


Autologous Biologics

TERUMOBCT

A photograph of two surgeons in an operating room. The surgeon on the right is wearing a blue surgical cap and a white face mask, looking intently at the patient. The surgeon on the left is wearing a grey surgical cap and a white face mask, also looking at the patient. They are both wearing blue surgical gowns. The background is a neutral, light-colored wall.

**ENHANCE PATIENT CARE
WITH THE RIGHT AUTOLOGOUS
BIOLOGIC SOLUTION**

A microscopic view of numerous red blood cells, which are biconcave discs, filling the frame. The cells are densely packed and appear in various shades of red and pink against a lighter background.

Helping enhance patient care by harnessing
the biologic potential of concentrated blood,
bone marrow and adipose tissue.

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AUTOLOGOUS BIOLOGICS:
HARNESSING THE POWER OF A PATIENT’S OWN CELLS

WHAT ARE AUTOLOGOUS BIOLOGICS?

Autologous biologic products are created by collecting and concentrating naturally occurring cells from a patient's own body; these products offer physicians alternative options for patients presenting with a wide variety of disorders, injuries and conditions.



During the procedure, cells are drawn from the patient, separated and concentrated using a specialized disposable kit and centrifuge, and then delivered to the application site. Processing can take less than 14 minutes.

Because the biologic is prepared from the patient's own cells, there is a significantly reduced risk of rejection or immune response using autologous biologics as compared to alternative options.^{1,2}

SmartPrep® System



THREE AUTOLOGOUS BIOLOGICS. ONE SYSTEM.

THE ONLY SYSTEM CLEARED
TO PROCESS THE THREE MAJOR
AUTOLOGOUS BIOLOGICS:

**BMA, whole blood
and lipoaspirate**

The first system to offer **one-button processing** of bone marrow aspirate, whole blood and lipoaspirate on a single point-of-care platform, the SmartPrep system **is designed to deliver a high concentration and optimal composition of autologous regenerative cells.**³

The system offers a high level of reproducibility.³ With one-button operation and automated processing that takes 14 minutes or less, the SmartPrep system is simple and easy to use.

The value and flexibility of the SmartPrep system help you limit your capital investment while expanding the options available to your patients.

Clinicians have the freedom to select the autologous biologic they believe will benefit each individual patient most.



BMAC®

BMAC (BONE MARROW ASPIRATE CONCENTRATE) SYSTEM

The BMAC system is used to concentrate bone marrow aspirate (BMA) derived from a patient's own bone marrow.

The concentrated BMA produced using the BMAC system contains a rich mixture of components, including stem cells, progenitor cells, platelets, growth factors, lymphocytes and granulocytes.^{4,5,6}

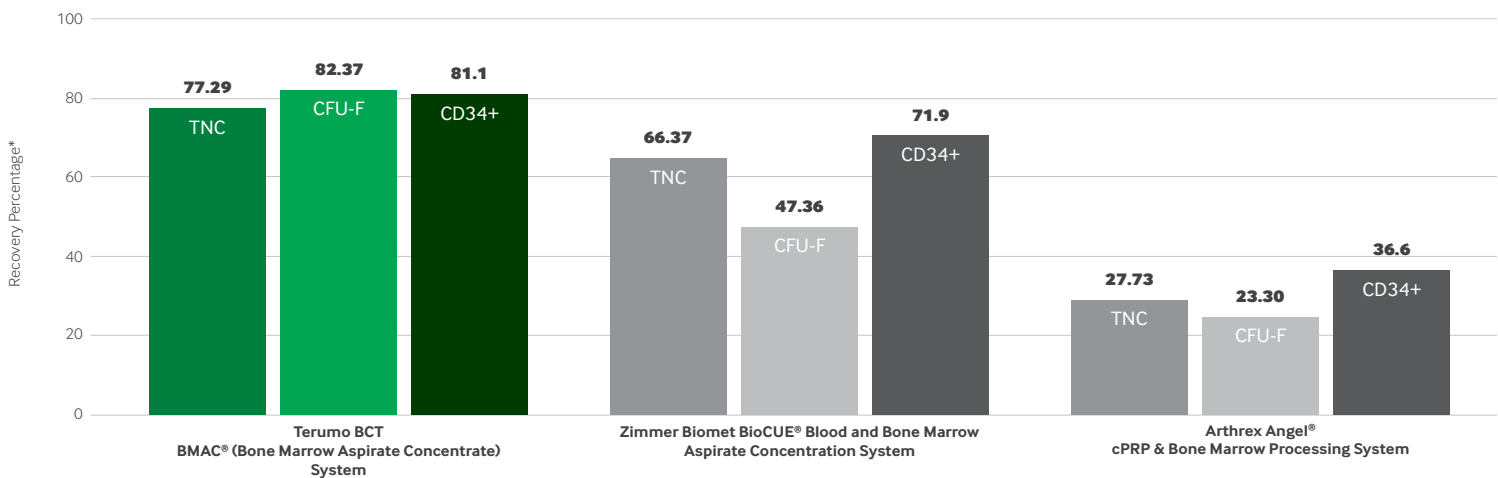
BMAC PRODUCED 2 to 3.5 Times More Consistent TNC Counts³

Lower variance produces higher confidence

HIGHER CELL RECOVERY³

THE HIGHER THE CELL RECOVERY, THE MORE CELLS AVAILABLE FOR A SURGEON TO DELIVER TO THE APPLICATION SITE.

BETTER CELL RECOVERY



TNC = Total nucleated cell
CFU-F = Colony-forming unit-fibroblast
N = 10

TNC PValue:

Biomet-Terumo BCT = 0.123

Arthrex-Terumo BCT = < 0.001

CFU PValue:

Biomet-Terumo BCT = < 0.001

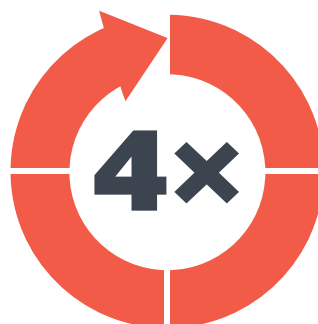
Arthrex-Terumo BCT = < 0.001

CD34+ PValue:

Biomet-Terumo BCT = 0.658

Arthrex-Terumo BCT = 0.001

*Based on one study, publication in progress.



The total nucleated cell (TNC) count found in a BMAC product is typically **four times more than that of unconcentrated BMA.**⁴



PRP®

PLATELET CONCENTRATE SYSTEM

Platelet-rich plasma (PRP) is plasma that contains a higher concentration of platelets than is typical for whole blood.

While platelet concentration is the primary focus of autologous PRP, preparations also **contain growth factors that may help optimize the conditions needed for healing.**^{7, 8, 9}

Other cellular components of PRP include white blood cells and peripheral stem cells. These components all play a biological role in the healing process and are provided at concentrated levels using the platelet concentrate system.



AdiPrep®

ADIPREP ADIPOSE CONCENTRATION SYSTEM

Adipose tissue is a heterogeneous biological tissue that offers stem cell content and cellular heterogeneity in a concentration that is higher than that of PRP but lower than that of concentrated BMA.¹⁰ Concentrated adipose tissue provides clinicians with a stem-cell-rich product in the form of a 3D scaffold with a high concentration of MSCs.

The AdiPrep system can generate an adipose graft capable of delivering a high concentration of stem cells directly to the application site.¹¹ The chart below shows the concentration of cellular components in a conventional adipose tissue graft.



The AdiPrep system generates a purified, MSC-rich graft in just 4 minutes' processing time.

Cellular Components From the AdiPrep System¹¹

Nucleated cells	230,000/mL
Cell viability	78% to 95%

About Terumo BCT



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OVER **YEARS**
OF EXPERIENCE IN
CELL COLLECTIONS

MORE THAN
4 MILLION



AUTOLOGOUS BIOLOGIC
PROCEDURES PERFORMED

TRUSTED BY CLINICIANS AROUND THE WORLD

Terumo BCT products have been used in more than 4 million cases and counting in hospitals and physicians' offices around the world—including some of the most prestigious and cutting-edge medical centers. Physicians choose Terumo BCT based on the high cell counts in the biologics created, the flexibility of the processing system and the dedicated support that comes with every Terumo BCT product.

A HISTORY OF INNOVATION

A global leader in blood component, therapeutic apheresis and cellular technologies, Terumo BCT entered the cell therapy market more than 40 years ago. Harvest Technologies became our Autologous Biologics business unit in 2015. Its two-decade history in point-of-care autologous biologics^{12,13} was a welcome addition to our cell therapy technologies portfolio.

Terumo BCT provides world-class manufacturing expertise, a well-established global footprint and a strong investment in innovation.

KEY FIRSTS

FOR OUR COMPANY



- 1969** TERUFLEX® Blood Bag System, our first blood bag set, is introduced in Japan
- 1972** COBE® 2991 Cell Processor begins setting performance standards for numerous cell processing applications; it is still in use today
- 1988** COBE® Spectra Apheresis System is the world's first centrifugal separation device to perform therapeutic plasma exchange with automated fluid balance and anticoagulant management controls
- 1999** SP-100, the first process disposable for use with the Harvest SMP-1000 system to have a fixed separation shelf for separating red blood cells from plasma, is cleared for manufacturing
- 2001** The Harvest PRP separation system, an automated autologous blood separation system, is cleared
- 2002** First process disposable designed with floating shelf technology for use with the SmartPrep 2 System is cleared for manufacturing
- 2003** Trima Accel® Automated Blood Collection System is the only apheresis system that collects any transfusable component in any combination
- 2006** BMAC® (Bone Marrow Aspirate Concentrate) System is cleared
- 2012** AdiPrep® Adipose Concentration System is cleared

Customer Support

HERE TO SERVE YOU

As a global leader in cellular technologies and a company with autologous biologics customers in 40 countries, we are proud of our reputation for high-quality products and dedicated customer service. We are committed to actively supporting you with the exceptional service you need to provide quality patient care.



CLINICAL SUPPORT

- Worldwide clinical support to resolve procedural issues
- Available during the busiest clinical hours, 6 a.m. to 5 p.m. (MT) Monday through Friday, excluding U.S. holidays
- In-service and on-site problem-solving available in most regions



TECHNICAL SUPPORT

- Worldwide device and disposables support
- Technical training classes
- Available during the busiest clinical hours, 6 a.m. to 5 p.m. (MT) Monday through Friday, excluding U.S. holidays
- Field performance support to investigate issues and provide process optimization and system troubleshooting may be available
- Service-level agreements to meet your needs

CUSTOMER SUPPORT

Toll-free (U.S. only): 1.877.842.7837

Direct: 1.303.542.5050

Terumo BCT Autologous Biologics

RISK INFORMATION

These procedures require needle access, possibly resulting in discomfort, tenderness, bruising, swelling, bleeding or pain at the access site, at which there is a small risk of infection. Lightheadedness, fainting, nausea or vomiting may occur.

Before any medical procedure, review prescription and nonprescription medications and any natural or herbal remedies your patient is taking or plans to take.

**TO SCHEDULE A MEETING OR TO
LEARN MORE ABOUT TERUMO BCT,
VISIT [TERUMOBCT.COM/biologics](https://www.terumobct.com/biologics)
OR CALL 1.877.842.7837**

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REFERENCES

- ¹Safdar A, Shaaban H, Tibayan R, et al. The clinical efficacy of using autologous platelet-rich plasma in hip arthroplasty: a retrospective comparative study. *J Nat Sci Biol Med.* 2015;6(1):49-55.
- ²Bowden RA, Slichter SJ, Sayers M, et al. A comparison of filtered leukocyte-reduced and cytomegalovirus (CMV) seronegative blood products for the prevention of transfusion-associated CMV infection after marrow transplant. *Blood.* 1995;86(9):3598-3603.
- ³Based on one study, publication in progress, where the BMAC system was compared to Zimmer Biomet BioCUE® Blood and Bone Marrow Aspirate Concentration System and Arthrex Angel® systems.
- ⁴Hermann PC, Huber SL, Herrier T, 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 Transplant.* 2008;16(10):1059-1069.
- ⁵Gianakos A, Sun L, Patel J, Adams D, Liporace F. Clinical application of concentrated bone marrow aspirate in orthopaedics: A systematic review. *World J Orthop.* 2017;8(6):491.
- ⁶Hansraj KK. Stem cells in spine surgery. *Surg Technol Int.* 2016;10(29):348-358.
- ⁷Giusti I, Rughetti A, D'Ascenzo S, et al. Identification of an optimal concentration of platelet gel for promoting angiogenesis in human endothelial cells. *Transfusion.* 2009;49(4):771-778.
- ⁸El-Sharkawy H, Kantarci A, Deady J, et al. Platelet-rich plasma: growth factors and pro- and anti-inflammatory properties. *J Periodontol.* 2007;78(4):661-669.
- ⁹Fiore S, Serhan C. Lipoxin A4 receptor activation is distinct from that of the formyl peptide receptor in myeloid cells: inhibition of CD11/18 expression by lipoxin A4-lipoxin A4 receptor interaction. *Biochemistry.* 1995;34(51):16678-16686.
- ¹⁰Bourin P, Bunnell BA, Casteilla L, et al. Stromal cells from the adipose tissue-derived stromal vascular fraction and culture expanded adipose tissue-derived stromal/stem cells: a joint statement of the International Federation for Adipose Therapeutics and Science (IFATS) and the International Society for Cellular Therapy (ISCT). *Cytotherapy.* 2013;15(6):641-648.
- ¹¹Internal data. Data on file.
- ¹²Data Research, Inc. 2015: U.S. market research report for orthopedic cell therapy.
- ¹³Transparency Market Research. 2016: Platelet-rich plasma market: global industry, size, share, growth, trends and forecast, 2016-2024.

TERUMOBCT

As a global leader in blood component, therapeutic apheresis and cellular technologies, we believe in the potential of blood to do even more for patients than it does today. This belief inspires our innovation and strengthens our collaboration with customers.

TERUMOBCT.COM

Terumo BCT, Inc.

10811 West Collins Ave.
Lakewood, Colorado 80215-4440
USA

USA Phone: 1.877.339.4228
Phone: +1.303.231.4357
Fax: +1.303.542.5215

Terumo BCT Europe N.V.

Europe, Middle East and Africa
Ikaroslaan 41
1930 Zaventem
Belgium

Phone: +32.2.715.0590
Fax: +32.2.721.0770

Terumo BCT Asia Pte. Ltd.

89 Science Park Drive
#04-25 (Lobby B)
The Rutherford
Singapore 118261

Phone: +65.6715.3778
Fax: +65.6774.1419

Terumo BCT Latin America S.A.

La Pampa 1517-12th Floor
C1428DZE
Buenos Aires
Argentina

Phone: +54.11.5530.5200
Fax: +54.11.5530.5201

Terumo BCT Japan, Inc.

Tokyo Opera City Tower 49F,
3-20-2, Nishi-Shinjuku,
Shinjuku-ku, Tokyo 163-1450,
Japan

Phone: +81.3.6743.7890
Fax: +81.3.6743.9800