



# BMA<sup>Q</sup>2<sup>®</sup>

BONE MARROW ASPIRATE CONCENTRATE

THE NATURAL CHOICE FOR OPTIMIZING HEALING

**HARVEST<sup>®</sup>**

Developing technologies for **accelerating healing, naturally<sup>®</sup>**

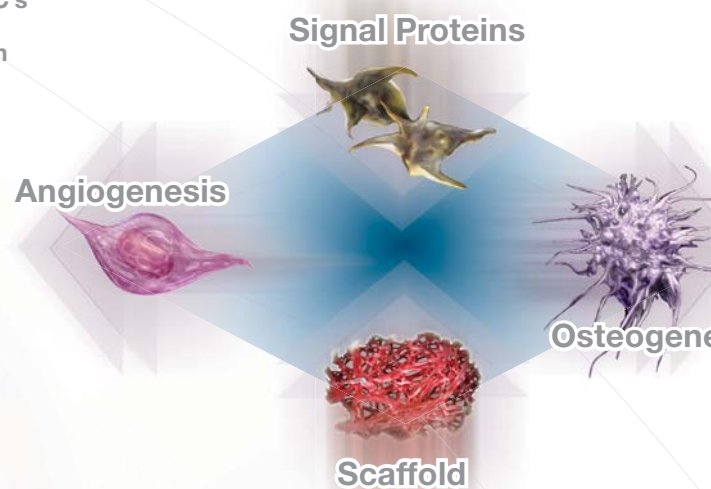
# Iliac Crest: The Gold Standard

All bone formation is dependent on the recruitment of endothelial progenitor cells (EPC's), hematopoietic stem cells (HSC's), mesenchymal stem cells (MSC's) and their supporting accessory cells to the defect site – Total Nucleated Cells.

Iliac crest autograft is often considered the gold standard for bone grafting. The iliac crest contains bone marrow which is a rich source of the regenerative cells needed for angiogenesis, and optimal bone formation and healing, including:

- Endothelial Progenitor Cells ::** Stimulate angiogenesis, release BMP-2 and BMP-6, and up-regulate the production of BMP-2<sup>1</sup>
- Hematopoietic Stem Cells ::** Orchestrate bone formation and directly convert to stromal MSC's (CD34<sup>+</sup>)<sup>2, 3, 4</sup>
- Mesenchymal Stem Cells ::** Convert to osteoblasts in support of new bone formation<sup>2, 3, 4, 5</sup>
- Platelets ::** Mediate cell-to-cell adhesion through the release of various adhesion and growth factors such as SDF-1 $\alpha$ <sup>6</sup>
- Lymphocytes ::** Support the migration and proliferation of EPC's<sup>7</sup>
- Granulocytes ::** Release vascular endothelial growth factors in support of angiogenesis<sup>8</sup>

## Essential Healing Factors



**BMAC<sup>®</sup> 2:** efficiently and effectively concentrates regenerative cells while retaining cellular viability and potential

# Reaping the Biological Benefits of Autologous Stem Cells

Harvest Technologies is the leader in developing point-of-care platforms to concentrate autologous stem cells, growth factors, and accessory cells to help optimize the conditions for healing. A decade ago, we introduced the first SmartPREP® Cell Concentrate System, making the use of autologous bioactive cells practical in hospital and office settings for the first time. Today it is standard-of-care.

Harvest continues its leadership tradition with the introduction of BMAC 2 for concentrating stem cells from bone marrow aspirate.



Harvest's mission is to further  
expand and enhance the  
use of autologous bioactive  
cells to help optimize the  
conditions for healing and  
improved patient outcomes.



# Autograft without the Morbidity

Iliac crest autograft is a rich source of regenerative cells for bone formation. However, harvesting autograft is traumatic, time-consuming, and associated with significant morbidity in as many as 30% of the cases.<sup>9</sup>

The cellular composition of autograft and concentrated nucleated cells from marrow aspirate are virtually equivalent. Transplanting these concentrated regenerative cells in a scaffold mimics autograft.

BMAC vs. Autograft			
	Autograft	Bone Marrow Aspirate	Harvest BMAC
<b>Total Nucleated Cells/mL</b>	<b>56 x 10<sup>6</sup></b> (n=10) <sup>10</sup>	<b>19 x 10<sup>6</sup></b> (n=10) <sup>10, 11</sup>	<b>72 x 10<sup>6</sup></b> (n=200) <sup>10, 11</sup>
<b>BMP-4*, pg-mL</b>	<b>144</b> (n=3) <sup>11</sup>	<b>19</b> (n=11) <sup>11</sup>	<b>180</b> (n=11) <sup>11</sup>

\* The production of BMP's are up-regulated in the fracture site, derived from HSC's, and members of the TGF- $\beta$  superfamily of proteins.<sup>1</sup>

BMAC is a minimally invasive procedure that significantly reduces patient morbidity at the harvest site and saves operating room time.

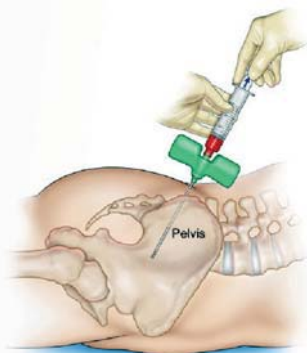
The Harvest BMAC 2 Series used with the SmartPReP 2 technology platform, eliminates the need for autograft by efficiently concentrating and recovering regenerative cells while retaining their cellular viability and proliferative potential.

# Superior Performance

Studies have shown healing is compromised in the absence of cellular concentration, particularly with patients that have significant comorbidities.<sup>12,13,14</sup> The BMAC system produces the highest cell yields available while concentrating the full complement of cells.<sup>15</sup>

## The BMAC 2 System:

- :: Concentrates all the key cells in their natural ratios
- :: Keeps cells in their natural plasma for maximum viability
- :: Enables the clinician to adjust the cell dose/volume
- :: Concentrates cells in less than 15 minutes at point-of-care
- :: Produces consistent and reliable nucleated cell loads<sup>11</sup>



Aspirate



Concentrate



Deliver

## References

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- (2) Matsumoto, T, et al, Therapeutic Potential of Vasculogenesis and Osteogenesis Promoted by Peripheral Blood CD34-Positive cells for Functional Bone Healing, *American Journal of Pathology*, 2006; 169:1440-1457
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- (7) Hurl, J, et al, Identification of a Novel Role of T Cells in Postnatal Vasculogenesis: Characterization of Endothelial Progenitor Cell Compartments for Circulating Vascular Endothelial Growth Factor, *Angiogenesis*, 2004; 6:283-287
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- (13) Stenderup, K, et al, Aging is Associated with Decreased Maximal Life Span and Accelerated Senescence of Bone Marrow Stromal Cells, *Bone*, 2003; 33:919-926
- (14) Hermann, P, et al, Concentration of Bone Marrow Total Nucleated Cells by a Point-of-Care Device Provides a High Yield and Preserves Their Functional Activity, *Cell Transplantation*, 2008; 16:1059-1069

# SmartPReP 2 and BMAC 2: A System You Can Trust

## SmartPReP 2

- :: Multifunction, point-of-care platform for concentrating autologous cells
- :: More than a decade of proven reliability
- :: Delivers 100% pure bone marrow aspirate concentrate
- :: One-button operation
- :: 15-minute automated process



## BMAC 2 Procedure Packs

- :: All-inclusive procedure packs based on clinical need (*standard 60 mL kit shown above*)
- :: Patented floating shelf technology delivers the multi-potent and progenitor cells needed
- :: Unique 5 port aspiration needle with trocar and blunt tip stylets maximizes cell harvesting in 60 mL and 120 mL kits, and new 15g BMA needle with depth stop in the 30 mL kit can be used to aspirate BMA from sources such as the vertebral body or the iliac crest.
- :: New **MARROWPREP™** collection and filter set greatly simplifies the preparation of BMA – entirely in the sterile field.

*The safety and effectiveness of this device for in vivo indications for use has not been established.*

# HARVEST®

Developing technologies for **accelerating healing, naturally®**

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CE Mark Authorized  
BSI Registered Firm  
ISO 13485 Registered

## Ordering Information (BMAC 2)

<b>SMP2-115</b>	<b>SmartPReP 2 Concentrate System</b> 115V-50/60 Hz or 240V-50/60 Hz
<b>WS-2</b>	<b>SmartPReP 2 Workstation</b>
<b>BMAC2 30-01</b> <b>NEW</b>	<b>Bone Marrow Aspirate Concentrate Procedure Pack</b> The BMAC2 30-01 Pack contains bone marrow aspiration and processing components for 30 mL bone marrow aspirate. Makes up to 4 mL BMAC from 30 mL marrow. 1/case.
<b>BMAC2 60-01</b>	<b>Bone Marrow Aspirate Concentrate Procedure Pack</b> Includes bone marrow aspiration and processing components for 60 mL bone marrow aspirate. Makes up to 10 mL BMAC from 60 mL marrow. 1/case.
<b>BMAC2 120-01</b>	<b>Bone Marrow Aspirate Concentrate Procedure Pack</b> Includes bone marrow aspiration and processing components for 120 mL bone marrow aspirate. Makes up to 20 mL BMAC from 120 mL marrow. 1/case.
<b>GDP-10</b>	<b>Graft Delivery Pack</b> For pre-mixing bone graft materials with bone marrow concentrate. 3/case.
<b>SK/S</b>	<b>SmartJet® Spray Applicator Kit</b> Spray delivery system. 6/case.
<b>LK/2</b>	<b>SmartJet® Liquid Applicator Kit</b> Liquid delivery system. 6/case.
<b>BAN-10</b>	<b>Bone Marrow Aspiration Needle Kit</b> 11 gauge x 110mm bone marrow aspiration needle with color coded fenestrated needle and blunt tip stylets. 10/case.

**To arrange an evaluation or for more information,  
call 877.8.HARVEST (toll free) or visit us at  
[www.harvesttech.com](http://www.harvesttech.com)**

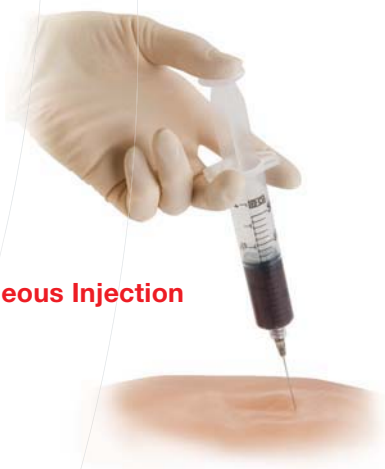


In less than **15 minutes**, 60 mL of  
bone marrow aspirate provides  
**10 mL of concentrated  
autologous stem cells**  
and growth factors.

# Delivery Options



**Enriched Bone Grafts**



**Percutaneous Injection**



**Topical Spray**