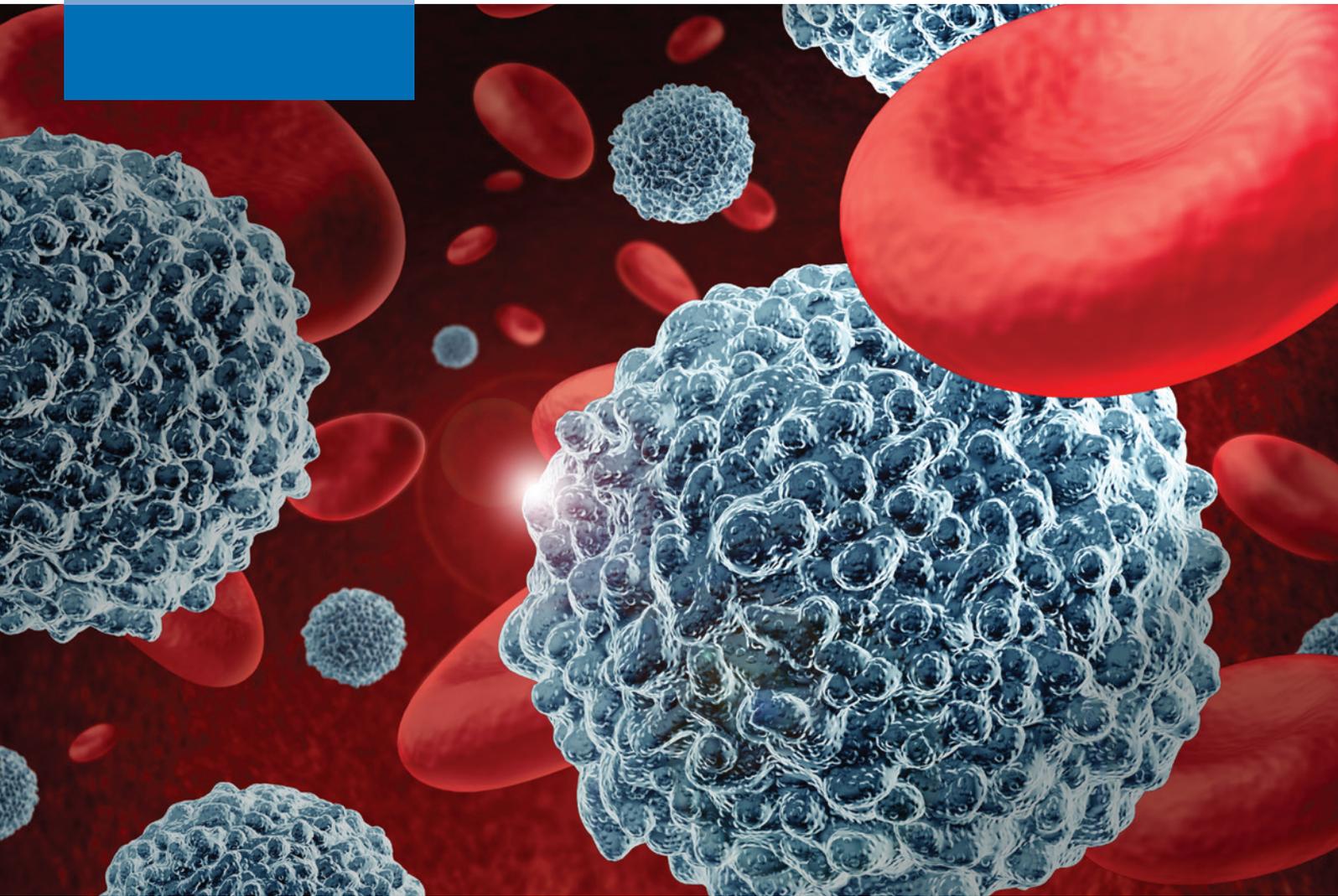


Hematopoietic and Immune Cell Products

Essential Tools for Hematopoietic Research



Essential Tools for Hematopoietic Research

Working with hematopoietic and immune cells requires not only a variety of donors, but also patience and skill to isolate and characterize specific cell types.

Let our 30+ years of experience help eliminate your hassles of finding donors, performing tedious cell isolations, and characterizing cells, so you can focus on your research.

Cells You Can Count On to Perform

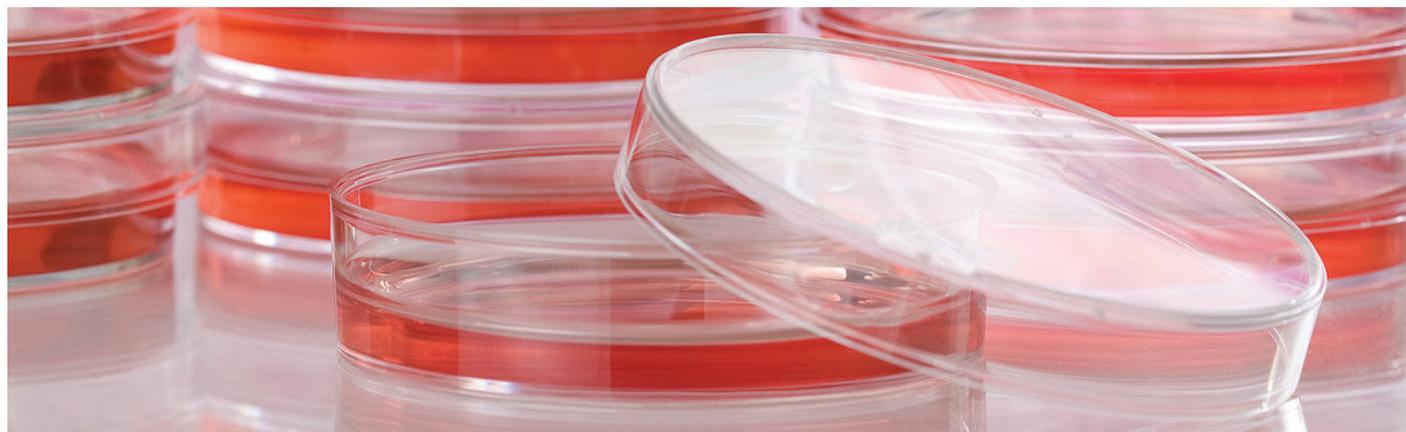
Cell performance is critical. We are so confident of the quality of our cells that we guarantee* viable cell counts and purity claims. Now you can get more for your money and stop worrying about the integrity of your cells.

Optimized Culture Systems

Your cells need sustenance to perform well. Depending upon your cell of choice, use Lonza's HPGM™ or LGM™ 3 Medium for optimal performance.

Choices in Cell Type and Tissue Source

Cells from different tissue sources can behave differently, which is why we offer cell types from a variety of tissue sources. In the following pages you can explore our catalog of fresh, unprocessed bone marrow as well as cells isolated from bone marrow, cord blood, and peripheral blood. We also have a custom cell isolation service, Cells on Demand™, to support non-catalog cell types or special bone marrow requests for your larger volume projects.



Fresh Human Bone Marrow

We Find the Donor. You Find the Cure.



We are Committed to Handling the Logistics So You Can Focus on Finding the Cure.

Providing the research community with unprocessed, normal human bone marrow while maintaining the well-being of our donors is at the forefront of our proprietary IRB approved bone marrow donor program. We have been delivering the fresh bone marrow you need for over 20 years so you can focus on the important work behind finding the cure.

More Cells

Fresh bone marrow samples are never diluted and contain greater than 15 million nucleated cells per mL, giving you more cells for your money. A total of 100 mL per donor can be ordered in 10 or 25 mL quantities.

Fresh Delivery

Fresh bone marrow is shipped at ambient temperature for next day delivery, so your samples arrive fresh and viable. International orders are also available, with varying lead times.

Relevant Results

A variety of donors is one of the cornerstones of relevant research results. We established our bone marrow donor program over 20 years ago in order to provide you with a variety of normal donors to help ensure you have relevant sample representation. In addition, we also understand the challenges HLA typing can present. In order to help you overcome some of those challenges, we now offer whole blood and bone marrow from the same donor.

Donor Criteria

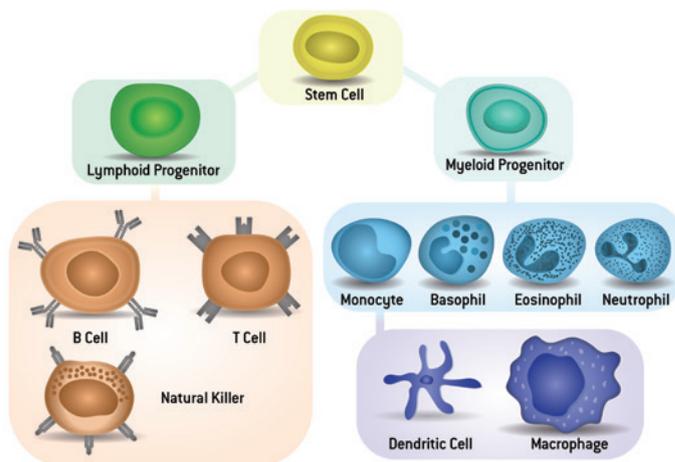
- Healthy males and non-pregnant females between the ages of 18 and 45 years old
- Acceptable vital signs and hematology values
- All donors are screened for general health and negative medical history for heart disease, kidney disease, liver disease, cancer, epilepsy, blood diseases, and bleeding disorders
- Negative blood tests for HIV-1, HIV-2, hepatitis B and hepatitis C

Bone Marrow and Cord Blood Hematopoietic Cells

Bone marrow and cord blood contain hematopoietic stem cells which are at the origin of hematopoiesis, the process by which blood cells are made. Hematopoietic cells are of increasing interest for their ability to help elucidate a more thorough understanding of the intricacies of the immune system and human disease.

Cord blood cells have been found to be phenotypically and functionally immature, suggesting they may not be as capable of mediating graft-versus-host disease as bone marrow or peripheral blood derived cells. This makes them an interesting tool for transplantation research. However, the number of umbilical cord cells is limited and thus poses a challenge in research as well as clinical utility. Conversely, bone marrow cells are unique in that they provide researchers the ability to work with large numbers of cells from a single donor or investigate differences in donors of various ages, genders, or ethnicities.

Most cell types are available from a variety of bone marrow and cord blood donors so you can compare and contrast characteristics and functions of cells from various donors as well as tissue sources.



CD34⁺ Cells

CD34⁺ cells are known to differentiate into all the various blood cell types. In addition, there is a positive correlation between the concentration of CD34⁺ cells and the likelihood of hematopoietic reconstitution upon transplantation. Thus, whether you are focusing on cell therapy research or drug discovery, CD34⁺ cells can play an important role in your hematopoietic research program.

- Isolated via immunomagnetic separation
- Characterization: $\geq 90\%$ CD34⁺ as assessed by flow cytometry
- Available from bone marrow and cord blood

CD133⁺ Cells

CD133⁺ cells are involved in multiple cellular functions, from regeneration and maintenance to metastasis and chemo-resistance.

- Isolated via immunomagnetic separation
- Characterization: $\geq 90\%$ CD133⁺ as assessed by flow cytometry
- Available from bone marrow and cord blood

Mononuclear Cells

Mononuclear cells (MNCs) are a mixed population of single nucleus cells, such as monocytes and lymphocytes. MNCs can be further purified or pushed to differentiate into individual cell types.

- Isolated via density gradient separation
- Available from bone marrow and cord blood

Stromal Cells

Bone marrow stromal cells are a mixed population of cell types, including fibroblasts, MSCs, adipocytes, endothelial cells, and macrophages. These cells can be used as a feeder layer for growing hematopoietic stem and progenitor cells for weeks without the need for exogenous cytokines.

- Mixed population mononuclear cells are cultured for 3–4 weeks, harvested, and cryopreserved
- Available from bone marrow

Mesenchymal Stem Cells (MSC)

MSCs are found in bone marrow and are capable of self-renewal as well as differentiation into bone, cartilage, fat, muscle, tendon, and marrow stroma cells. MSCs are excellent tools for regenerative medicine research.

- Cryopreserved at passage two
- Characterization: Positive for CD73, CD90, CD105, CD166 and CD44, and negative for CD14, CD19, CD34, CD45 and HLA-DR as assessed by flow cytometry
- Functional testing of differentiation to osteogenic, chondrogenic, and adipogenic lineages
- Optimized media kits for expansion and differentiation are available

Peripheral Blood Immune Cells

The human immune system is a complex and intricate network of cells and signaling pathways aimed at defending the body against the many pathogens present in our environment. To make things even more complex, studies are also providing insight into the intricacies of the intersections between the immune system and diseases such as cancer, brain disorders, and cardiovascular disease. Studying immunology and human disease *in vitro* requires not only finding donors, but also patience and skill to isolate specific immune cell types.

Cryopreserved cells can eliminate the hassles of finding donors and doing tedious cell isolations because all you have to do is thaw and culture. Let Lonza simplify your life with purified immune cells and optimized culture media.

Peripheral Blood Mononuclear Cells (PBMCs)

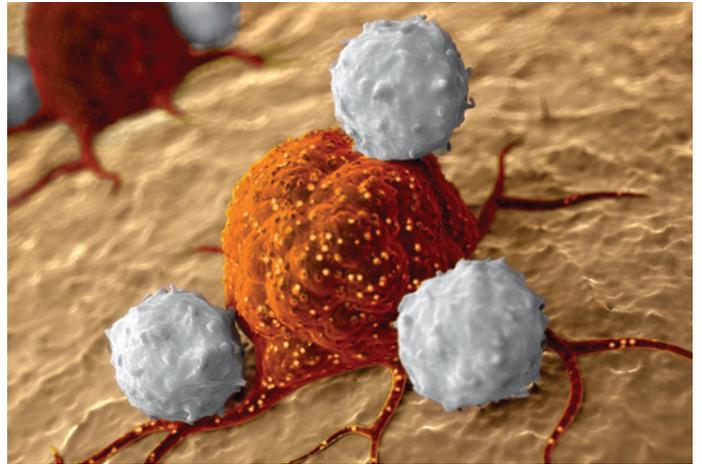
PBMCs are a mixed population of single nucleus cells. They can be further purified into individual cell types such as NK cells, T cells, and B cells. In addition, PBMCs are often times a rich source of monocytes, which can be directed to differentiate into either macrophages or dendritic cells through culture with various cytokines.

- Isolated via density gradient separation
- Guaranteed* to contain ≥ 50 million viable cells per ampoule

HPGM™ Hematopoietic Progenitor Growth Medium

HPGM™ can be used in combination with various cytokines to support proliferation or differentiation of hematopoietic stem and progenitor cells.

- Serum-free and chemically defined medium that contains only human proteins
- Tested for ability to support both proliferation and differentiation
- For use with bone marrow and cord blood CD34⁺, mononuclear, and CD133⁺ cells



CD14⁺ Monocytes

Monocytes play an important role in host defense as circulating monocytes and can also differentiate into tissue macrophages as well as antigen-presenting dendritic cells.

- Isolated via immunomagnetic separation from PBMCs
- Characterization: $\geq 90\%$ CD14⁺ as assessed by flow cytometry
- Available in three sizes and guaranteed* to contain $\geq 10, 20,$ or 40 million viable cells per ampoule, depending upon vial size ordered

CD4⁺ T Cells

CD4⁺ T cells play an important role in the cell-mediated immune response to infection. They work with other immune cells to promote various aspects of the immune system, such as macrophage activation and enhanced activity of natural killer cells.

- Isolated via positive immunomagnetic separation from mononuclear enriched cell population
- Characterization: ≥ 90% CD4⁺ as assessed by flow cytometry
- Guaranteed* to contain ≥ 10 million viable cells per ampoule

Natural Killer (NK) Cells

NK cells are key players in both innate and adaptive immunity and thus, are a critical component in overall host defense and immune regulation. They are traditionally characterized by their presence of the CD56 marker and absence of CD3. In addition, expression of CD16 is related to potency of NK cell cytotoxic effector activity.

- Isolated via either positive or negative immunomagnetic separation
- Characterization: ≥ 90% CD56⁺ as assessed by flow cytometry. CD16 expression is typically 60–90%. Negatively selected cells tend to exhibit higher amounts of CD16⁺ cells.
- Guaranteed* to contain ≥ 5 million viable cells per ampoule

Cells on Demand Services

If you don't see the cell type or tissue you're interested in, our Cells on Demand™ cell isolation services might be your answer.

Lonza has decades of experience isolating dozens of cell types from human and animal tissues. We also provide cell expansions, cells from matched donors, and a wide array of transfection and cell characterization services. Tell us your specifications and we'll aim to deliver cells with the characterization appropriate for your research interests.

Contact CellsonDemand@lonza.com for more details.

Dendritic Cells (DCs)

DCs are the messenger cells of the immune system, where they process and present pathogenic antigens to host T cells in order to initiate an immune response. There are many categories of DCs, with the monocyte-derived cells (Mo-DC or MDCC) being the most common.

- Immature DCs are differentiated from monocytes via culture with IL-4 and GM-CSF
- Characterization: CD11c⁺, CD86⁺, CD80⁺, HLA-DR⁻, and CD14⁻
- Guaranteed* to contain ≥ 3 million viable cells per ampoule
- Depending upon culture conditions, these cells are able to either survive up to 7 days in culture as immature DCs or fully differentiate into mature DCs upon culture with additional cytokines

LGM™ 3 Lymphocyte Growth Medium

LGM™ 3 was optimized for serum-free growth and maintenance of lymphocytes and dendritic cells. Cytokine and growth conditions vary depending upon application. The Lonza Scientific Support team is happy to suggest culture conditions for different applications.

- Serum-free and chemically defined medium that contains only human proteins
- Comes complete with human albumin, insulin, and transferrin
- Addition of cytokines may be required, depending upon application



Ordering Information

Cell Source	Description	Format	Volume	Cat. No.	
Bone Marrow	Unprocessed bone marrow	Fresh	10 mL	1M-105	
			25 mL	1M-125	
	Bone marrow and blood from the same donor**	Fresh	10 mL bone marrow and	1M-105	
			100 mL peripheral blood**	1W-500	
			25 mL bone marrow and	1M-125	
			100 mL peripheral blood**	1W-500	
	CD34 ⁺	Cryopreserved	0.1 Million viable cells/vial	2M-101	
			0.3 Million viable cells/vial	2M-101A	
			0.5 Million viable cells/vial	2M-101B	
			1 Million viable cells/vial	2M-101C	
			2 Million viable cells/vial	2M-101D	
			5 Million viable cells/vial	2S-101D	
Mononuclear cells	Cryopreserved	25 Million viable cells/vial	2M-125C		
		300 Million viable cells/vial	2M-125E		
		5 Million viable cells/vial	2S-101D		
CD133 ⁺ cells	Cryopreserved	0.5 Million viable cells/vial	2M-102		
Stromal cells	Cryopreserved	5 Million viable cells/vial	2M-302		
Recommended Growth Medium: HPGM™ – Hematopoietic Growth Medium			500 mL	PT-3926	
Cord Blood	CD34 ⁺ cells	Cryopreserved	0.1 Million viable cells/vial	2C-101B	
			0.5 Million viable cells/vial	2C-101A	
			1 Million viable cells/vial	2C-101	
	Mononuclear cells	Cryopreserved	50 Million viable cells/vial	2C-150B	
			100 Million viable cells/vial	2C-150A	
			200 Million viable cells/vial	2C-150	
	CD133 ⁺ cells	Cryopreserved	0.1 Million viable cells/vial	2C-102A	
	Recommended Growth Medium: HPGM™ – Hematopoietic Growth Medium			500 mL	PT-3926
	Peripheral Blood	Mononuclear cells (PBMC)	Cryopreserved	50 Million viable cells/vial	CC-2702
		CD14 ⁺ monocytes	Cryopreserved	10 Million viable cells/vial	2W-400C
20 Million viable cells/vial				2W-400B	
40 Million viable cells/vial				2W-400A	
CD4 ⁺ T cells		Cryopreserved	10 Million viable cells/vial	2W-200	
Dendritic cells		Cryopreserved	3 Million viable cells/vial	CC-2701	
Natural killer cells		Cryopreserved (+ selection)	5 Million viable cells/vial	2W-502	
		Cryopreserved (- selection)	5 Million viable cells/vial	2W-501	
Recommended Growth Medium: LGM™ 3 – Lymphocyte Growth Medium			500 mL	CC-3211	

**Whole peripheral blood can currently only be purchased in combination with an order for unprocessed bone marrow from the same donor.

Mesenchymal Stem Cells and Media

	Product	Description	Size	Cat. No.
Cells	hMSC – Human Mesenchymal Stem Cells	—	≥750,000 cells/vial	PT-2501
Media	MSCGM™ Mesenchymal Stem Cell Growth Medium BulletKit™	MSCBM™ Basal Medium [440 mL] + MSCGM™ SingleQuots™	Kit	PT-3001
	TheraPEAK™ MSCGM™ CD Serum-free Mesenchymal Stem Cell Growth Medium BulletKit™	MSCBM™ CD Basal Medium [500 mL] + MSCGM™ CD SingleQuots™	Kit	190632
Differentiation	hMSC – Human Mesenchymal Stem Cell Osteogenic Differentiation Medium BulletKit™	Osteogenic Differentiation Basal Medium [170 mL] + SingleQuots™ Kit	Kit	PT-3002
	hMSC – Human Mesenchymal Stem Cell Chondrogenic Differentiation Medium BulletKit™	Chondrogenic Differentiation Basal Medium [185 mL] + SingleQuots™ Kit	Kit	PT-3003
	hMSC – Human Mesenchymal Stem Cell Adipogenic Differentiation Medium BulletKit™	Adipogenic Maintenance Medium [170 mL] + SingleQuots™ Kit, Adipogenic Induction Medium [170 mL] + SingleQuots™ Kit	Kit	PT-3004

www.lonza.com

www.lonza.com/hematopoiesis

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*Guarantee/guaranteed means Lonza will replace or refund the applicable portion of the purchase on terms more fully described at www.lonza.com/hematopoiesis

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