.

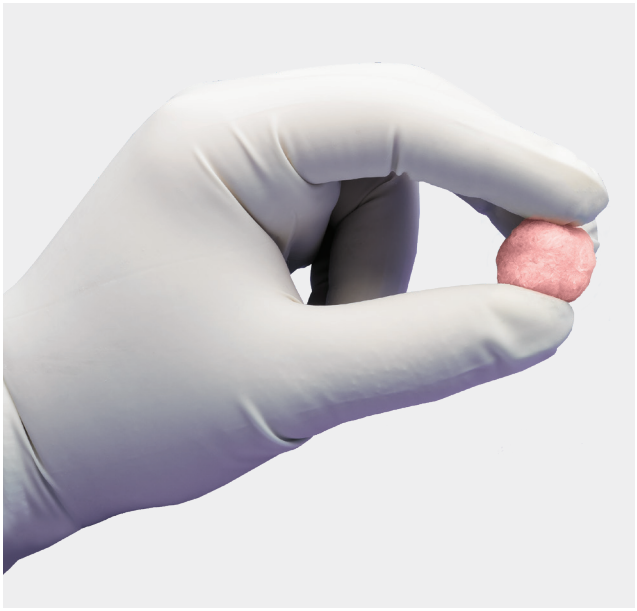
Hydrated DBM provides a scaffold that is rich in growth factors, natural architecture, and interconnected porosity.

The Angel cPRP and BMA processing kit is a convenient and rapid means of concentrating the cellular contents and growth factors contained in BMA.

AlloSync™ Pure DBM

AlloSync Expand Demineralized Cortical Fibers

AlloSync Button



ArthroCell™ Cellular Bone Graft

AlloSync™ Putty, Gel, and Paste

Ordering Information

Product Description	Item Number
Angel® PRP System Centrifuge	ABS-**10060**
Angel PRP System Centrifuge, refurbished	ABS-**10060R**
Angel cPRP and BMA Tray	ABS-**10062T**
Angel BMA Processing Kit With Vortex™ Threaded Recovery Needle, 8 ga closed tip, w/ ACD-A	ABS-**10062K-TH8CTA**
Angel BMA Processing Kit With Vortex Threaded Recovery Needle, 8 ga open tip, w/ ACD-A	ABS-**10062K-TH8OTA**
Angel BMA Processing Kit With Vortex Threaded Recovery Needle, 13 ga closed tip, w/ ACD-A	ABS-**10062K-TH13CTA**
Angel BMA Processing Kit With Vortex Threaded Recovery Needle, 13 ga open tip, w/ ACD-A	ABS-**10062K-TH13OTA**
Angel BMA Processing Kit With Vortex Threaded Recovery Needle, 8 ga closed tip, w/o ACD-A	ABS-**10062K-TH8CT**
Angel BMA Processing Kit With Vortex Threaded Recovery Needle, 8 ga open tip, w/o ACD-A	ABS-**10062K-TH8OT**
Angel BMA Processing Kit With Vortex Threaded Recovery Needle, 13 ga closed tip, w/o ACD-A	ABS-**10062K-TH13CT**
Angel BMA Processing Kit With Vortex Threaded Recovery Needle, 13 ga open tip, w/o ACD-A	ABS-**10062K-TH13OT**
Arthrex Biologics Cart	ABS-**10010**
BioXpress™ Graft Delivery Device, 10 cm, blunt tip	ABS-**10053-10**
BioXpress Graft Delivery Device, 15 cm, blunt tip	ABS-**10053-15**
BioXpress Graft Delivery Device, 10 cm, angled tip	ABS-**10053-10-45**
BioXpress Graft Delivery Device, 15 cm, angled tip	ABS-**10053-15-45**
Viscous-Gel™ High Viscosity Applicator	ABS-**10050**
Viscous-Spray™ Low Viscosity Applicator	ABS-**10051**
Viscous-Spray II Low Viscosity System	ABS-**10052**
Fenestrated Delivery Needle	ABS-**20000**
Tuohy Delivery Needle	ABS-**21000**
Cannula Bending Tool	AR-**6650**

To order, please call Arthrex, Inc. at **(800) 933-7001**. Contact your local Arthrex representative for additional information.

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