

# Frequencies of Human Cell Types

## In Blood-Related Sources

Cell Type	Phenotype	Frequencies in cells/mL (x 10 <sup>6</sup> ) and/or in % (mean ± SD of total leukocytes) <sup>1</sup>	Cell Source <sup>2</sup>							
			Whole Blood	PBMC <sup>3</sup>	Leukopak	LRSC	Bone Marrow	Buffy Coat	PMNC	Cord Blood
Erythrocytes	CD235a <sup>+</sup>	cells/mL	4060 ± 486 <sup>4</sup>	— <sup>5</sup>	—	—	—	—	—	—
Leukocytes	CD45 <sup>+</sup>	cells/mL	6.3 ± 3.1	—	—	—	—	—	—	—
Platelets	CD41 <sup>+</sup>	cells/mL	140 – 450	—	—	—	—	—	—	—
Lymphocytes	F5C / SSC	cells/mL	1.1 – 3.5	—	—	—	—	—	—	—
		%	45.0 ± 20.2	—	—	—	—	—	—	—
T Cells	CD3 <sup>+</sup>	cells/mL	0.54 – 1.79		—	—	—	—	—	—
		%	27.7 ± 7.0	46.9 ± 18.7	50.6 ± 11.1	48.0 ± 15.0	—	—	—	—
Naïve Pan T Cells	CD3 <sup>+</sup> CD45RA <sup>+</sup> CD45RO <sup>-</sup> CD197 <sup>+</sup>	%	—	—	11.4 ± 5.2	—	—	—	—	—
TCRab T Cells	CD3 <sup>+</sup> TCRab <sup>+</sup>	%	—	—	50.9 ± 6.1	—	—	—	—	—
TCRgd T Cells	CD3 <sup>+</sup> TCRgd <sup>+</sup>	%	—	4.8 ± 2.4	3.0 ± 2.0	4.8 ± 2.2	—	—	—	—
Th1 T Cells	CD4 <sup>+</sup> CXCR3 <sup>+</sup>	%	—	9.1 ± 3.1	12.7 ± 3.1	—	—	—	—	—
Th17 T Cells	CD4 <sup>+</sup> CXCR3 <sup>+</sup> CCR6 <sup>+</sup>	%	—	—	5.4 ± 1.6	—	—	—	—	—
CD4 <sup>+</sup> T Cells	CD3 <sup>+</sup> CD4 <sup>+</sup>	cells/mL	0.30 – 1.50		—	—	—	—	—	—
		%	21.6 ± 8.4	38.0 ± 14.7	27.3 ± 7.1	29.3 ± 12.0	—	—	—	—
Naïve CD4 <sup>+</sup> T Cells	CD3 <sup>+</sup> CD4 <sup>+</sup> CD45RA <sup>+</sup> CD45RO <sup>-</sup>	cells/mL	—	0.08 – 0.76	—	—	—	—	—	—
		%	—	13.3 ± 4.6	12.2 ± 2.9	3.3 ± 3.0	—	—	—	—
Memory CD4 <sup>+</sup> T Cells	CD3 <sup>+</sup> CD4 <sup>+</sup> CD45RA <sup>-</sup> CD45RO <sup>+</sup>	cells/mL	—	0.25 – 0.81	—	—	—	—	—	—
		%	7.2 ± 2.0	14.9 ± 4.3	11.2 ± 2.5	9.8 ± 4.0	—	—	—	—
Central Memory CD4 <sup>+</sup> T Cells	CD3 <sup>+</sup> CD4 <sup>+</sup> CD45RO <sup>-</sup> CD62L <sup>+</sup>	%	—	—	10.5 ± 4.4	—	—	—	—	—
Effector CD4 <sup>+</sup> T Cells	CD3 <sup>+</sup> CD4 <sup>+</sup> CD45RO <sup>+</sup> CD62L <sup>-</sup>	%	—	—	5.5 ± 2.3	—	—	—	—	—
Regulatory CD4 <sup>+</sup> T Cells	CD3 <sup>+</sup> CD4 <sup>+</sup> CD25 <sup>+</sup> FOXP3 <sup>+</sup>	cells/mL	0.007 – 0.052		—	—	—	—	—	—
		%	0.41 ± 0.23	2.0 ± 0.76	2.0 ± 0.96	1.3 ± 0.62	—	—	—	—
Resting CD4 <sup>+</sup> T Cells	CD3 <sup>+</sup> CD4 <sup>+</sup> CD8 <sup>-</sup> CD25 <sup>-</sup> CD69 <sup>-</sup> HLA-DR <sup>-</sup>	%	—	22.9 ± 6.4	20.5 ± 14.9	—	—	—	—	—
CD8 <sup>+</sup> T Cells	CD3 <sup>+</sup> CD8 <sup>+</sup>	cells/mL	0.14 – 0.82		—	—	—	—	—	—
		%	6.0 ± 4.1	19.3 ± 5.8	15.8 ± 6.1	12.5 ± 6.0	—	—	—	—
Naïve CD8 <sup>+</sup> T Cells	CD3 <sup>+</sup> CD8 <sup>+</sup> CD45RA <sup>+</sup> CCR7 <sup>+</sup> CD45RO <sup>-</sup> CD57 <sup>-</sup> CD56 <sup>-</sup>	cells/mL	—	0.03 – 0.21	—	—	—	—	—	—
		%	—	10.8 ± 3.4	6.1 ± 3.2	—	—	—	—	—
Memory CD8 <sup>+</sup> T Cells	CD3 <sup>+</sup> CD8 <sup>+</sup> CD45RA <sup>-</sup> CD45RO <sup>+</sup>	%	—	5.1 ± 2.2	5.8 ± 1.8	2.9 ± 1.4	—	—	—	—
Central Memory CD8 <sup>+</sup> T Cells	CD3 <sup>+</sup> CD8 <sup>+</sup> CD45RO <sup>-</sup> CD62L <sup>+</sup>	%	—	—	2.7 ± 1.4	—	—	—	—	—
Effector Memory CD8 <sup>+</sup> T Cells	CD3 <sup>+</sup> CD8 <sup>+</sup> CD45RO <sup>+</sup> CD62L <sup>-</sup>	%	—	—	4.6 ± 2.9	—	—	—	—	—
B Cells	CD3 <sup>-</sup> CD19 <sup>+</sup>	cells/mL	0.07 – 0.53		—	—	—	—	—	—
		%	6.1 ± 3.2	9.0 ± 4.2	8.5 ± 4.0	8.0 ± 5.2	—	—	—	—
Naïve B Cells	CD19 <sup>+</sup> CD27 <sup>-</sup>	cells/mL	0.05 – 0.37		—	—	—	—	—	—
		%	5.9 ± 3.8	5.7 ± 2.8	5.4 ± 2.9	—	—	—	—	—
Memory B Cells	CD19 <sup>+</sup> CD27 <sup>+</sup>	%	—	3.2 ± 1.6	2.3 ± 1.2	—	—	—	—	—
Plasma Cells	CD138 <sup>+</sup>	%	—	—	—	—	0.2 – 2.0	—	—	—
Natural Killer Cells	CD3 <sup>-</sup> CD56 <sup>+</sup>	cells/mL	0.08 – 0.43		—	—	—	0.08 – 0.43	—	—
		%	3.5 ± 1.3	8.8 ± 3.8	6.1 ± 2.5	11.7 ± 6.1	—	—	—	—
Innate Lymphoid Cells	CD1a <sup>-</sup> CD3 <sup>-</sup> CD4 <sup>-</sup> CD11c <sup>-</sup> CD14 <sup>-</sup> CD16 <sup>+</sup> CD19 <sup>-</sup> CD34 <sup>-</sup> CD94 <sup>-</sup> CD123 <sup>-</sup> CD303 <sup>+</sup> FcεR1a <sup>+</sup> TCRab <sup>+</sup> TCRgd <sup>+</sup> CD127 <sup>+</sup>	cells/mL	0.0006 – 0.005		—	—	—	—	—	—
		%	—	—	0.10 ± 0.07	—	—	—	—	—
Type 2 Innate Lymphoid Cells	CD1a <sup>-</sup> CD3 <sup>-</sup> CD11c <sup>-</sup> CD14 <sup>-</sup> CD16 <sup>-</sup> CD19 <sup>-</sup> CD34 <sup>-</sup> CD94 <sup>-</sup> CD123 <sup>-</sup> CD303 <sup>-</sup> FcεR1a <sup>-</sup> TCRab <sup>-</sup> TCRgd <sup>-</sup>	%	0.02 ± 0.02	—	0.02 ± 0.04	—	—	—	—	—
Myeloid Cells	CD33 <sup>+</sup> CD66 <sup>+</sup>	cells/mL	3.9 – 6.5	—	—	—	—	—	—	—
		%	67.7 ± 9.0	—	—	—	—	—	—	—
Monocytes	CD14 <sup>+</sup>	cells/mL	0.20 – 0.90		—	—	—	0.20 – 0.90	—	—
		%	7.2 ± 4.0	12.0 ± 6.1	21.2 ± 10.3	20.1 ± 9.7	—	8.8 ± 4.2	—	—
Dendritic Cells	CD14 <sup>+</sup> CD16 <sup>+</sup> CD20 <sup>-</sup> CD56 <sup>+</sup> TCRab <sup>-</sup> CD123 <sup>+</sup> or CD11c <sup>+</sup>	cells/mL	—	0.02 – 0.06	—	—	—	—	—	—
		%	—	—	1.98 ± 0.86	2.18 ± 0.93	—	—	—	—
Myeloid Dendritic Cells	CD3 <sup>-</sup> CD14 <sup>+</sup> CD19 <sup>-</sup> CD20 <sup>-</sup> CD34 <sup>-</sup> CD56 <sup>+</sup> HLA-DR <sup>+</sup> CD11c <sup>+</sup>	cells/mL	—	0.01 – 0.03	—	—	—	—	—	—
		%	—	0.87 ± 0.23	1.5 ± 0.7	1.97 ± 1.03	—	—	—	—
Plasmacytoid Dendritic Cells	CD3 <sup>-</sup> CD14 <sup>+</sup> CD16 <sup>+</sup> CD19 <sup>-</sup> CD20 <sup>-</sup> CD34 <sup>-</sup> CD56 <sup>+</sup> HLA-DR <sup>+</sup> CD123 <sup>+</sup>	cells/mL	—	0.01 – 0.04	—	—	—	—	—	—
		%	—	0.56 ± 0.31	0.46 ± 0.21	0.21 ± 0.12	—	—	—	—
Granulocytes	CD66b <sup>+</sup> CD16 <sup>+</sup> AND CD66b <sup>+</sup> CD16 <sup>+</sup> AND CD66b <sup>+</sup> CD203c <sup>+</sup> CD123 <sup>+</sup> IgE <sup>+</sup>	cells/mL	2.13 – 6.35	—	—	—	—	—	2.13 – 6.35	—
		%	47.4 ± 17.5	—	5.1 ± 7.7	3.8 ± 3.8	—	—	49.3 ± 11.2	—
Neutrophils	CD16 <sup>+</sup> CD66b <sup>+</sup>	cells/mL	2.09 – 5.97	—	—	—	—	—	2.09 – 5.97	—
		%	55.1 ± 12.5	—	—	3.9 ± 4.2	—	—	55.4 ± 19.6	—
Eosinophils	CD16 <sup>+</sup> CD66b <sup>+</sup>	cells/mL	0.03 – 0.30	—	—	—	—	—	0.03 – 0.30	—
		%	2.7 ± 1.1	—	—	1.7 ± 1.4	—	—	3.5 ± 2.8	—
Basophils	CD123 <sup>+</sup> IgE <sup>+</sup>	cells/mL	0.01 – 0.08	—	—	—	—	—	0.01 – 0.08	—
		%	0.7 ± 0.3	—	—	1.1 ± 0.5	—	—	0.8 ± 0.3	—
Hematopoietic Stem and Progenitor Cells (CD34 <sup>+</sup> )	CD34 <sup>+</sup> CD45lo	cells/mL	0.001 – 0.007	0.001 – 0.007 <sup>6</sup>	—	—	0.001 – 0.007	—	—	0.001 – 0.007
		%	0.07 ± 0.01	0.12 ± 0.04	1.1 ± 0.9 <sup>6</sup> 0.12 ± 0.09 <sup>7</sup>	0.6 ± 0.5	3.3 ± 1.7 <sup>8</sup>	—	—	0.6 ± 0.4 1.4 ± 3.7 <sup>9</sup>

## Products and Resources To Support Your Research

Cell Sourcing	<b>Human Primary Cells<sup>10</sup></b>  Start experiments confidently with a dependable supply of ethically sourced fresh and frozen human primary cell products that consistently meet your requirements, and streamline your workflow with ThawSTAR®, an automated, water-free thawing system that eliminates the risk of contamination and delivers controlled thawing profiles.   <a href="http://www.stemcell.com/PrimaryCells">www.stemcell.com/PrimaryCells</a> <a href="http://www.stemcell.com/ThawSTAR">www.stemcell.com/ThawSTAR</a>	
	<b>EasySep™</b>  Choose a smarter, more efficient way to isolate cells with our EasySep™ product portfolio.   <a href="http://www.EasySep.com">www.EasySep.com</a>	
Cell Isolation	<b>RoboSep™</b>  Automate cell processing and isolation of up to 16 samples using RoboSep™ instruments with EasySep™ reagents.   <a href="http://www.RoboSep.com">www.RoboSep.com</a>	
	<b>RosetteSep™</b>  Isolate untouched cells from whole blood during density gradient centrifugation, in just one step, using RosetteSep™. Combine with SepMate™ tubes for faster, highly reproducible cell isolation.   <a href="http://www.RosetteSep.com">www.RosetteSep.com</a>	
Cell Processing	<b>Lymphoprep™</b>  Isolate mononuclear cells with a density gradient medium compatible with SepMate™ and RosetteSep™.   <a href="http://www.stemcell.com/densitygradientmedia">www.stemcell.com/densitygradientmedia</a>	
	<b>SepMate™</b>  Say goodbye to slow and laborious sample layering over density gradient medium with SepMate™ tubes that reduce PBMC isolation to just 15 minutes. Combine SepMate™ with RosetteSep™ to isolate specific cell subsets.   <a href="http://www.SepMate.com">www.SepMate.com</a>	
Cell Culture	<b>ImmunoCult™</b>  Optimize your immune cell cultures by choosing from a range of specialized ImmunoCult™ media, activators, and supplements that allow you to culture various cell types, including T cells, B cells, NK cells, dendritic cells, and macrophages.   <a href="http://www.stemcell.com/ImmunoCulture">www.stemcell.com/ImmunoCulture</a>	
	<b>Antibodies &amp; ELISA Kits</b>  Take the guesswork out of cell analysis. Choose antibodies verified for use with STEMCELL products, then accurately quantify analytes with highly sensitive ELISA kits.   <a href="http://www.stemcell.com/ELISA">www.stemcell.com/ELISA</a>	
Cryopreservation	<b>Cell Storage Media</b>  Maintain high viability and function of human cell types using cGMP-manufactured cell freezing and preservation media, such as CryoStor®, HypoThermosol®, and BloodStor®.   <a href="http://www.stemcell.com/cryopreservation">www.stemcell.com/cryopreservation</a>	

1. Cell type frequencies will vary from donor to donor. 2. PBMC - Peripheral Blood Mononuclear Cells; LRSC - Leukopak Reduction System Cone; PMNC - Polymorphonuclear Cells. 3. PBMCs isolated from whole blood by density gradient centrifugation. 4. Data taken from a different time point as opposed to the rest of the cells/mL data. 5. Data not available. 6. Mobilized leukopak. 7. Non-mobilized leukopak. 8. BMMC - Bone Marrow Mononuclear Cells. 9. CBMC - Cord Blood Mononuclear Cells. 10. Certain products are only available in select territories. Please contact your local Sales representative or the Product & Scientific Support team at [techsupport@stemcell.com](mailto:techsupport@stemcell.com) for further information.