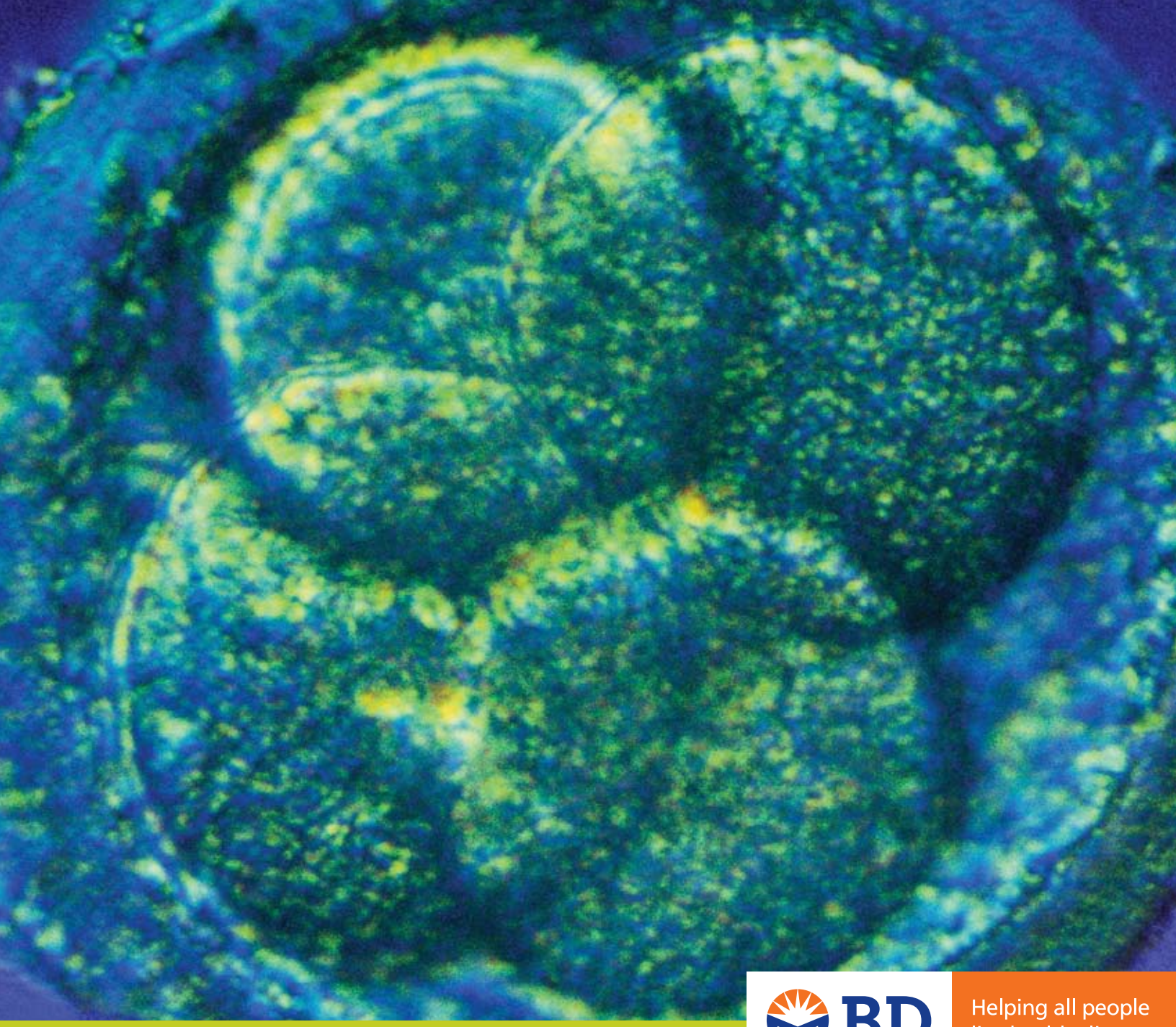

BD

Helping all people live healthy lives

BD Biosciences Stem Cell Source — from isolation to analysis

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BD Biosciences Stem Cell Source — from isolation to analysis

- Over 20 years of cell separation leadership
- Dependable innovation in cell culture technology
- Advanced functional assays
- Thousands of proven reagents and systems for cell analysis

Introduction

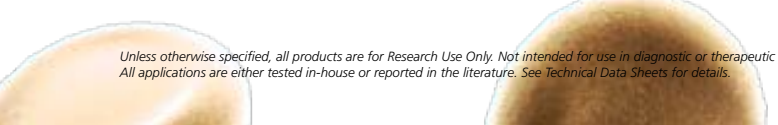
Stem cell research is a rapidly expanding area of investigation, with the ultimate goal to prevent, diagnose, and treat human diseases, including heart disease, diabetes, cancer, stroke, and neurological disorders, such as Parkinson's and Alzheimer's disease.

BD Biosciences has provided integrated, high-value products and services for cell culture and analysis for more than two decades with hallmark brands such as BD Falcon™ and BD FACS™. BD FACS™ brand instruments are considered the gold standard in the field of flow cytometry and, along with BD Pharmingen™ and BD Transduction Laboratories™ brand antibodies, we offer one of the largest collections of reagents for applications including flow cytometric analysis, western blotting, immunofluorescence microscopy, and ELISA.

With the addition of new instrument platforms such as the BD Pathway™ high-content imager and BD CARV II™ confocal imager, we now provide one of the most comprehensive portfolios of cell culture and cell analysis tools to the research community. BD Biosciences - Discovery Labware and its BD Falcon™, BD BioCoat™, and BD™ brands offer tools for researchers investigating the mechanisms that dictate stem cell growth and differentiation, as well as stem cell use for tissue engineering applications.

In stem cell research, BD Biosciences was first to commercialize systems and reagents for characterizing and isolating hematopoietic stem cells for research use. This, fueled by research developments, has led to the now well-accepted therapeutic approaches to leukemia and lymphoma. It is one of our continuous goals to build our successes and maintain our leadership as a provider of research and diagnostic tools for somatic and embryonic stem cell research.

This brochure provides an overview of our current product portfolio for stem cell investigation. Part of the BD Biosciences core focus has been to foster collaborations to develop or license new reagents and technologies. If you would like to contribute to our expanding portfolio of stem cell research products and services, please contact one of our BD Biosciences Marketing or Business Development Departments.



Stem Cells and Their Functionality

Stem cells are unspecialized cells that have the remarkable ability to differentiate into the many cell types required for tissue and organ development.

Stem cells are known to proliferate over very long periods. An important area of research is the study of signals in an organism that cause a stem cell to proliferate and remain unspecialized until differentiated cells are needed for the growth or repair of a specific tissue. Understanding this regulation of cell differentiation caused by internal or external factors is critical to ultimately developing therapies to fight a multitude of diseases.

Embryonic Stem Cells

Embryonic stem cells (ESCs) are pluripotent stem cells derived from the embryo blastocyst. They renew themselves indefinitely and develop into different mature cell types, like the brain, heart, bones, muscles, and skin cells. Embryonic stem cells are the early building blocks of each human being.

Adult Stem Cells

Adult stem cells, somatic stem cells, or tissue-specific progenitor stem cells, are undifferentiated cells found in tissues or organs. Their role is to maintain and repair the tissues in which they exist. Adult stem cells can only proliferate for a limited number of cycles. Their ability to differentiate is inversely correlated to the number of proliferation cycles.

Recently, researchers have determined that adult stem cells are present in tissues previously thought to be devoid of these cells. These tissues include brain, bone marrow, peripheral blood, blood vessels, skeletal muscle, skin, adipose, and liver.

Three kinds of stem cells are in adult bone marrow. Hematopoietic stem cells (HSCs), form all blood cells in the body. Bone marrow stromal stem cells, or mesenchymal stem cells (MSCs), generate the cells of bone, cartilage, fat, and fibrous connective tissue.

Central nervous system (CNS) stem cells are capable of self-renewal and give rise to the three main cell types of the CNS: neurons, astrocytes, and oligodendrocytes.

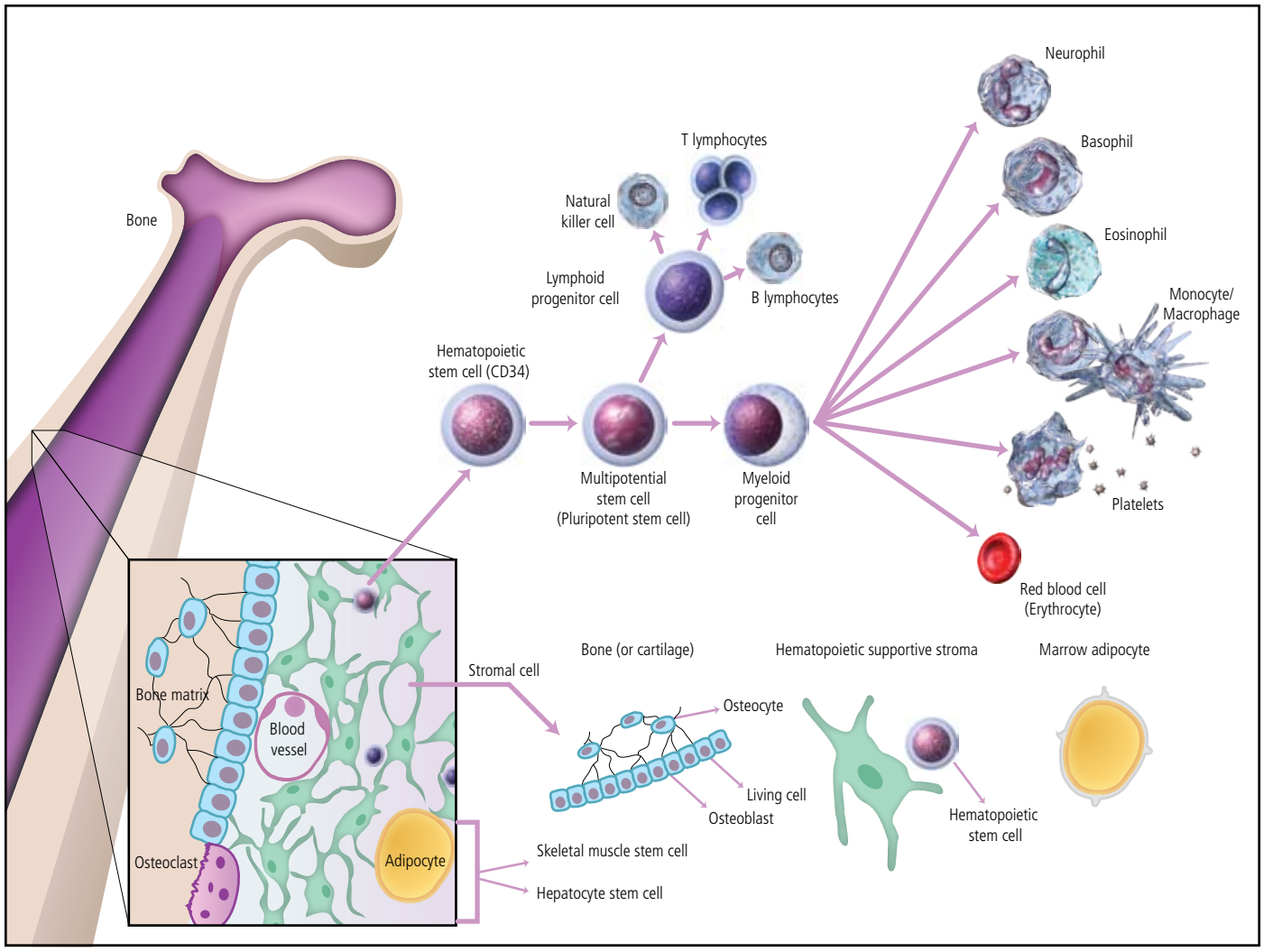
Embryonic and adult stem cells have advantages and disadvantages regarding their potential use for cell-based regenerative therapies:

- Embryonic stem cells can become any cell type in the body, while adult stem cells are generally limited to the different cell types within the tissue or organ.
- Embryonic stem cells can be grown in culture relatively easily, while adult stem cells are rare and difficult to expand for stem cell therapies. Exceptions are MSCs and hepatocyte progenitor cells that are relatively easy to expand.
- An advantage to adult stem cells is that the patient's own cells can be used, grown in cell culture and then reintroduced, thus avoiding the difficulties caused by immune rejection. A tremendous amount of research is focused on the optimization of methods for growing and differentiating adult stem cells.

Summary of Similarities and Differences Between Embryonic and Adult Stem Cells

- Embryonic stem cells are pluripotent cells that can differentiate into all cell types of the body.
- Embryonic stem cells can reproduce themselves indefinitely.
- Adult stem cells have limited potential for reproduction and differentiation.
- Embryonic stem cells can be relatively easily grown in cell culture, while adult stem cells are more rare, and methods for growing them in culture are more complicated. This limits their use since a large number of cells are needed for stem cell therapies.
- The advantage to adult stem cells is that the patient's own cells can be expanded in culture and reintroduced to the patient. The cells would not be rejected by the immune system.

Hematopoietic and Stromal Stem Cell Differentiation



Stem Cells and Their Functionality *(continued)*

Potential Uses of Human Stem Cells

- **Basic studies of the role of signal transduction and gene expression in the regulation of stem cell growth and differentiation**

  Conditions such as cancer and birth defects are due to abnormal cell division and differentiation. An understanding of the mechanisms that dictate these conditions will be required to develop strategies for therapy.

- **For use in drug development**

  Stem and progenitor cells may enable the identification of new drug targets for a variety of indications.

- **For clinical use**

  Stem cells have great promise for use in cell therapy and regenerative medicine. For example, stem cell transplantation into the heart may assist functional tissue regeneration in patients that suffer from heart disease.

While embryonic and adult stem cells may ultimately be used for cell and tissue engineering–based therapies in humans, it is well recognized that considerable basic research will be required to achieve this goal. This work will include both *in vitro* and *in vivo* analyses of stem cell growth and differentiation.

Stem Cell Markers

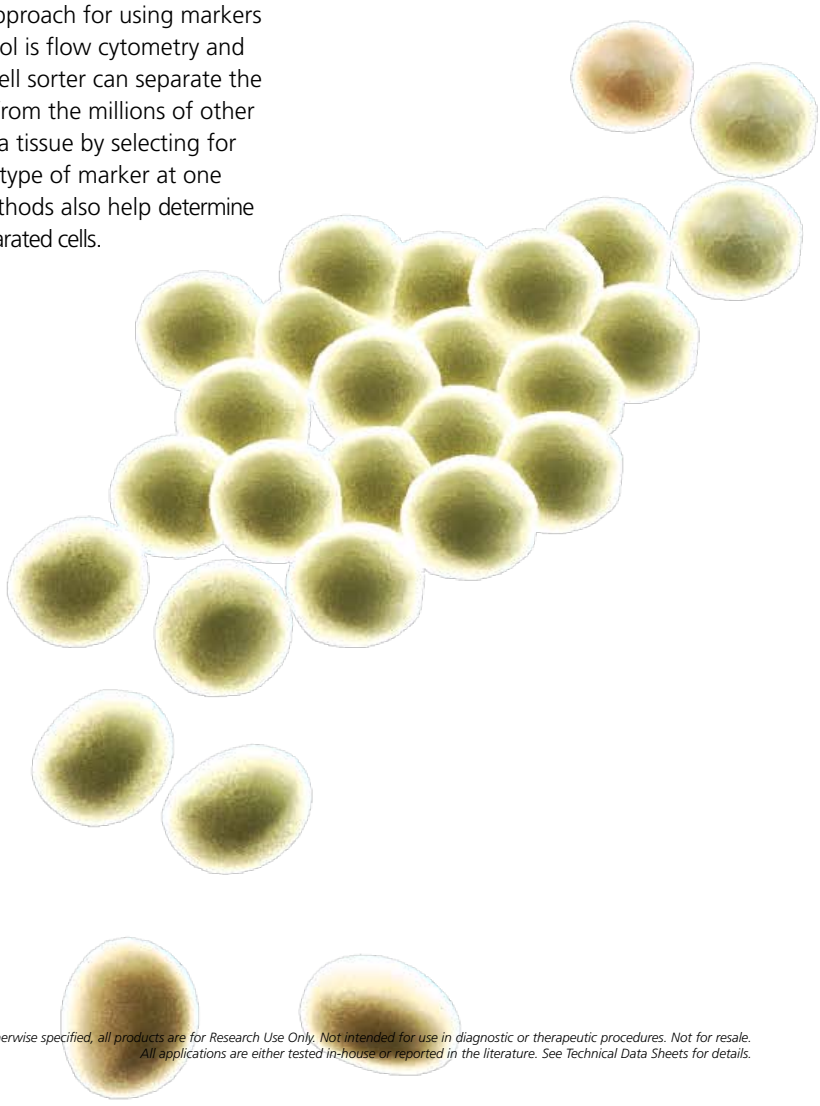
Molecular markers are critical to the study of cellular differentiation and cell-fate specification. To study the transition from one cell type to another, a researcher must conclusively identify distinct cell types.

While stem cells are best defined functionally, a number of molecular markers have been used to characterize various stem cell populations. In many cases, a combination of multiple markers is used to identify a particular stem cell type.

For example, CNS stem cells express a range of markers, including nestin, vimentin, Sox2, Ki-67, GD2 ganglioside, and CD15 (Lewis X), as well as the tetraspanins CD9 and CD81, CD95 (Fas), and major histocompatibility complex (MHC) class I antigens.

A convenient approach for using markers as a research tool is flow cytometry and cell sorting. A cell sorter can separate the rare stem cells from the millions of other cells present in a tissue by selecting for more than one type of marker at one time. These methods also help determine the purity of separated cells.

Although a number of tissue engineering–based therapies have been developed, a major obstacle is availability of suitable cells. While undifferentiated stem and progenitor cells are a promising source for key differentiated cell types, there is no method for expanding many undifferentiated cell populations. Ultimately, we will learn how to control the proliferation and differentiation of cells appropriately *in vitro* and *in vivo,* by controlling their microenvironment. This knowledge could enable tissue engineering to emerge as a viable therapeutic option for the treatment of many diseases.



Stem Cell Markers

Marker Name	Cell Type	Localization	Significance	Hu	Ms
Blood Vessel					
ABCG2 (CDw338)	Primitive stem cells	Cell surface	A multi-drug resistance protein that is a member of the ATP binding cassette (ABC) transporters. It is highly expressed on primitive stem cells as identified by the "side-population" (SP) phenotype.	√	
CD144 Vascular endothelial cell cadherin (VE-Cadherin)	Smooth muscle	Cell surface	Identifies smooth muscle cells in the wall of blood vessels.	√	√
Fetal liver kinase-1 (Flk1)	Endothelial	Cell surface	Cell-surface receptor protein that identifies endothelial cell progenitors; marker of cell-cell contacts.		√
Smooth muscle cell-specific myosin heavy chain	Smooth muscle	Intracellular	Identifies smooth muscle cells in the wall of blood vessels.		
Bone Marrow (BM) and Blood					
Bone morphogenetic protein receptor (BMPR)	MSC and progenitor cells	Cell surface	Important for the differentiation of committed mesenchymal cell types from mesenchymal stem and progenitor cells. BMPR identifies early mesenchymal lineages (stem and progenitor cells).	√	√
Bone Morphogenic Protein (BMP-2 and BMP-4)	ESC, endoderm	Secreted	BMP plays an important role in induction of mesoderm, hematopoiesis, and epidermis formation.		
CD3	Leukocyte lineage	Cell surface	Specific for developing and mature T lymphocytes.	√	√
CD4	Leukocyte lineage	Cell surface	Specific for developing and mature T lymphocytes.	√	√
CD8	Leukocyte lineage	Cell surface	Specific for developing and mature T lymphocytes.	√	√
CD19	Absent on HSC, present on leukocyte lineage	Cell surface	Specific for developing and mature B lymphocytes.	√	√
CD34	HSC, satellite, endothelial progenitor	Cell surface	Indicative of a HSC or endothelial progenitor; CD34 also identifies muscle satellite, a muscle stem cell.	√	√
CD38	Absent on HSC, present on leukocyte lineage	Cell surface	Cell-surface molecule that identifies leukocyte lineages. Selection of $CD34^+/CD38^-$ cells enables purification of HSC populations.	√	√
CD44	HSC, MSC	Cell surface	Cell-adhesion molecule expressed by HSC, MSC, most developing and mature leukocytes, and many mesenchymal cell types.	√	√
CD45 (Leukocyte common antigen)	Absent on HSC, present on leukocyte lineage	Cell surface	Cell-surface protein on leukocytes and their progenitors.	√	√
CD45R/B220	Absent on HSC, present on leukocyte lineage	Cell surface	Specific for developing and mature B lymphocytes.		√
CD59	HSC	Cell surface	Glycoprotein expressed on hematopoietic and non-hematopoietic cells. CD59 also participates in spontaneous T-cell/erythrocyte adhesion, interacts with CD2, and plays a role in T-cell activation.	√	√
CD90 (Thy-1)	HSC, MSC	Cell surface	Cell-surface protein; negative or low detection is suggestive of HSC.	√	√
CD90.1 (Thy-1.1)	HSC	Cell surface	Cell-surface protein; negative or low detection is suggestive of HSC.		√
CD90.2 (Thy-1.2)	HSC	Cell surface	Cell-surface protein; negative or low detection is suggestive of HSC.		√
CD117 (c-Kit)	HSC, MSC	Cell surface	Cell-surface receptor that identifies HSC and MSC in BM. Binding by fetal calf serum (FCS) enhances proliferation of ES, HSCs, MSCs, and hematopoietic progenitor cells.	√	√
CD135 (Flt-3)	HSC, progenitor cells	Cell surface	Receptor protein tyrosine kinase that regulates hematopoiesis.	√	√
CDCP1	HSC, progenitor cells	Cell surface	Expressed on a subset of $CD34^+$ stem/progenitor cells in the bone marrow, cord blood and mobilized peripheral blood. Studies describe the detection of CDCP1 on $CD34^+/CD38^-$ bone marrow stem/progenitor cells, but not on mature peripheral blood leukocytes. CDCP1 is expressed on lung, colon and breast malignant cells, and is coexpressed with CD34 and CD133 on myeloid leukemic cells.	√	
Hoechst dye	Absent on HSC	Intracellular	Fluorescent dye that binds DNA; HSCs extrude the dye and stain lightly compared with other cell types.	√	√
Lineage surface antigen (Lin)	Absent on HSC, MSC, present on differentiated erythrocytes and leukocyte lineage	Cell surface	Markers of mature blood cell lineages; detection of Lin-negative cells assist in the purification of HSC and hematopoietic progenitor populations.	√	√
Ly-6G and Ly-6C (Gr-1)	Absent on HSC, MSC, present on differentiated leukocyte lineage	Cell surface	Specific for developing and mature granulocytes.		√

Key: ***BM*** *– Bone Marrow;* ***EB*** *– Embryoid Bodies;* ***MSC*** *– Mesenchymal Stem Cell;* ***ECC*** *– Embryonal Carcinoma Cell;*
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Stem Cell Markers *(continued)*

Marker Name	Cell Type	Localization	Significance	Hu	Ms
Ly-6A/E (Sca-1)	HSC, MSC	Cell surface	Indicative of HSC and MSC.		√
Mac-1 (CD11b/CD18)	Leukocyte lineage	Cell surface	Specific for mature granulocyte and macrophage.	√	√
Muc-18 (CD146)	Bone marrow fibroblasts, endothelial cells, MSC	Cell surface	May be important in hematopoiesis.	√	
PU.1	HSC	Cell surface	Transcription factor that is exclusively expressed on cells with hematopoietic lineage.	√	
Stem cell factor (SCF, mast cell growth factor, or c-Kit ligand)	Stromal cells, fibroblasts	Cell surface, Secreted	The two forms of the protein enhance proliferation of ES and EC and bind the receptor CD117.	√	√
Stro-1 antigen	MSC	Cell surface	Selection of Stro-1+ cells assist in isolating MSC.		
TER-119	Erythrocytes	Cell surface	Expressed on developing and mature erythrocytes.		√
Liver					
Albumin	Hepatocyte	Secreted	Principal protein produced by the liver; indicates functioning of maturing and fully differentiated hepatocytes.	√	√
CD29 (β-1 integrin)	Hepatocyte	Cell surface	Cell-adhesion molecule important in cell-cell interactions; marker expressed during development of liver.	√	√
Nervous System					
CD56 (N-CAM)	Ectoderm	Cell surface	Cell-surface molecule that promotes cell-cell interaction; indicates primitive neuroectoderm formation.	√	√
CD133 (AC133)	CNS stem cell, HSC	Cell surface	Marker for pluripotent stem cells. The CD133 positive fractions of human bone marrow, cord blood and peripheral blood have been shown to efficiently engraft in xenotransplantation models, and have been shown to contain the majority of the granulocyte/macrophage precursors, NOD/SCID repopulating cells and $CD34^+$ dendritic cell precursors.		
CNPase	NSC, Oligodendrocyte	Intracellular	Expressed at high levels by oligodendrocytes in the central nervous system and by Schwann cells in the peripheral nervous system and is virtually absent in other cell types.		
FOXD3 (Genesis)	ESC	Intracellular	The WH gene FOXD3 (previous Hfh2 or Genesis) is expressed in the early preimplantation embryo, in ES cells, and then later in the neural crest.		
GABA	NSC	Secreted	Release of the neurotransmitter GABA by adult neuronal precursor cells that develop into neurons. Limits stem cell proliferation.		
GAD65	Neurons, oligodendrocyte, astrocyte	Intracellular	GAD65 is the predominant form of Glutamic Acid Decarboxylase found in human islets and has been shown to be the major target of antibodies in human type 1 diabetes.	√	√
GAP-43	NSC	Cell surface	GAP43 is expressed by developing and regenerating neurons, and to a lesser extent, reactive glial cells.		
Glial fibrillary acidic protein (GFAP)	Ectoderm, Astrocyte	Cell surface	Protein specifically produced by astrocytes.	√	√
HLXB9 (homeo box HB9)	Ectoderm, Mesoderm	Intracellular	Mutation in the HLXB9 transcription factor causes an autosomal dominant form of sacral agenesis.		
Microtubule-associated protein-2 (MAP-2)	Neuron	Cytoplasm	Dendrite-specific MAP; protein found specifically in dendritic branching of neuron.	√	
MSI1	Ectoderm	Intracellular	MS/1 Musashi homolog 1. Preferentially expressed in neural progenitors capable of generating both neurons and glia during embryonic and postnatal development of the CNS..		
Myelin basic protein (MBP)	Oligodendrocyte	Cell surface	Protein produced by mature oligodendrocytes; located in the myelin sheath surrounding neuronal structures.		√
Nestin	Neural progenitor	Intracellular	Intermediate filament structural protein expressed in primitive neural tissue.	√	√
Neural tubulin	Ectoderm, Neuron	Intracellular	Important structural protein for neuron; identifies differentiated neuron.		
NeuroD1	Ectoderm, Neuron	Intracellular	Important in initiating neuronal differentiation and maintaining the nervous system.		
Neurofilament (NF)	Neuron	Intracellular	Important structural protein for neuron; identifies differentiated neuron.	√	√
Neuron Specific Enolase (NSE)	Neuron	Intracellular	Useful marker for neuronal lineage.	√	
Neuron Specific Nuclear Protein (NeuN)	NSC	Intracellular	NeuN is a neuron-specific, DNA-binding nuclear protein, which makes it an important marker for neurons in vertebrates.		
P75 Neurotrophin R	NSC	Cell surface	Suggested to serve critical functions during the development of the nervous system.		
Noggin	Neuron	Intracellular	A neuron-specific gene expressed during the development of neurons.		

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Stem Cell Markers *(continued)*

Marker Name	Cell Type	Localization	Significance	Hu	Ms
O4	Oligodendrocyte	Cell surface	O4 is present on immature, developing oligodendrocyte.		
O1	Oligodendrocyte	Cell surface	O1 characterizes mature oligodendrocyte.		
Pax-5	Ectoderm	Intracellular	A B cell–specific activator protein (BSAP) is present in the early stages of B lymphocyte development.	√	√
Pax-6	Ectoderm, Neuron	Intracellular	Human homologues of the *Drosophila melanogaster* gene prd. Pax-6 is expressed in the developing nervous system and in developing eyes.		
PSA-NCAM (Polysialic acid-neural cell adhesion molecule)	NSC	Cell surface	An embryonic form of N-CAM mainly expressed in the developing nervous system.		
S100	NSC, Astrocyte	Intracellular	Involved in microtubule dissociation and inhibition of microtubule assembly		
SOX1	Ectoderm	Intracellular	SOX1 is essential for ventral telencephalic development.		
Synaptophysin	Neuron	Cell surface	Neuronal protein located in synapses; indicates connections between neurons.		√
Tau	Neuron	Intracellular	Type of MAP; helps maintain structure of the axon.		
Tyrosine Hydroxylase (TH)	Ectoderm, Neuronal lineage	Intracellular	Rate-limiting enzyme in the synthesis of catecholamines, tyrosine hydroxylase has a key role in the physiology of adrenergic neurons.		
Wnt 1	NSC, Endoderm	Secreted	Signaling molecule that helps control the differentiation of neurons that release the transmitter dopamine and serotonin		
Pancreas					
Cytokeratin 19 (CK19)	Pancreatic epithelium	Intracellular	CK19 identifies specific pancreatic epithelial cells that are progenitors for islet cells and ductal cells.	√	
Glucagon	Pancreatic islet, Endoderm	Intracellular	Expressed by α-islet cell of pancreas.		
Insulin	Pancreatic islet, Endoderm	Intracellular	Expressed by β-islet cell of pancreas.	√	√
Insulin-promoting factor-1 (PDX-1)	Pancreatic islet, Endoderm	Intracellular	Transcription factor expressed by beta-islet cell of pancreas.		
Nestin	Pancreatic progenitor	Intracellular	Structural filament protein indicative of progenitor cell lines including pancreatic.	√	√
Pancreatic polypeptide	Pancreatic islet	Secreted	Expressed by γ-islet cell of pancreas.		
Somatostatin	Pancreatic islet	Secreted	Expressed by δ-islet cell of pancreas.		
STAT3	ESC	Intracellular	STAT family members are phosphorylated by the receptor associated kinases, and then form homo- or heterodimers that translocate to the cell nucleus where they act as transcription activators.		
TAT-SF1	ESC	Intracellular	General transcription elongation factor.		
TERT	ESC	Intracellular	Telomerase expression plays a role in cellular senescence, as it is normally repressed in postnatal somatic cells resulting in progressive shortening of telomeres.		
Pluripotent Stem Cells					
Alkaline phosphatase	ESC, ECC	Cell surface	Elevated expression of this enzyme is associated with undifferentiated pluripotent stem cell (PSC).	√	√
Alpha-fetoprotein (AFP)	Endoderm	Intracellular	Protein expressed during development of primitive endoderm; reflects endodermal differentiation.		
Bone morphogenetic protein-4	Mesoderm	Secreted	Growth and differentiation factor expressed during early mesoderm formation and differentiation.		
Brachyury	Mesoderm	Intracellular	Transcription factor important in the earliest phases of mesoderm formation and differentiation; used as the earliest indicator of mesoderm formation.		
CD9	ESC	Cell surface	CD9 is associated with leukemia inhibitory factor (LIF)-mediated maintenance of ES.	√	√
CD30	ESC, ECC	Cell surface	Surface receptor molecule found specifically on PSC.	√	√
CD56 (N-CAM)	Ectoderm	Cell surface	Cell-surface molecule that promotes cell-cell interaction; indicates primitive neuroectoderm formation.	√	√
CRABP2	Ectoderm, Neuronal Lineage	Intracellular	Function unknown. The inducibility of the CRABP2 gene suggests that this isoform is important in retinoic acid-mediated regulation of human skin growth and differentiation.		
Cripto (TDGF-1)	ESC, Cardiomyocyte	Cell surface	Gene for growth factor expressed by ES, primitive ectoderm, and developing cardiomyocyte.		
CRTR-1	ESC	Intracellular	CP2 related transcriptional repressor 1 (CRTR 1), is expressed in a developmentally regulated fashion *in vivo* and acts as a direct repressor of transcription.		
GATA-4 gene	Endoderm	Intracellular	Expression increases as ES differentiates into endoderm.		

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Stem Cell Markers *(continued)*

Marker Name	Cell Type	Localization	Significance	Hu	Ms
GCTM-2	ESC, ECC	Secreted	Synthesized by undifferentiated PSCs.		
Genesis	ESC, ECC	Intracellular	Transcription factor uniquely expressed by ES cells either in or during the undifferentiated state of PSC.		
Germ cell nuclear factor	ESC, ECC	Intracellular	Transcription factor expressed by PSC.		
Nanog	ESC	Intracellular	Recognizes the undifferentiated state of human and mouse stem cells. Nanog directs propagation of undifferentiated ES cells.		
Hepatocyte nuclear factor-4 (HNF-4)	Endoderm	Intracellular	Transcription factor expressed early in endoderm formation.		
Nucleostemin	ESC	Intracellular	Plays a role in tumor stem cell biology. Although the exact function is not yet known, it behaves like a molecular switch to control cell division.		
HLXB9 (homeo box HB9)	Ectoderm, Mesoderm	Intracellular	Mutation in the HLXB9 transcription factor causes an autosomal dominant form of sacral agenesis.		
Hsp27	ESC	Intracellular	Hsp27 has been identified as a switch between differentiation and apoptosis in murine embryonic stem cells.		
Nestin	Ectoderm, neural and pancreatic progenitor	Intracellular	Intermediate filaments within cells; characteristic of primitive neuroectoderm formation.	√	√
Oct-3	ESC, ECC	Intracellular	Member of the POU family of transcription factors; functions in pluripotent cells of early embryos and undifferentiated embryonal cell lines.		√
Podocalyxin	HSC, ESC	Cell surface	CD34–related marker of murine HSCs and ESCs.		
Pramel-4	ESC	Intracellular	Target gene of Oct-4 that is expressed in pluripotent stem cells.		
Pramel-5	ESC	Intracellular	Target gene of Oct-4 that is expressed in pluripotent stem cells.		
Rex-1	ESC	Intracellular	A marker gene for undifferentiated ES cells.		
Silylated keratan sulfate proteoglycan	ESC, ECC	Cell surface	Specific extracellular matrix-associated molecule is synthesized by undifferentiated PSC.		
Sox-2	ESC	Intracellular	SOX2 belongs to the SOX (SRY-like HMG box) family of transcription factors with diverse roles in development.		
Stage-specific embryonic antigen-1 (SSEA-1; CD15)	ESC, ECC	Cell surface	Glycoprotein specifically expressed in early embryonic development and by undifferentiated PSCs.	√	√
Stage-specific embryonic antigen-3 (SSEA-3)	ESC, ECC	Cell surface	Glycoprotein specifically expressed in early embryonic development and by undifferentiated PSCs.		
Stage-specific embryonic antigen-4 (SSEA-4)	ESC, ECC	Cell surface	Glycoprotein specifically expressed in early embryonic development and by undifferentiated PSCs.		
TAZ	MSC	Intracellular	Transcriptional coactivator with PPZ-binding motif that functions as a transcriptional modulator of MSC differentiation.		
Telomerase	ESC, ECC	Intracellular	An enzyme uniquely associated with immortal cell lines; useful for identifying undifferentiated PSCs.	√	√
Telomerase Reverse Transcriptase (TERT)	ESC	Intracellular	TERT plays a role in senescence, as it is normally repressed in postnatal somatic cells resulting in progressive shortening of telomerates.		
TRA-1-60	ESC	Cell surface	Pluripotency stem cell marker.		
TRA-1-81	ESC	Cell surface	Pluripotency stem cell marker.		
UTF1	ESC	Intracellular	Expressed mainly in ES cells. Oct-3/4induces rapid proliferattion and tumorigenie properties of ES cells through activation of the UTF1 gene.		
Vasa-1	ESC, germ cells	Intracellular	The human VASA gene is specifically expressed in late germ cell lineage development.		
Vimentin	Ectoderm, neural and pancreatic progenitor	Intracellular	Intermediate filaments within cells; characteristic of primitive neuroectoderm formation.	√	√
Skeletal Muscle/Cardiac/Smooth Muscle					
CD140α	NSC	Cell surface	Involved in cell proliferation, differentiation, and survival.		
HLA-ABC	All nucleated cells	Cell surface	Receptor for CD8/TCR, T/APC interaction.	√	
MyoD and Pax7	Myoblast, myocyte	Intracellular	Transcription factors that direct differentiation of myoblasts into mature myocytes.	√	√
Myogenin and MR4	Skeletal myocyte	Intracellular	Secondary transcription factors required for differentiation of myoblasts from muscle stem cells.	√	√
Myosin heavy chain	Cardiomyocyte	Intracellular	A component of structural and contractile protein found in cardio myocyte.		
Myosin light chain	Skeletal myocyte	Intracellular	A component of structural and contractile protein found in skeletal myocyte.		

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To investigate the biological properties of stem cells and tissue-specific progenitor cells *in vitro*, cell culture systems have been established to characterize the effects of key extracellular matrix (ECM) molecules, growth factors/cytokines, and other factors that influence stem/progenitor cell expansion and differentiation. For tissue engineering applications, stem cells have been used for *in vivo* studies to assess the production and functionality of key differentiated cell types in the context of tissue regeneration and repair.

Extracellular Matrix (ECM) Molecules, Growth Factors, and other Factors Used to Promote Stem/Progenitor Cell Proliferation and Differentiation *In Vitro*

Stem Cell Type	Progenitor or Differentiated Cell Type	ECM, Growth Factor/Cytokine, and/or Other Factor
Embryo		
Embryonic stem cell	Expansion of undifferentiated ESC[8,9,41-43]	BD Matrigel™ Matrix, BD™ PuraMatrix™ Peptide Hydrogel, Gelatin, LIF
	Pancreatic endocrine progenitor[8]	bFGF
	Pancreatic islet[8]	bFGF, nicotinamide
	Expansion of Nestin+ neural progenitors[9]	Laminin, bFGF, poly-ornithine
	Neuron[9,10]	Laminin, poly-ornithine, RA
	Survival of ES-derived motor neurons[11]	BD Matrigel™ Matrix, BDNF, NT-3, CNTF, GDNF
	Glial progenitor cells[12]	bFGF, PDGF-AA
	Adipocyte[13]	RA
	Chondrocyte[14]	BMP-2, BMP-4
	Osteoblast[15]	RA, dexamethasone, ascorbate, ß-glycerol phosphate
	Dendritic cells[16]	GM-CSF, IL-3
	Endothelial cells[17]	Collagen IV, VEGF
Bone Marrow		
Mesenchymal stem cell	Osteoblast[18-20]	BMP-2, bFGF, dexamethasone, ascorbate, ß-glycerol phosphate
	Chondrocyte[19-21]	TGF-ß3, dexamethasone
	Neuron, Glial cells[22]	EGF, BDNF, RA
	Adipocyte[19,20]	Dexamethasone, insulin, indomethacin, 1-methyl-3-isobutylxanthine
Multipotent adult progenitor cell	Expansion of undifferentiated MAPCs[23]	Fibronectin, EGF, PDGF-BB, 2% FBS
	Osteoblast[23]	Fibronectin, dexamethasone, ascorbate, ß-glycerol phosphate
	Chondrocyte[23]	TGF-ß1
	Endothelial cells[24]	Fibronectin, VEGF
	Hepatocyte-like cells[25]	BD Matrigel™ Matrix, FGF-4, HGF
Hematopoietic stem cell	Platelets, red/white blood cells[26]	IL-3, IL-6, G-CSF, erythropoietin, thrombopoietin
	Expansion of undifferentiated progenitors	IL-3, IL-6, Stem cell factor, Flt3 ligand, thrombopoietin
	Megakaryocytes, Platelets	IL-3, IL-6, GM-CSF, thrombopoietin
	Reticulocytes, Erythrocytes	IL-3, IL-6, IL-9, erythropoietin, GM-CSF
	B lymphocytes	CXCL12, IL-3, Flt3 ligand, IL-7
	Granulocytes	G-CSF, GM-CSF, IL-3, IL-6
	Monocytes, Macrophages, Dendritic cells	GM-CSF, M-CSF, TNF-α
	Mast Cells	IL-4, IL-6

Key: ***BM*** *– Bone Marrow;* ***EB*** *– Embryoid Bodies;* ***MSC*** *– Mesenchymal Stem Cells;* ***ECC*** *– Embryonal Carcinoma Cells;* ***ESC*** *– Embryonic Stem Cells;* ***HSC*** *– Hematopoietic Stem Cells;* ***Hu*** *– Human;* ***Ms*** *– Mouse; √ – Available from BD Biosciences*

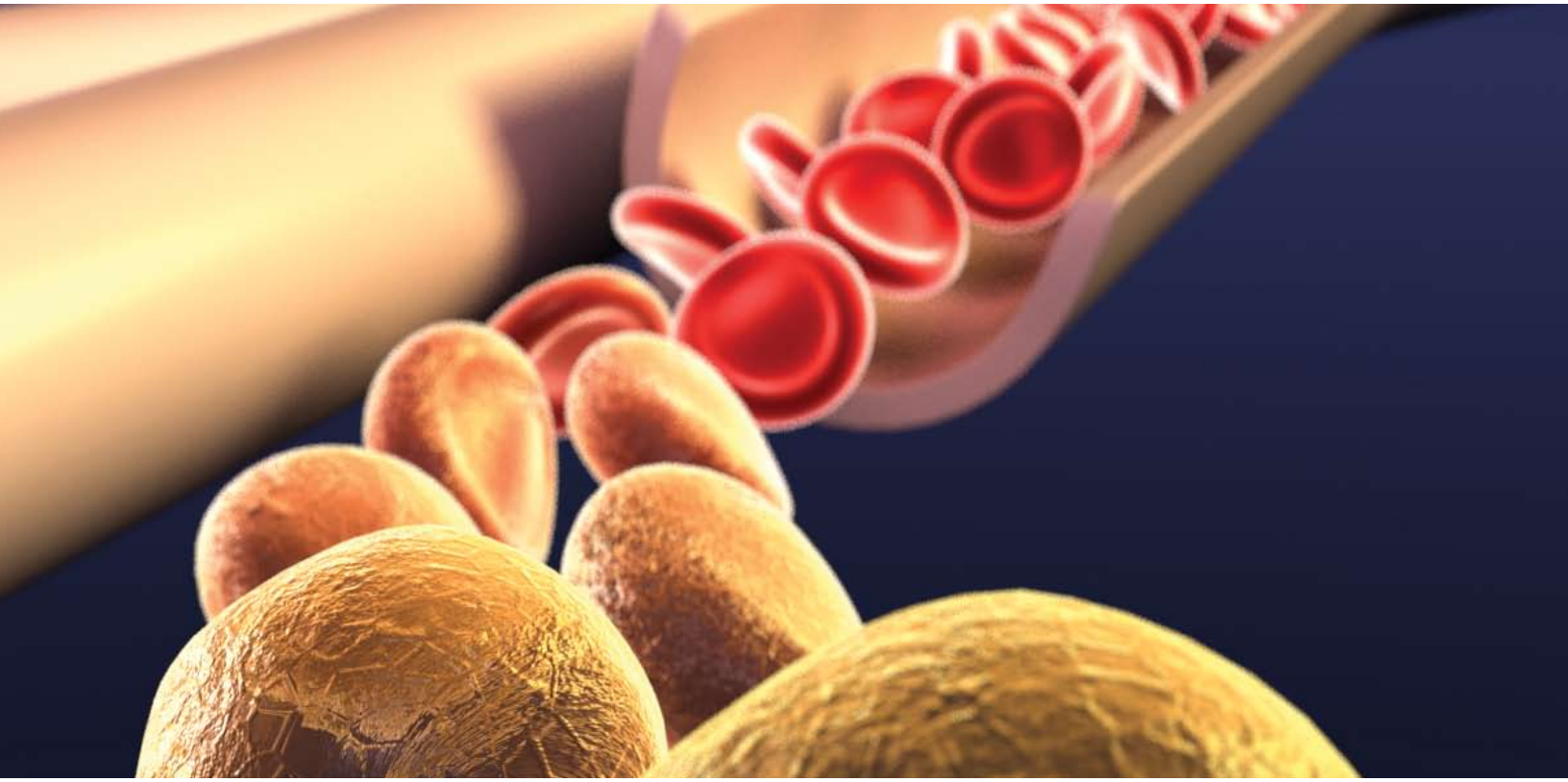
Color Key: *ECM molecules are denoted in blue; growth factors/cytokines in red; other factors in black.*

Extracellular Matrix (ECM) Molecules, Growth Factors, and Other Factors Used to Promote Stem/Progenitor Cell Proliferation and Differentiation *In Vitro (continued)*

Stem Cell Type	Progenitor or Differentiated Cell Type	ECM, Growth Factor/Cytokine, and/or Other Factor
Thymus		
Multipotential thymic precursor	T lymphocytes	IL-7
	NK cells	Flt3 ligand, IL-7, IL-15, IL-2, IL-12, IL-18
	Dendritic cells	GM-CSF, IL-3, IL-6, Flt3 ligand
Adult Tissue		
Liver	Expansion of undifferentiated oval cells[27]	Fibronectin, SCF, Flt-3 ligand, IL-3, LIF
	Hepatocyte[28]	Fibronectin, HGF, EGF
	Pancreatic islet[27,28]	Fibronectin, SCF, Flt-3 ligand, IL-3, nicotinamide
	Hepatocyte Progenitor[39]	BD™ PuraMatrix™ Peptide Hydrogel
Neural stem cell/ Neural progenitor cell	Expansion of NPCs[29]	βFGF, EGF, LIF
	Neuron, Glial cells[30-34]	Fibronectin, Laminin, βFGF, EGF, PDGF-AA PDGF-AB, PDGF-BB, NT-4, CNTF
	Neural, Glial Progenitors[40]	BD™ PuraMatrix™ Peptide Hydrogel
Adipose stem cell	Osteoblast[35]	Dexamethasone, ascorbate, ß-glycerol phosphate
	Chondrocyte[35,36]	TGF-ß1, insulin, ascorbate
	Adipocyte[35]	Dexamethasone, insulin, indomethacin, 1-methyl-3-isobutylxanthine
Muscle-derived stem cell	Expansion of MDSCs[37]	Collagen, IGF-1, EGF, SCF, FGF2
	Osteoblast[38]	Collagen, BMP-2

Key: ***ECM*** *– extracellular matrix;* ***EGF*** *– epidermal growth factor;* ***LIF*** *– leukemia inhibitory factor;* ***SCF*** *– stem cell factor;* ***HGF*** *– hepatocyte growth factor;* ***PDGF*** *– platelet-derived growth factor;* ***VEGF*** *– vascular endothelial growth factor;* ***BMP*** *– bone morphogenetic protein;* ***BDNF*** *– brain derived neurotrophic factor;* ***NT*** *– neurotrophin;* ***CNTF*** *– ciliary neurotrophic factor;* ***bFGF*** *– basic fibroblast growth factor;* ***TGF-ß*** *– transforming growth factor-beta;* ***IL*** *– interleukin;* ***G-CSF*** *– granulocyte-colony stimulating factor;* ***GM-CSF*** *– granulocyte-macrophage colony stimulating factor;* ***IGF*** *– insulin-like growth factor;* ***RA*** *– retinoic acid;* ***FBS*** *– fetal bovine serum.*

Color Key: *ECM molecules are denoted in blue; growth factors/cytokines in red; other factors in black.*



BD™ PuraMatrix™ Peptide Hydrogel

Cat. No. 354250

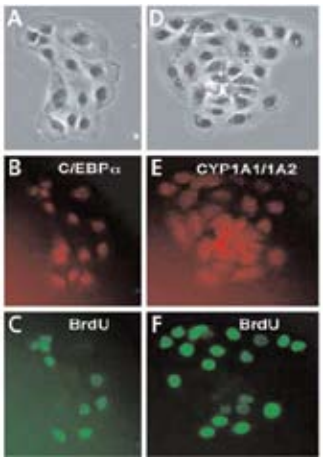
BD™ PuraMatrix™ Peptide Hydrogel is a synthetic matrix used to create defined, three-dimensional (3D) microenvironments for a variety of cell culture experiments. To achieve optimal cell growth and differentiation, it is necessary to determine the appropriate mixture of this material and bioactive molecules (eg, growth factors, extracellular matrix [ECM] proteins, and/or other molecules). BD PuraMatrix Peptide Hydrogel consists of standard amino acids (1% w/v) and 99% water. Under physiological conditions, the peptide component self-assembles into a 3D hydrogel that exhibits a nanometer scale fibrous structure. The hydrogel is readily formed in a culture dish, plate, or cell culture insert.

The resulting hydrogel has been shown to promote the differentiation of hepatocyte progenitor cells,[39] rat pheochromocytoma cells (PC12),[45] and hippocampal neurons.[40-44] Studies have also demonstrated that BD PuraMatrix Peptide Hydrogel supports the attachment of a variety of primary (eg, neuronal, fibroblast, keratinocyte) and transformed (eg, MG-63, SH-SY5Y, HEK293, NIH3T3) cell types. Other potential applications include stem cell proliferation, tumor cell migration and invasion, angiogenesis assays, and *in vivo* model analyses of tissue regeneration. BD PuraMatrix Peptide Hydrogel is biocompatible, resorbable, and devoid of animal-derived material and pathogens. For *in vivo* studies in animals, the soluble material can be injected and will subsequently form a 3D hydrogel upon contact with the physiological environment.

To examine the potential utility of self-assembling peptides in the context of cardiac regeneration, recent work from the laboratory of Dr. Richard Lee demonstrated that endothelial cells improve cardiac myocyte survival and organization when these cell types were co-cultured in 3D using a peptide hydrogel (RAD16-II) closely related to BD PuraMatrix (RAD16-I).[45] In a subsequent study from the same group, RAD16-II injected into the myocardium of mice was found to promote vascular cell recruitment (endothelial and smooth muscle cells) into the microenvironment created by the hydrogel.[46]

Differentiation of Hepatocyte Progenitor Cells

Rat hepatocyte progenitor cells (Lig-8) were encapsulated in BD PuraMatrix Peptide Hydrogel and cultured overnight in defined medium at 37°C. Samples were then used for bromodeoxyuridine (BrdU) uptake and *in situ* immunofluorescence analyses. As shown in the figure below, Lig-8 cells form spheroid colonies when cultured within the 3D hydrogel and express the hepatocyte markers CCAAT/enhancer binding protein (C/EBP) and cytochrome P450 1A1/1A2 (CYP1A1/1A2) in a manner that is independent of cellular mitotic activity.[39] Therefore, while some cells are proliferating, the entire colony exhibits differentiation potential.



Lig-8 cells cultured in BD™ PuraMatrix™ Peptide Hydrogel.
All cells in spheroid colonies, arrested or not, undergo differentiation. Spheroids were isolated, transferred to adherent cultures, and incubated with BrdU for 24 hours.

A. spheroid colony (phase contrast)
B. same optical layer as A immunostained for C/EBP (red)
C. same optical layer as A immunostained for BrdU (green)
D. spheroid colony (phase contrast)
E. same optical layer as D immunostained for CYP1A1/1A2 (red)
F. same optical layer as D immunostained for BrdU

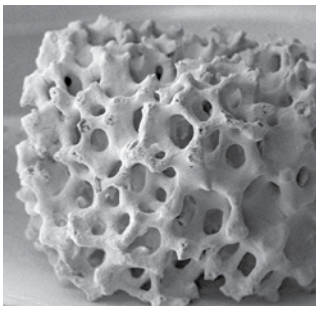
Data provided by 3D Matrix, Inc. and originally described in Semino, C.E., et al., *Differentiation* 71:262 (2003).

Features and Benefits

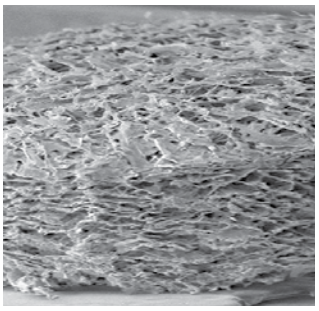
Purified Synthetic Peptide Composition (1% w/v)	Highly defined material that promotes cell attachment
3D Hydrogel Structure	Assembles into fibrous structure with average pore size of 50-200 nm
Easy Handling Injectable for *in vivo* Studies in Animals	Easily mixed with cells and/or bioactive molecules (eg, growth factors) prior to gelation; injectable for *in vivo* studies in animals
Transparent Hydrogel	Samples are readily visualized using standard staining methodologies and microscopy
Established Protocols	3D cell encapsulation cultures; Surface plating of adherent cells on microporous membrane inserts and microplates; cell recovery for sub-culturing or biochemical analyses; *in vivo* injection

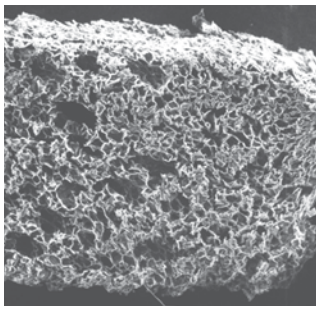
BD™ Three Dimensional Scaffolds

The BD™ Three Dimensional (3D) Scaffolds are ideal for *in vitro* and *in vivo* analyses of cell growth and differentiation. These scaffolds provide a 3D physical support matrix for *in vitro* cell culture as well as *in vivo* tissue regeneration.



BD™ 3D Calcium Phosphate Scaffold (Cat. No. 354617): Supports short- and long-term growth and differentiation of mesenchymal cells.





BD™ 3D Collagen Composite (Cat. No. 354613) (left) and BD™ OPLA® (Cat. No. 354614) (Open-Cell Poly-Lactic Acid) (right) Scaffolds: Support short- and long-term growth and differentiation of a variety of epithelial cells (eg, hepatocytes), neurons, endothelial cells, osteoblasts, chondrocytes, fibroblasts, and smooth muscle cells.

CD34 Human Hematopoietic Progenitor Cell Marker

The CD34 antigen is a single-chain transmembrane glycoprotein, MW 105 to 120 kilodaltons (kd). The antigen is associated with human hematopoietic progenitor cells and is a differentiation stage-specific leukocyte antigen. The CD34 antigen is present on immature hematopoietic precursor cells and all hematopoietic colony-forming cells in bone marrow and blood, including unipotent (CFU-GM, BFU-E) and pluripotent progenitors (CFU-GEMM, CFU-Mix, and CFU-Blast). Terminal deoxynucleotidyl transferase-positive B and T lymphoid precursors in normal bone marrow are $CD34^+$. The CD34 antigen is present on early myeloid cells that express the CD33 antigen but lack the CD14 and CD15 antigens and on early erythroid cells that express the CD71 antigen and dimly express the CD45 antigen.

The CD34 antigen is also found on capillary endothelial cells and approximately 1% of human thymocytes. Normal peripheral blood lymphocytes, monocytes, granulocytes, and platelets do not express the CD34 antigen. CD34 antigen density is highest on early hematopoietic progenitor cells and decreases as cells mature. The antigen is absent on fully differentiated hematopoietic cells.

Uncommitted $CD34^+$ progenitor cells are $CD38^-$ and lack lineage-specific antigens such as CD71, CD33, CD10, and CD5, while $CD34^+$ cells that are lineage-committed express the CD38 antigen in high density. Most $CD34^+$ cells reciprocally express either the CD45RO or CD45RA antigens, with the $CD45RO^+$ population being the more primitive. Approximately 60% of acute B lymphoid leukemias and acute myeloid leukemias (AMLs) and 1% to 5% of acute T lymphoid leukemias express the CD34 antigen. The antigen is not expressed on chronic lymphoid leukemias or lymphomas.

BD Biosciences offers a variety of different monoclonal antibodies against CD34. Please refer to the product list in the back of this brochure or visit us online.

Several multicolor combinations are available that include combinations of CD34 with other markers such as CD45, CD15, and HLA-DR.

Highlighted Products for Stem Cell Biology and Tissue Engineering Research *(continued)*

BD Biosciences offers products for *In Vitro* Diagnostic use, and is a leading provider of CD34 reagents for clinical flow cytometry applications.

The BD Procount™ progenitor cell enumeration system is a fully integrated clinical system for automated counting of CD34 positive cells. It combines powerful software, unique reagents, and BD Trucount™ technology to minimize variability in CD34 counts with an easy-to-use method. BD Procount software, when used with Procount reagents, identifies and enumerates $CD34^+$ cells on a BD FACSCalibur™ flow cytometer.

BD Procount™ Progenitor Cell Enumeration Kit

Cat. No. 340498

The BD Procount™ progenitor cell enumeration kit is designed as a two-step, lyse-no-wash assay. The 25-test kit consists of a CD34 reagent, an isotype control reagent, and BD Trucount™ absolute count tubes to determine the absolute cell counts volumetrically. The BD Procount analysis strategy fulfills the need for a procedure with minimal sample handling and processing, combined with a consistent and standardized data analysis method. The BD Procount kit is intended for identifying and enumerating $CD34^+$ cells. $CD34^+$ cells may be present in peripheral blood and leukapheresis.

BD™ Stem Cell Control Kit

Cat. No. 340991

The BD™ Stem Cell Control Kit is intended as a complete, two-level process control for immunophenotyping and enumeration of leukocytes by flow cytometry. It is a control for antibody staining, red blood cell (RBC) lysis, instrument setup and performance, and data analysis.

Immunophenotyping by flow cytometry is a complex, multi-step process. The BD Stem Cell Control Kit is a stable control, with assigned values that can be used to monitor the immuno-phenotyping process for $CD34^+$ cells.

BD FACSCalibur™ Flow Cytometry System*

The BD FACSCalibur™ system combines unique dual-laser technology, an automated sample loader option, and powerful software to provide the high throughput necessary to meet productivity requirements of clinical laboratories. The modularity and innovative technology of the BD FACSCalibur system also offers researchers the flexibility required for a variety of research applications.

- Three- or four-color fluorescence capability
- BD FACStation™ system data management system
- Flexible and modular for future upgrades

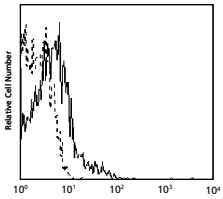
*Class I (1) Laser Product

Human Hematopoietic Stem Cell Research Reagents

APC Conjugated Mouse Anti-Human Hematopoietic Progenitor Cells (HPCs)

Cat. No. 557929

Monoclonal antibody BB9 recognizes a cell-surface glycoprotein of approximately 160 kDa, expressed on primitive hematopoietic progenitor cells. This antibody was generated using human bone marrow-derived stromal cells as immunogen. BB9 reacts with stromal cells, a minor subset of human bone marrow cells; it does not react with peripheral blood leukocytes.



APC Hematopoeitic Progenitor Cell, with isotype control.

Profile of anti-hematopoeitic progenitor cell (BB9) reactivity on peripheral blood lymphocytes analyzed by flow cytometry.

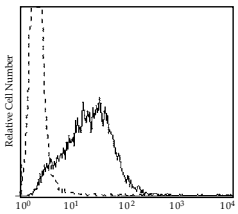
Reacts with a subset of CD34$^+$, CD90$^+$ demonstrating low or absent expression of CD38, low retention of Rhodamine 123 and Ki-67$^-$. CD34$^+$BB9$^+$ cells are able to sustain hematopoiesis in pre-CFU culture stimulated with IL-3, IL-6, G-CSF and SCF BB9 also reacts with a subset of CD34$^+$ cells from mobilized peripheral blood.

The BB9 antibody is also available as a PE conjugate.

CD117 (c-kit), R-Phycoerythrin (R-PE)-Conjugated Mouse Anti-Human Monoclonal Antibody

Cat. No. 555714

Monoclonal antibody YB5.B8 recognizes CD117 (c-kit), a 145 kDa cell-surface glycoprotein with tyrosine kinase activity. CD117 is present on hematopoietic progenitor cell subsets, thymocytes, mast cells, hepatocytes and histiocytes. CD117 serves as a cytokine receptor for steel factor (SLF), also known as stem cell factor (SCF) or mast cell growth factor (MGF). The interaction of c-kit and SLF is crucial to hematopoiesis, mast cell differentiation, melanogenesis, and germ cell development. The ability of YB5.B8 antibody to block the binding of c-kit ligand is still controversial.



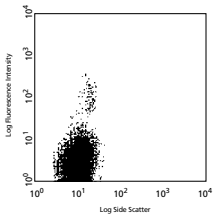
Log Fluorescence Intensity Profile of the erythroleukemia cell line, TF-1, analyzed by flow cytometry.

The YB5.B8 antibody is also available as APC and PE-Cy 5 conjugate.

CD34, R-Phycoerythrin (R-PE)-Conjugated Mouse Anti-Human Monoclonal Antibody

Cat. No. 550619

Monoclonal antibody 563 recognizes the human form of the 105-120 kDa heavily O-glycosylated and N-glycosylated transmembrane glycoprotein, CD34, expressed on stem/progenitor hematopoietic cells, endothelial cells and some tissue. Clone 563 also cross reacts with a subset of peripheral blood mononuclear cells of both rhesus and cynomolgus macaque monkeys, but not baboon. The distribution of stemlike cells is similar to that observed with peripheral blood mononuclear cells from normal human donors.

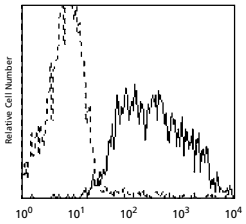


Profile of CD34 Ab reactivity on peripheral blood (CD14-negative) stem cells from rhesus macaque (Macaca mulatta) analyzed by flow cytometry.

CDw338 (ABCG2) Mouse Anti-Human Monoclonal Antibody

Cat. No. 552823

Monoclonal antibody 5D3 reacts with ABCG2 (BCRP1), a multi-drug resistance protein that is a member of the ATP binding cassette (ABC) transporters. It is highly expressed on primitive stem cells as identified by the "side-population" (SP) phenotype. This SP phenotype is based on the efflux of fluorescent dyes such as Rhodamine 123 and Hoechst 33342. The expression of ABCG2 appears to be highly conserved as it has been identified in various species. Studies show that highly purified murine stem cells express BCRP1 mRNA and this expression declines sharply as the stem cells express CD34. The highest levels of BCRP1 mRNA expression have been seen in KDR+ human stem cells.



ABCG2 (BCRP1)-Purified Log Fluorescence Intensity.

Profile of anti-ABCG2 (clone 5D3) reactivity on MCF7-BCRP cells surface analyzed by flow cytometry. Second step staining with Cat. No. 550589.

For more information visit **bdbiosciences.com**

Alexa Fluor® Dyes

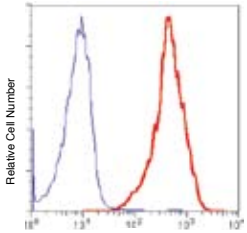
The Alexa Fluor® dye has become a widely used dye in stem cell research due to its brightness and photostability. BD Biosciences carries a wide selection of Alexa Fluor conjugated antibodies. Please visit our online catalog for a complete listing.

Alexa Fluor® 647 Mouse Anti-Human Cub Domain Containing Protein (CDCP1) Monoclonal Antibody

Cat. No. 558212

Monoclonal antibody CUB1 reacts with the Cub Domain Containing Protein 1 (CDCP1), a transmembrane protein described to contain three CUB domains in the extracellular region with a hexalysine stretch in the cytoplasmic region. It is expressed on a subset of CD34$^+$ stem/progenitor cells in the bone marrow, cord blood and mobilized peripheral blood. Studies describe the detection of CDCP1 on CD34$^+$/CD38$^-$ bone marrow stem/progenitor cells, but not on mature peripheral blood leukocytes. CDCP1 is expressed on lung, colon and breast malignant cells and is coexpressed with CD34 and CD133 on myeloid leukemic cells. It may play a role of adhesion or interaction with the extracellular matrix. Reports describe transplanted human CDCP1$^+$ cells into NOD/SCID mice to successfully engraft and undergo multi-lineage differentiation.

The CUB1 antibody is also available as a PE conjugate.



Alexa Fluor® CDCP1 and Isotype Control

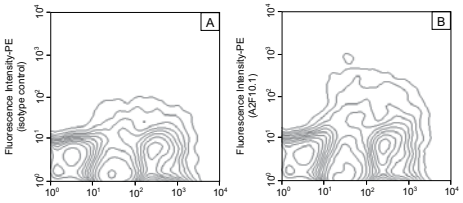
Profile of CDCP1 (CUB1) reactivity on HT29 cells analyzed by flow cytometry.

Mouse HSC Research Reagents

R-Phycoerythrin (R-PE)-Conjugated Rat Anti-Mouse CD135 (Flk-2/Flt3, Ly-72) Monoclonal Antibody

Cat. No. 553842

The A2F10 antibody reacts with Flk-2/Flt3 (Ly-72, CD135), a receptor protein tyrosine kinase closely related to c-kit, c-fms, and PDGF Receptor of the immunoglobulin superfamily. The Flt3 message is detected in hematopoietic stem cells and primitive progenitor cells in fetal liver, adult bone marrow, and fetal and adult thymus, as well as brain, placenta, and testis; but it is absent in more mature hematopoietic cells. In flow cytometric analysis, the A2F10 antibody recognizes Flt3-transfected Y3 cells (but not the parent cell line) and early B lymphoid lineage cells in juvenile and adult bone marrow. A role for CD135 in the regulation of hematopoiesis is suggested by the observations that soluble Flk-2/Flt3 ligand can both stimulate proliferation of stem cell-enriched fetal liver, fetal thymus, and adult bone marrow populations and enhance their responses to other growth factors *in vitro*.

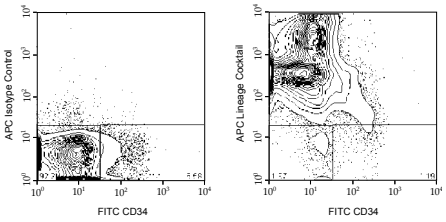


Expression of CD135 on bone-marrow leukocytes. BALB/c bone-marrow cells were stained with FITC-conjugated anti-mouse CD45R/B220 and CD11b (Integrin α_M chain) monoclonal antibodies (Cat. no. 553087/553088 and 554982, respectively) and either PE-conjugated Rat IgG_{2a}, κ isotype control mAb R35-95 (Cat. no. 553930, Panel A) or PE-conjugated mAb A2F10.1 (Panel B).

APC Mouse Lineage Antibody Cocktail, with Isotype Control CD3e, CD11b, CD45R/B220, Erythroid Cells, and Ly-6G and Ly-6C,

Cat. No. 558074

The APC Mouse Lineage Antibody Cocktail has been designed to react with cells from the major hematopoietic lineages, such as T lymphocytes, B lymphocytes, monocytes/macrophages, NK cells, erythrocytes, and granulocytes. This pre-diluted Cocktail of five APC-conjugated antibodies is designed for the flow cytometric identification of hematopoietic progenitors in mouse bone marrow. The APC Mouse Lineage Isotype Control Cocktail contains equivalent concentrations of isotype-matched negative-control immunoglobulin. Additional fluorochrome-labeled reagents may be combined with the APC Mouse Lineage Antibody Cocktail, and the APC Mouse Lineage Isotype Control Cocktail, to further characterize hematopoietic progenitor subpopulations.

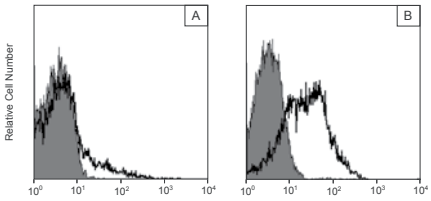


Identification of $CD34^+$ and $CD34^-$ subpopulations of hematopoietic progenitors. BALB/c bone marrow cells were treated with Mouse BD Fc Block™ purified anti-CD16/CD32 mAb 2.4G2 (Cat. No. 553141/553142) and stained with either FITC rat IgG_{2a} κ isotype control (not shown) or FITC anti-CD34 mAb RAM34 (Cat. No. 553733) and with either APC Mouse Lineage Isotype Control Cocktail (left panel) or APC Mouse Lineage Antibody Cocktail (right panel). Dead cells were excluded from analysis by staining with propidium iodide (Cat. No 556463).

R-Phycoerythrin (R-PE)-Conjugated Rat Anti-Mouse CD34 Monoclonal Antibody

Cat. No. 551387

The RAM34 antibody reacts with the CD34 glycoprotein on the surface of three independently derived mouse CD34-transfected cell lines. Normal thymocytes and splenocytes are negative for CD34 expression. In the bone marrow, 7-10% of cells are stained with RAM34 mAb, including most of the Ly-6A/E (Sca-1)$^+$ CD90 (Thy-1) low Lineage Marker- hematopoietic stem cell-enriched subpopulation and myeloerythroid progenitors. CD34 is also expressed on a small percentage of fetal liver cells, including NK-cell progenitors. CD34 has been reported to be expressed on the endothelium of capillaries and, in this form, to function as a ligand for L-selectin. Consistent with this observation, RAM34 antibody stains endothelial cells in spleen, thymus, and postcapillary HEVs in the lymph nodes. It is reported that RAM34 antibody can be used to select $CD34^+$ $CD117$ (c-Kit)$^+$ Ly-6A/E (Sca-1)$^+$ Lineage Marker- bone marrow-derived hematopoietic stem cells, capable of short-term multi-lineage reconstitution of lethally irradiated mice; while the CD34- $CD117^+$ Sca-1$^+$ Lineage Marker- population contains self-renewing hematopoietic stem cells. Similarly, the bone marrow population with high dye efflux capacity and which is highly enriched for long-term reconstituting hematopoietic stem cells is $CD34^-$ $CD117$ (c-Kit)$^+$ Ly-6A/E (Sca-1)$^+$ Lineage Marker.



The expression of CD34 on Lineage Marker-negative bone-marrow cells. C57BL/6 bone-marrow leukocytes were stained with PE-conjugated RAM34 mAb before (Panel A) and after (Panel B) depletion of the lineage-committed cells with the Mouse Lineage Panel (Cat. No. 559971) followed by a magnetic beads separation method. The open histograms represent stained cells, while the shaded histograms represent unstained negative-control cells.

The RAM34 antibody is also available as FITC, APC, and Biotin conjugate.

Ly-6A/E (Sca-1) R-Phycoerythrin (R-PE)-Conjugated Rat Anti-Mouse Monoclonal Antibody

Cat. No. 553108

The D7 antibody reacts with Ly-6A.2 and Ly-6E.1, which are allelic members of the Ly-6 multigene family. Sca-1 (Ly-6A/E), a phosphatidylinositol-anchored protein of about 18 kDa, is expressed on the multipotent hematopoietic stem cells (HSC) in the bone marrow of mice with both Ly-6 haplotypes. In mice expressing the Ly-6.2 haplotype (eg, AKR, C57BL, C57BR, C57L, C58, DBA/2, PL, SJL, SWR, 129), Ly-6A/E is also expressed on distinct subpopulations of bone marrow and peripheral B lymphocytes and thymic and peripheral T lymphocytes.

The D7 antibody is also available as FITC, PE-Cy 7, and Biotin conjugate.

For more information visit **bdbiosciences.com**

Instrumentation

Next Generation Flow Cytometry High-Speed Sorter

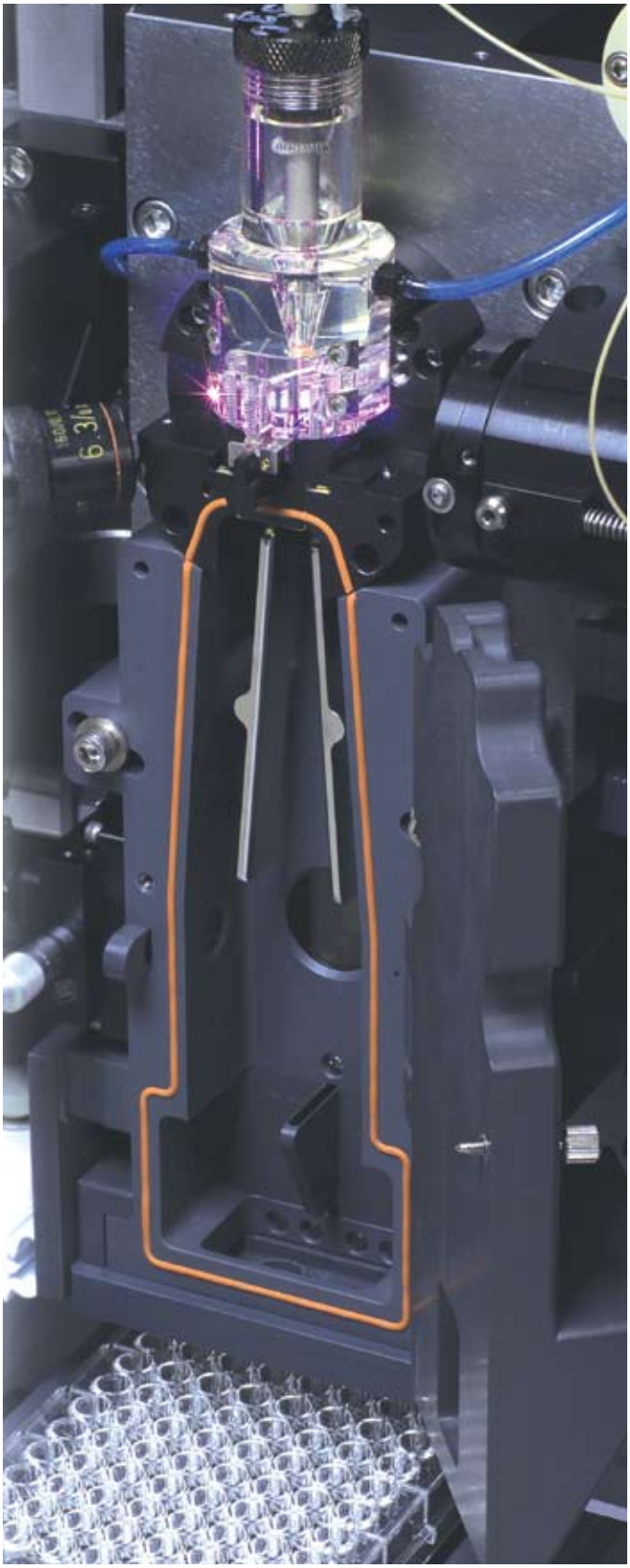
BD FACSAria™ Cell Sorter*

The BD FACSAria™ cell sorter sets a new standard for high-performance flow cytometry. Based on an entirely new design in instrumentation, the BD FACSAria cell sorter is the first benchtop sorter to incorporate a fixed alignment cuvette flow cell. The numerous technological advances embodied in the BD FACSAria cell sorter reduce the cost of owning a high-speed sorter and accelerate research by providing unparalleled, easy-to-use sorting and analysis.

BD FACSAria software provides pioneering instrument control for flexible sorting and data analysis. All instrument and sorting controls are embedded in the software to simplify instrument setup and operation. New features programmed into the software provide the complete solution for high-performance cell sorting.

A customized 355nm (UV) or 375nm (near UV) laser option for the BD FACSAria™ allows for precise sorting of side population stem cells labeled with Hoechst 33342. The collected cells can be cultured and used in further experiments.

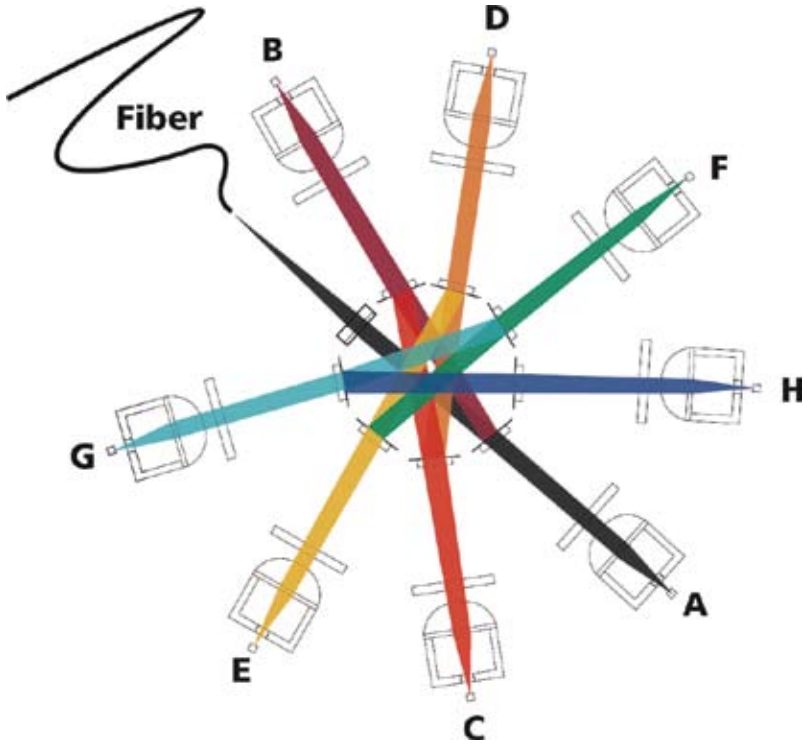
*Class I (1) Laser Product



Revolutionary Optics System of the BD FACSAria™ Flow Cytometer

High Sensitivity

This new optical system increases the quality and quantity of the information acquired from each sample.



Octagon-shaped collection optics.

For more information, visit bdbiosciences.com/FACSAria

Class I (1) Laser Product

BD FACSVantage™ SE System*

High-speed cell sorting with maximum flexibility

The BD FACSVantage™ SE flow cytometry system is the most flexible high-speed cell sorting instrument for the research laboratory. This instrument platform can accommodate any laser wavelength and a variety of nozzle sizes for maximum performance for any research application.

To meet the demands of today's research, we've improved the BD FACSVantage SE and its many options to allow for customization to meet any possible cell sorting need. This technology is accessible through a familiar user interface and efficient ergonomic design. The BD FACSVantage SE flow cytometry system is fully modular.

BD FACSVantage SE System

- Multicolor analysis and sorting
- BD FACStation™ data management system
- Flexible and modular for future upgrades
- Non-rectangular sort windows

Options

- Digital option
- BD TurboSort™ option
- BD MacroSort™ option
- BD CloneCyt™ Plus
- BD FACS™ Accudrop
- Pulse Processor

*Class I (1) Laser Product

BD Biosciences Fluorochrome Reference Chart

Typical Instrument Configuration

Instrument	Laser	Excitation Laser Line (nm)	Fluorescence Channel	Fluorochromes Provided by BD Biosciences			
BD FACSCalibur™	Argon (L1)	488	FL1 Green	FITC	Alexa Fluor® 488		
			FL2 Yellow	PE			
			FL3 Red	PE-Cy5*	PerCP	PerCP-Cy5.5	PE-Cy7
	Red Diode (L2)	635	FL4 Red	APC*	Alexa Fluor® 647		
BD FACSCanto™	Argon (L1)	488	Green	FITC			
			Yellow	PE			
			Red	PerCP	PerCP-Cy5.5		
			Infra Red	PE-Cy7			
	HeNe (L2)	633	Red	APC*			
			Infra Red	APC-Cy7			
BD FACSVantage™ SE (typical setup)	Argon (L1)	488	FL1 Green	FITC	Alexa Fluor® 488		
			FL2 Yellow	PE			
			FL6 Red	PE-Texas Red®	PE-Cy5*	PerCP-Cy5.5	
			FL3 Infra Red	PE-Cy7			
	Krypton (L2)	407	FL4 (1) Blue	Alexa Fluor® 405	Pacific Blue®		
	HeNe (L2 or L3)	633	FL4 (2) Red	APC*	Alexa Fluor® 647		
			FL5 Infra Red	APC-Cy7			
BD™ LSR II (typical setup)	Argon (L1)	488	Green	FITC	Alexa Fluor® 488		
			Yellow	PE			
			Red	PE-Texas Red®	PE-Cy5*	PerCP	PerCP-Cy5.5
	HeNe (L2)	633	Red	APC*	Alexa Fluor® 647		
			Infra Red	APC-Cy7			
	UV (L3)	355	Violet				
			Blue	Alexa Fluor® 405	Pacific Blue®		
	Violet (L4)	405	Green	AmCyan			
			Blue	Alexa Fluor® 405	Pacific Blue®		
BD FACSAria™ (typical setup)	Argon (L1)	488	Green	FITC	Alexa Fluor® 488		
			Yellow	PE			
			Red	PE-Texas Red®	PE-Cy5*	PerCP	
			Far Red	PerCP-Cy5.5			
			Infra Red	PE-Cy7			
	HeNe (L2)	633	Red	APC*	Alexa Fluor® 647		
			Infra Red	APC-Cy7			
	Violet (L3)	407	Green	AmCyan			
			Blue	Alexa Fluor® 405	Pacific Blue®		
BD FACSArray™ (typical setup)	Green Diode (L1)	532	Yellow	PE			
			Far Red	PerCP-Cy5.5	PE-Cy7		
	Red Diode (L2)	635	Red	APC*	Alexa Fluor® 647		
			Infra Red	APC-Cy7			

* APC and PE-Cy5 may be used together on instruments with cross-beam compensation.
Note: Custom BD FACSAria™ instruments equipped with either 355nm or 375nm lasers can be ordered to enable stem cell applications using Hoescht or Dapi dyes.

Identification of a Primitive Progenitor Cell Subset Using Hoechst 33342

Characterization of hematopoietic stem cells and their subsets has traditionally been performed with cell surface staining using fluorescently labeled monoclonal antibodies. A cell marker of choice is CD34,[47] a transmembrane phosphoglycoprotein that is selectively expressed on vascular endothelial cells, tissue fibroblasts or stromal cells, and hematopoietic cells. CD34 has been used in different combinations with other cell surface markers and is the most prevalent marker currently used for identification of mouse and human progenitor cells. The cells identified by these methods have biological properties that include self renewal and differentiation into mature cell lineages.[48,49]

Fluorescent probes such as rhodamine 123[50,51] and pyronin Y[52] have been shown to fractionate subpopulations of hematopoietic progenitor cells when used with other cell surface markers. Goodell[53,54,55] and co-workers have described a method using dual wavelength flow cytometry to define a small (0.01 – 0.10%) population of primitive progenitor cells that selectively efflux the dye Hoechst 33342 (bis-benzimide) in mouse, primate, and human bone marrow, as well as in a variety of tissues. This population of cells is termed "side population" (SP) cells. These cells are enumerated by exciting the Hoechst–labeled cells with the 350 nm line of a UV laser and then simultaneously measuring the fluorescence using blue and far red emission filters. Of particular interest is that these cells express CD34-low to negative and are thought to be the most primative of progenitor cells identified to date.

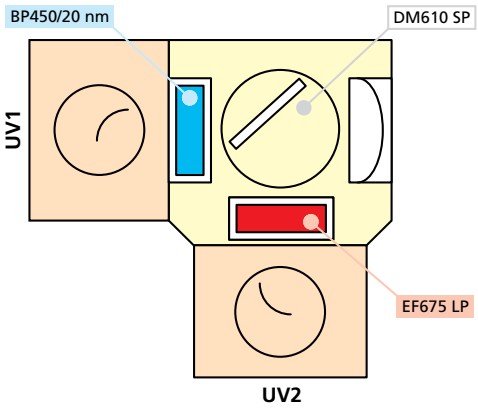


Figure 1. Optical diagram showing the position of the filter set that includes the following filters: DM610 SP, BP450/20, and EF675 LP.

Method

The SP hematopoietic stem cells are identified by the cells' ability to differentially efflux the Hoechst dye via a multi-drug–like transport mechanism. This is a dynamic process; therefore, care must be taken during the labeling protocol by judiciously observing the time and temperature requirements.[56]

The BD Biosciences Stem Cell Side-Population Filter Set (Cat. No. 341063) provides operators of the BD FACSVantage™ SE (with or without the BD FACSDiva digital electronics option) with a convenient way to set up flow cytometers equipped with an ultraviolet laser in the second or third positions to perform these experiments. The DM610 SP used to distinguish the red from the blue fluorescence signals comes premounted on a mirror holder that is attached to the instrument's dichroic mirror holder. The BP450/20nm and EF675-LP filters are then installed in front of the PMT detectors as shown in ***Figure 1***.

The BP450/20nm is used to discriminate the fluorescent blue signal and the EF675-LP red signal. The events are collected using linear amplification (***Figure 2***).

For best results:

1. Tune UV laser to 350 nm and 100 mW for defining this rare sub-population of cells.
2. Display data as correlated Hoechst blue and Hoechst red in linear mode.
3. Align cytometer to minimize the CVs in all fluorescence channels for this application.
4. Keep the sample at 4°C throughout the analysis or sort to minimize dye efflux.
5. Collect sorted S-P cells at 4°C in a small volume of DMEM containing 10% FBS and 10 mM HEPES (use a 1.5 ml Eppendorf centrifuge tube).
6. Maintain a low sample differential for maximum resolution.
7. Collect a large list-mode data file of 100,000 events for the analysis.
8. Gate out the dead cells using propidium iodide (PI).

The phenomenon of "red fluorescence" from Hoechst 33342 is not fully understood. It is thought that the way in which the dye binds to the chromatin conformation has a direct effect on the emission spectra.[57]

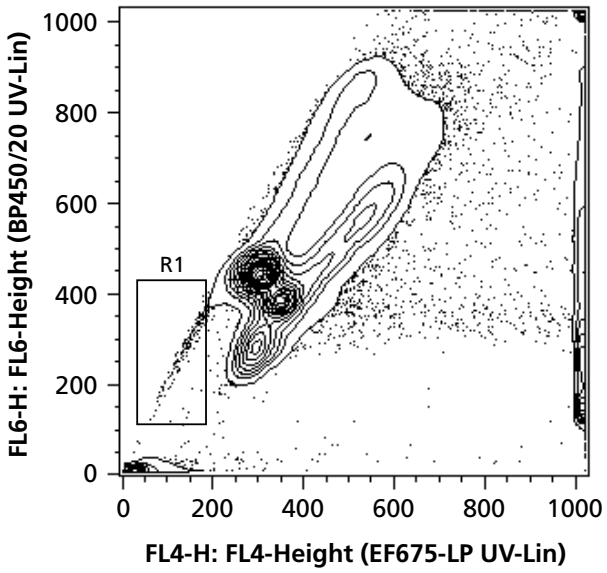


Figure 2. Murine C57BL/6 bone marrow was stained using Hoechst 33342. A data set of 100,000 events was collected in list mode. The contour plot at 5% probability of ungated events shows the S-P population (R1) with frequencies that range from 0.02 to 0.08%.

BD FACSVantage SE

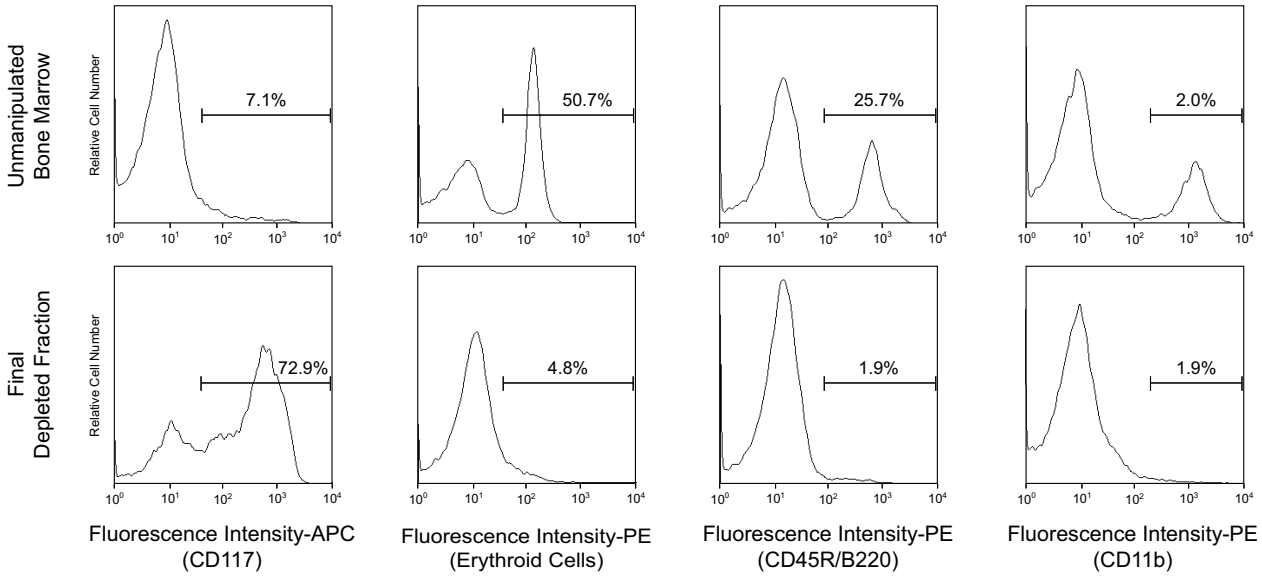
BD IMag™ Magnetic Cell Separation System

Mouse Hematopoietic Progenitor (Stem) Cell Enrichment Set – DM

Cat. No. 558451

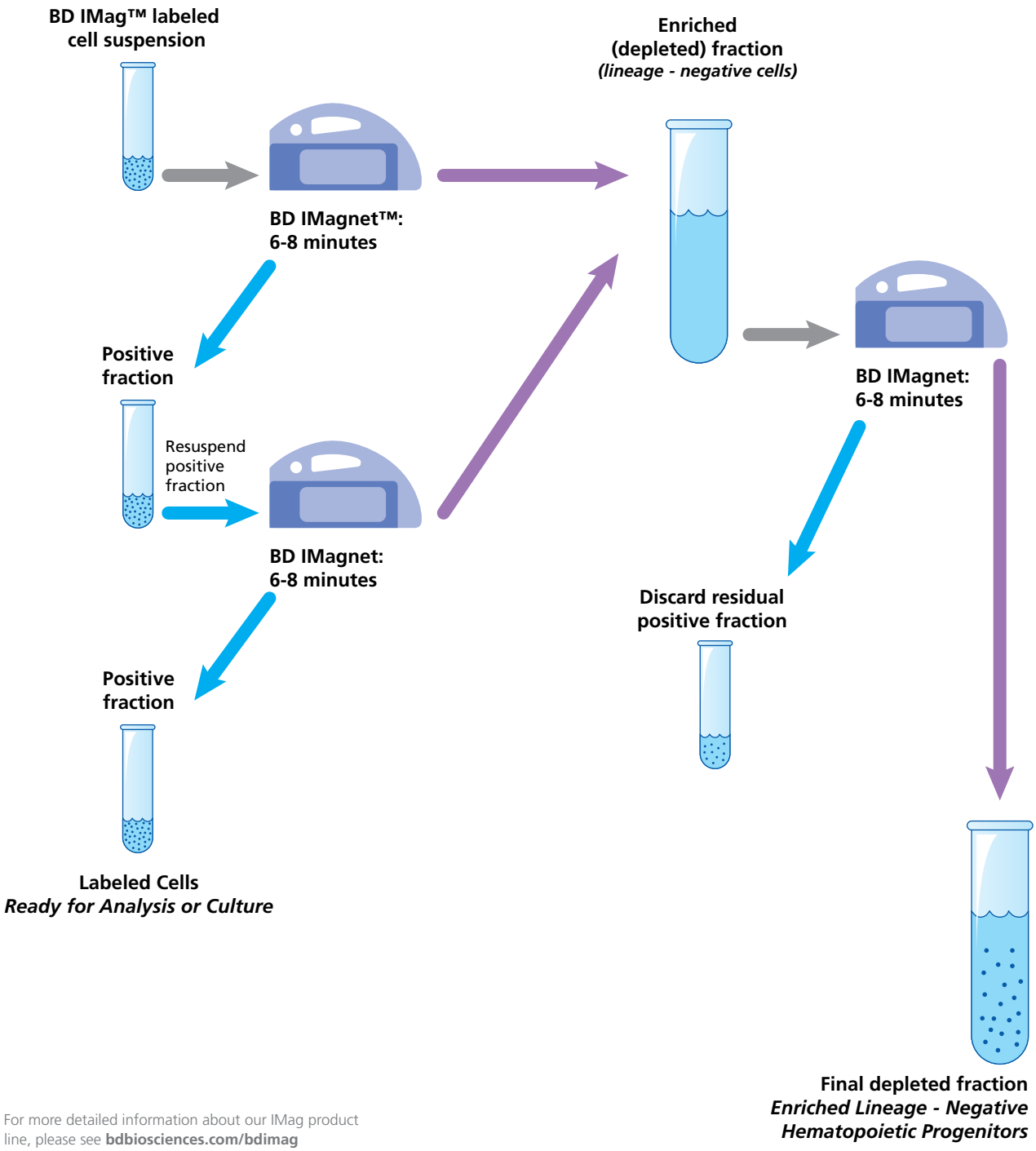
The BD IMag™ Mouse Hematopoietic Progenitor Cell Enrichment Set – DM reacts with cells from the major hematopoietic cell lineages, such as T lymphocytes, B lymphocytes, monocytes/macrophages, granulocytes, and erythrocytes. The Biotinylated Mouse Lineage Depletion Cocktail contains biotinylated monoclonal antibodies to mouse CD3e (CD3ε chain), CD11b (Integrin α_M chain), CD45R/B220, Ly-6G and Ly-6C (Gr-1), and TER-119/ Erythroid Cells (Ly-76). The BD IMag™ Streptavidin Particles Plus – DM are magnetic nanoparticles that have streptavidin covalently conjugated to their surfaces. This Set is designed for the immunomagnetic enrichment of hematopoietic progenitors from mouse bone marrow by depletion of cells committed to the T- and B-lymphocytic, myeloid (monocytic and granulocytic), and erythroid lineages.

The set contains sufficient reagents to label $1x10^9$ bone marrow cells.



Depletion of lineage-committed cells from mouse bone marrow. BALB/c bone-marrow cells were labeled with the BD IMag™ Mouse Hematopoietic Progenitor Enrichment Set – DM and separated on the BD IMagnet™ (Cat. no. 552311) according to the accompanying protocol. To demonstrate the efficiency of the depletion, unmanipulated bone marrow cells and the final depleted fraction were stained with APC-conjugated anti-mouse CD117 mAb 2B8 (Cat. No. 553356) to detect hematopoietic progenitors, and with PE-conjugated mAb TER-119 (Cat. No. 553673), PE-conjugated mAb RA3-6B2 (Cat. No. 553089/553090), and PE-conjugated mAb M1/70 (Cat. No. 557397/553311) to detect lineage-commited cells. The percentage of positive cells is indicated in each panel; placement of each marker is based on staining with the appropriate isotype control (data not shown). The final depleted fraction contains a greatly increased proportion of $CD117^+$ cells and less than 5% of lineage-positive contaminants.

Depletion Flow Chart for Mouse Hematopoietic Progenitor (Stem) Cells



For more detailed information about our IMag product line, please see **bdbiosciences.com/bdimag**

Imaging – Seeing is Believing

BD CARV II™ Confocal Imager

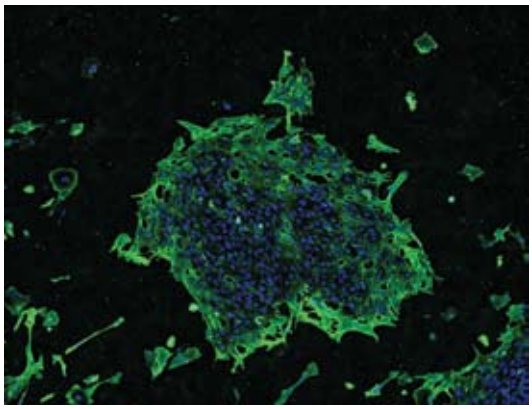
The BD CARV II™ confocal imager delivers high-resolution CCD confocal imaging in an easy-to-use and cost-effective optical package that fits on your existing microscope. High-speed multi-point confocal scanning, combined with high quantum efficiency CCD cameras, minimizes photobleaching and allows real-time imaging and recording at up to 100 fps. A long life arc source coupled to the instrument via an alignment-free light guide allows for full spectrum (360 nm - 700 nm) confocal imaging of virtually any fluorescent probe. Automation of internal multi-position excitation, dichroic, and emission filter wheels permits fast multi-dimensional imaging of up to five or more fluorescent probes in the same sample.

The BD CARV II™ system provides an easy-to-use confocal upgrade to your existing microscope without sacrificing image quality or three dimensional imaging capabilities.

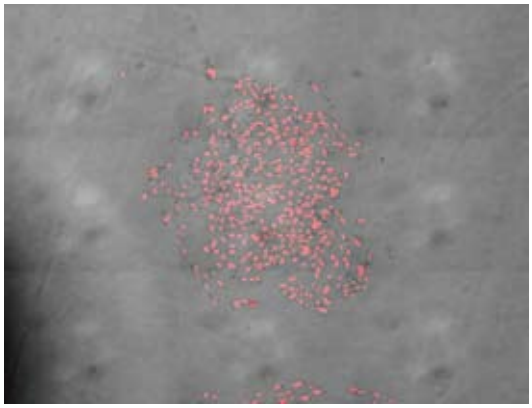
BD Pathway™ Bioimager

The BD Pathway™ bioimager is an automated, confocal, real-time, single-cell kinetic and endpoint imaging system that has been integrated into a single, compact unit. The BD Pathway was designed to provide high-resolution, automated confocal imaging with sophisticated imaging software to assist in developing better cell-based assays. The system allows the user to explore biological events without many of the restrictions of conventional microscope-based high-content imaging systems.

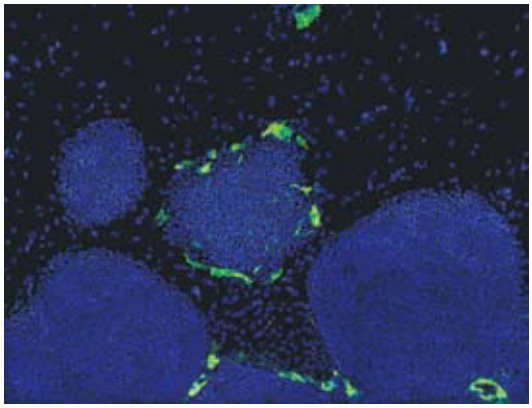
The BD Pathway™ bioimager provides a wide range of imaging capabilities including kinetic, endpoint, and three dimensional confocal imaging. The environmentally controlled imaging chamber with liquid handling provides unsurpassed live cell kinetic imaging possibilities.



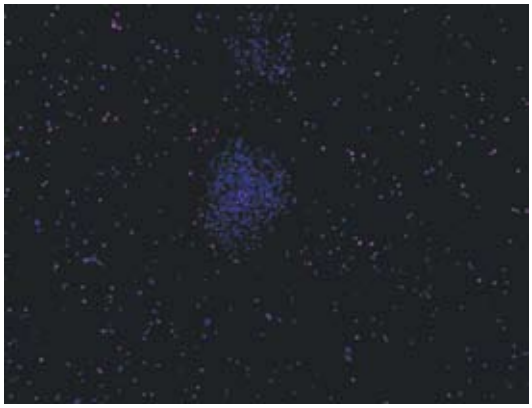
Merged montaged* image of of hES celss labeled with SSEA-4 and Hoechst 33342 on BD Matrigel™ Matrix, 20X objective.



Merged montaged* transmitted light image of hES cells labeled with Oct-3, 20X objective.



Merged montaged* image of hES cells labeled with SSEA-1 and Hoechst 33342 on MEF feeder cells.



Merged montaged* image of live (blue - stained with Hoescht 33342) and dead (pink - stained with Propidium Iodide) hES cells.

* These are all montaged images: Stem cell colonies are large and at 20X objective only on a small fraction of the colony would be visible in the image. The precision of the BD Pathway™ bioimager stage allows users to take multiple images right next to each other (a montage) to piece together a large subject matter as if it were one image.

Reagents for Human Stem Cell Research

Antibodies to Stem Cell Growth Factors

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
CD271 (NGF Receptor)	Hu	C40-1457	Mouse IgG_1, κ	FCM, IF	RUO	Purified	0.1 mg	**557194**
				FCM	RUO	Biotin	100 tests	**557195**
				FCM	RUO	PE	100 tests	**557196**
basic FGF	Chick, Dog,	3	Mouse IgG_1	IF, WB	RUO	Purified	50 µg	**610870**
	Hu, Ms, Rat			IF, WB	RUO	Purified	150 µg	**610871**
				WB	RUO	HRP	150 µg	**610873**
		6	Mouse IgG_1	IF, IHC, IP, WB	RUO	Purified	50 µg	**610072**
				IF, IHC, IP, WB	RUO	Purified	150 µg	**610073**
EGF Receptor	Hu, Ms	13	Mouse IgG_1	IF, IP, WB	RUO	Purified	50 µg	**610016**
				IF, IP, WB	RUO	Purified	150 µg	**610017**
				IF	RUO	FITC	50 µg	**612554**
				IF	RUO	FITC	150 µg	**612555**
	Hu	EGFR1	Mouse IgG_{2b}, κ	FCM, IF	RUO	Purified	0.1 mg	**555996**
				FCM	RUO	PE	100 Tests	**555997**
				FCM	RUO	PE-Cy7	0.1 mg	**558018**
EGF Receptor, Activated Form	Hu	74	Mouse IgG_1	IF, IP, WB	RUO	Purified	50 µg	**610025**
				IF, IP, WB	RUO	Purified	150 µg	**610026**
G-CSF	Hu	BVD11-37G10	Rat IgG_{2a}	ELISA Det.	RUO	Biotin	0.5 mg	**554670**
		BVD13-3A5	Rat IgG_1	ELISA Cap., WB	RUO	Purified	1.0 mg	**551342**
GM-CSF	Hu	BVD2-21C11	Rat IgG_{2a}	IC/FCM Block, IP/WB	RUO	Purified	0.1 mg	**554503**
				ELISA Det.	RUO	Biotin	0.5 mg	**554505**
				IC/FCM	RUO	PE	0.1 mg	**554507**
		BVD2-23B6	Rat IgG_{2a}	Neu	RUO	NA/LE	0.5 mg	**554501**
				ELISA Cap., IP/WB	RUO	Purified	0.5 mg	**554502**
IL-3	Hu	BVD3-1F9	Rat IgG_1	ELISA Det.	RUO	Biotin	0.5 mg	**554674**
				IC/FCM	RUO	PE	0.1 mg	**554676**
		BVD8-3G11	Rat IgG_1	Neu	RUO	NA/LE	0.5 mg	**554671**
				ELISA Cap., WB	RUO	Purified	0.5 mg	**554672**
IL-6	Hu	AS12	Mouse IgG_1, κ	FCM, IC	RUO (GMP)	FITC	50 tests	**340526**
				FCM, IC	RUO (GMP)	PE	50 tests	**340527**
		MQ2-13A5	Rat IgG_1	Neu	RUO	NA/LE	0.5 mg	**554541**
				ELISA Cap., IC/FCM Block, WB	RUO	Purified	0.5 mg	**554543**
				IC/FCM	RUO	FITC	0.1 mg	**554544**
				IC/FCM	RUO	PE	0.1 mg	**554545**
		MQ2-39C3	Rat IgG_{2a}	ELISA Det., WB	RUO	Biotin	0.5 mg	**554546**
		MQ2-6A3	Rat IgG_{2a}, κ	IC/FCM Block, ICC	RUO	Purified	0.25 mg	**559068**
				IC/FCM	RUO	FITC	0.1 mg	**554696**
				IC/FCM	RUO	PE	0.1 mg	**554697**
				IC/FCM	RUO	PE	100 tests	**559331**
				FCM	RUO	APC	0.1 mg	**558098**
Leukemia Inhibitory Factor (LIF, HILDA)	Hu	1F10	Mouse IgG_1, κ	FCM	RUO	PE	100 tests	**558571**

Reagents for Human Stem Cell Research

Antibodies to Stem Cell Markers

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
CD4	Hu	RPA-T4	Mouse IgG_1, κ	FA, FCM	RUO	NA/LE	0.5 mg	**555343**
				FCM, IHC(Fr)	RUO	Purified	0.1 mg	**555344**
				IHC(Fr), IHC(Zn)	RUO	Purified	1 ml	**550369**
				FCM	RUO	Biotin	100 tests	**555345**
				FCM	RUO	FITC	100 tests	**555346**
				FCM	RUO	PE	100 tests	**555347**
				FCM	RUO	APC	100 tests	**555349**
				FCM	RUO	Alexa Fluor® 488	100 tests	**557695**
				FCM	RUO	Alexa Fluor® 647	100 tests	**557707**
				FCM	RUO	Alexa Fluor® 700	0.1 mg	**557922**
				FCM	RUO	Pacific Blue®	0.1 mg	**558116**
				FCM	RUO	APC-Cy7	100 tests	**557871**
				FCM	RUO	PE-Cy5	100 tests	**555348**
		SK3	Mouse IgG_1, κ	FCM	RUO (GMP)	Purified	200 tests	**346320**
				FCM	RUO (GMP)	Biotin	100 tests	**347321**
				FCM	RUO (GMP)	PE	100 tests	**347327**
				FCM	RUO (GMP)	PerCP	100 tests	**347324**
				FCM	RUO (GMP)	PerCP-Cy5.5	50 tests	**341654**
				FCM	RUO (GMP)	APC	100 tests	**340443**
				FCM	RUO (GMP)	APC-Cy7	100 tests	**341095**
				FCM	RUO (GMP)	PE-Cy7	100 tests	**348789**
				FCM	RUO	PE-Cy7	100 tests	**557852**
		SK3, SK4	Mouse IgG_1, κ	FCM	RUO (GMP)	FITC, FITC	100 tests	**347413**
CD4 v4	Hu	L120	Mouse IgG_1, κ	FCM	RUO (GMP)	FITC	50 tests	**340422**
				FCM	RUO (GMP)	PE	50 tests	**340419**
CD8	Hu	G42-8	Mouse IgG_{2a}, κ	FCM	RUO	Purified	0.1 mg	**551346**
				FCM	RUO	FITC	0.1 mg	**551347**
		HIT8a	Mouse IgG_1, κ	FCM	RUO	NA/LE	0.5 mg	**555630**
				FCM, IHC(Fr)	RUO	Purified	0.1 mg	**555631**
				IHC(Fr), IHC(Zn)	RUO	Purified	1 ml	**550372**
				FCM	RUO	FITC	100 tests	**555634**
				FCM	RUO	PE	100 tests	**555635**
				FCM	RUO	PE-Cy5	100 tests	**555636**
		RPA-T8	Mouse IgG_1, κ	FCM	RUO	NA/LE	0.5 mg	**555363**
				FCM, IHC(Fr)	RUO	Purified	0.1 mg	**555364**
				FCM	RUO	Biotin	100 tests	**555365**
				FCM	RUO	FITC	100 tests	**555366**
				FCM	RUO	PE	100 tests	**555367**
				FCM	RUO	APC	100 tests	**555369**
				FCM	RUO	Alexa Fluor® 488	100 tests	**557696**
				FCM	RUO	Alexa Fluor® 647	100 tests	**557708**
				FCM	RUO	Alexa Fluor® 700	0.1 mg	**557945**
				FCM	RUO	Pacific Blue®	0.1 mg	**558207**
				FCM	RUO	PE-Cy5	100 tests	**555368**
				FCM	RUO	PE-Cy7	100 tests	**557746**
		SK1	Mouse (BALB/c) IgG_1, κ	FCM	RUO (GMP)	Purified	200 tests	**346310**
				FCM	RUO (GMP)	Biotin	100 tests	**347311**
				FCM	RUO (GMP)	FITC	100 tests	**347313**
				FCM	RUO (GMP)	PerCP	100 tests	**347314**
				FCM	RUO (GMP)	PerCP-Cy5.5	50 tests	**341051**
				FCM	RUO (GMP)	APC	100 tests	**340584**
				FCM	RUO (GMP)	APC-Cy7	100 tests	**348793**
				FCM	RUO (GMP)	PE-Cy7	100 tests	**335787**
				FCM	RUO	APC-Cy7	100 tests	**557834**
		SK2	Mouse IgG_{2a}, κ	FCM	RUO (GMP)	Purified	100 tests	**347350**

Reagents for Human Stem Cell Research

Antibodies to Stem Cell Markers (continued)

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
CD15 and SSEA-1	Hu ,Ms,Rat	HI98	Mouse IgM, κ	FCM, IHC(F), IHC(Fr)	RUO	Purified	0.1 mg	**555400**
				IHC(F), IHC(Fr)	RUO	Purified	1 ml	**550382**
				FCM	RUO	FITC	100 tests	**555401**
				FCM	RUO	PE	100 tests	**555402**
				FCM	RUO	APC	100 tests	**551376**
		MMA	Mouse IgM,κ	FCM	RUO (GMP)	Purified	100 tests	**347420**
				FCM	RUO (GMP)	FITC	100 tests	**347423**
				FA, IHC(F)	RUO	Purified	0.2 mg	**559045**
		W6D3	Mouse IgG_1, κ	FCM	RUO	Purified	0.1 mg	**557895**
				FCM	RUO	PE	100 tests	**558084**
CD24	Hu	ML5	Mouse IgG_{2a}, κ	FCM, IHC(Fr)	RUO	Purified	0.1 mg	**555426**
				FCM	RUO	FITC	100 tests	**555427**
				FCM	RUO	PE	100 tests	**555428**
CD30 (Ki-1)	Hu	Ber-H83	Mouse IgG_1, κ	FCM	RUO (GMP)	FITC	50 tests	**341644**
				FCM	RUO (GMP)	PE	50 tests	**341645**
		Ber-H8	Mouse IgG_1, κ	FCM, IHC(F), IHC(Fr)	RUO	Purified	0.5 mg	**555827**
				FCM	RUO	Biotin	0.5 mg	**555828**
				FCM	RUO	FITC	100 tests	**555829**
				FCM	RUO	PE	100 tests	**550041**
CD33	Hu	HIM3-4	Mouse IgG_1, κ	FCM	RUO	Purified	0.1 mg	**555625**
				FCM	RUO	FITC	100 tests	**555626**
		P67.6	Mouse IgG_1, κ	FCM	RUO (GMP)	Purified	100 tests	**347780**
				FCM	RUO (GMP)	FITC	50 tests	**340533**
				FCM	RUO (GMP)	PE	100 tests	**347787**
				FCM	RUO (GMP)	PerCP-Cy5.5	50 tests	**341650**
				FCM	RUO (GMP)	APC	100 tests	**340474**
				FCM	RUO (GMP)	PE-Cy7	100 tests	**333946**
		WM53	Mouse IgG_1, κ	FCM	RUO	Purified	0.1 mg	**555449**
				FCM	RUO	PE	100 tests	**555450**
				FCM	RUO	APC	100 tests	**551378**
				FCM	RUO	PE-Cy5	100 tests	**551377**
CD34 (gp 105-120)	Hu	563	Mouse IgG_1, κ	FCM	RUO	Purified	0.1 mg	**550760**
				FCM	RUO	PE	100 tests	**550761**
		581	Mouse IgG_1, κ	FCM, IHC(F), IHC(Fr)	RUO	Purified	0.1 mg	**555820**
				IHC(F)*, IHC(Fr)	RUO	Purified	1 ml	**550390**
				FCM	RUO	FITC	100 tests	**555821**
				FCM	RUO	PE	100 tests	**555822**
				FCM	RUO	APC	100 tests	**555824**
				FCM	RUO	PE-Cy5	100 tests	**555823**
		8G12	Mouse IgG_1, κ	FCM	RUO (GMP)	Purified	100 tests	**348050**
				FCM	RUO (GMP)	FITC	100 tests	**348053**
				FCM	RUO (GMP)	PE	100 tests	**348057**
				FCM	RUO (GMP)	PerCP	50 tests	**340430**
				FCM	RUO (GMP)	PerCP-Cy5.5	50 tests	**347203**
				FCM	RUO (GMP)	APC	100 tests	**340441**
				FCM	RUO (GMP)	PE-Cy7	100 tests	**348791**
		My10	Mouse IgG_1, κ	FCM	RUO (GMP)	Purified	100 tests	**347660**

Reagents for Human Stem Cell Research

Antibodies to Stem Cell Markers (continued)

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
CD34	Cyno, Rhe, Hu	563	Ms IgG_1, κ	FCM	RUO	PE	50 tests	**550619**
CD34 (gp 105-120)	Ms	RAM34	Rat IgG_{2a}, κ	FCM	RUO	Purified	0.5 mg	**553731**
				IHC(Fr), IHC(Zn)	RUO	Purified	1 ml	**550537**
				FCM	RUO	Biotin	0.5 mg	**553732**
				FCM	RUO	FITC	0.5 mg	**553733**
				FCM	RUO	PE	0.2 mg	**551387**
				FCM	RUO	APC	0.1 mg	**558038**
CD34 (gp 105-120)	Dog	2E9	Ms IgG_1, κ	FCM	RUO	Biotin	0.1 mg	**550427**
CD34 (gp 105-120)	Dog	1H6	Ms IgG_1, κ	FCM	RUO	PE	0.1 mg	**559369**

CD34 Antibodies – Multicolor

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
CD15/CD34	Hu	MMA, 8G12	Ms IgM, κ, Ms IgG_1, κ	FCM	RUO	FITC, PE	50 tests	**341128**
CD45/CD34 combination	Hu	2D1, 8G12	Ms IgG_1, κ Ms IgG_1, κ	FCM	RUO	FITC, PE	50 tests	**341071**
HLA-DR/CD34	Hu	L243, 8G12	Ms IgG_{2a}, κ, Ms IgG_1, κ	FCM	RUO	FITC, PE	50 tests	**341146**

Reagents for Human Stem Cell Research

Antibodies to Stem Cell Markers (continued)

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
CD38	Hu	22	Mouse IgG_1, κ	IF, WB	RUO	Purified	50 µg	**611114**
				IF, WB	RUO	Purified	150 µg	**611115**
		HB7	Mouse IgG_1, κ	FCM	RUO (GMP)	Purified	100 tests	**347680**
				FCM	RUO (GMP)	FITC	50 tests	**340927**
				FCM	RUO (GMP)	PE	50 tests	**342371**
				FCM	RUO (GMP)	PE	100 tests	**347687**
				FCM	RUO (GMP)	APC	100 tests	**340439**
		HIT2	Mouse IgG_1, κ	FCM, IHC(Fr)	RUO	Purified	0.1 mg	**555458**
				FCM	RUO	FITC	100 tests	**555459**
				FCM	RUO	PE	100 tests	**555460**
				FCM	RUO	PerCP-Cy5.5	0.1 mg	**551400**
				FCM	RUO	APC	100 tests	**555462**
				FCM	RUO	PE-Cy5	100 tests	**555461**
CD45 (Leukocyte Common Antigen, Ly-5)	Hu	2D1	Mouse IgG_1, κ	FCM	RUO (GMP)	Purified	100 tests	**347460**
				FCM	RUO (GMP)	FITC	100 tests	**347463**
				FCM	RUO (GMP)	PerCP	100 tests	**347464**
				FCM	RUO (GMP)	PerCP-Cy5.5	50 tests	**340953**
				FCM	RUO (GMP)	APC	100 tests	**340943**
				FCM	RUO (GMP)	APC-Cy7	100 tests	**348795**
				FCM	RUO	APC-Cy7	100 tests	**557833**
	Hu, Ms, Rat	69	Mouse IgG_1, κ	IF, IP, WB	RUO	Purified	50 µg	**610265**
				IF, IP, WB	RUO	Purified	150 µg	**610266**
	Hu	HI30	Mouse IgG_1, κ	FCM, IHC(F), IHC(Fr)	RUO	Purified	0.1 mg	**555480**
				FCM	RUO	Biotin	100 tests	**555481**
				FCM	RUO	FITC	100 tests	**555482**
				FCM	RUO	PE	100 tests	**555483**
				FCM	RUO	APC	100 tests	**555485**
				FCM	RUO	PE-Cy5	100 tests	**555484**
				FCM	RUO	PE-Cy7	100 tests	**557748**
CD45/CD34 combination	Hu	2D1, 8G12		FCM	RUO (GMP)	FITC, PE	50 tests	**341071**
CD56 (N-CAM)	Hu	B159	Mouse IgG_1, κ	FCM	RUO	NA/LE	0.5 mg	**555513**
				FCM	RUO	Purified	0.1 mg	**555514**
				FCM	RUO	Biotin	100 tests	**555515**
				FCM	RUO	PE	100 tests	**555516**
				FCM	RUO	APC	100 tests	**555518**
				FCM	RUO	Alexa Fluor® 488	100 tests	**557699**
				FCM	RUO	Alexa Fluor® 647	100 tests	**557711**
				FCM	RUO	Alexa Fluor® 700	0.1 mg	**557919**
				FCM	RUO	PE-Cy7	100 tests	**557747**
				FCM	RUO	PE-Cy5	100 tests	**555517**
	Bab, Cyno, Hu, Rhe	MY31	Mouse IgG_1, κ	FCM	RUO (GMP)	Purified	100 tests	**347740**
				FCM	RUO (GMP)	PE	100 tests	**347747**
				FCM	RUO	Purified	0.2 mg	**559049**
	Hu	NCAM16.2	Mouse (BALB/c) IgG_{2b}, κ	FCM	RUO (GMP)	FITC	50 tests	**340410**
				FCM	RUO (GMP)	PE	50 tests	**340363**
				FCM	RUO (GMP)	APC	100 tests	**341025**
				FCM	RUO (GMP)	PE-Cy7	100 tests	**335791**
				FCM	RUO	Purified	0.1 mg	**558171**
				ELISA, FA, FCM, IHC(Fr), IP	RUO	Purified	0.2 mg	**559043**
CD59	Hu	p282 (H19)	Mouse IgG_{2a}, κ	FCM, IF	RUO	Purified	0.1 mg	**555761**
				FCM	RUO	Biotin	100 tests	**555762**
				FCM	RUO	FITC	100 tests	**555763**
				FCM	RUO	PE	100 tests	**555764**

Reagents for Human Stem Cell Research

Antibodies to Stem Cell Markers (continued)

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
CD71 (Transferrin Receptor)	Hu	L01.1	Mouse IgG_{2a}, κ	FCM	RUO (GMP)	Purified	100 tests	**347510**
				FCM	RUO (GMP)	FITC	100 tests	**347513**
				FCM	RUO (GMP)	APC	100 tests	**341028**
		M-A712	Mouse IgG_{2a}, κ	FCM, IHC(Fr)	RUO	Purified	0.1 mg	**555534**
				FCM	RUO	Biotin	100 tests	**555535**
				FCM	RUO	FITC	100 tests	**555536**
				FCM	RUO	PE	100 tests	**555537**
				FCM	RUO	APC	100 tests	**551374**
				FCM	RUO	PE-Cy5	100 tests	**551143**
CD90 (Thy-1)	Hu, Pig, Rab	5.00E+10	Mouse IgG_1, κ	FCM	RUO	NA/LE	0.5 mg	**555592**
				FCM, IHC(Fr)	RUO	Purified	0.1 mg	**555593**
				IHC(Fr), IHC(Zn)	RUO	Purified	1 ml	**550402**
				FCM	RUO	Biotin	0.1 mg	**555594**
				FCM	RUO	FITC	0.1 mg	**555595**
				FCM	RUO	PE	0.1 mg	**555596**
				FCM	RUO	APC	0.1 mg	**559869**
				FCM	RUO	PE-Cy5	0.1 mg	**555597**
CDw93 (C1qRp)	Hu	R139	Mouse IgG_{2b}, κ	FA, FCM	RUO	NA/LE	0.5 mg	**552954**
				FCM, IF, WB	RUO	Purified	0.1 mg	**551087**
				FCM	RUO	FITC	0.1 mg	**551531**
				FCM	RUO	PE	0.1 mg	**551509**
		R3	Mouse IgM, κ	FCM, IP, WB	RUO	Purified	0.1 mg	**551454**
				FCM	RUO	Biotin	100 tests	**552117**
CD105 (Endoglin)	Hu	266	Mouse IgG_1, κ	IHC(Fr), IHC(Zn), IP	RUO	Purified	0.1 mg	**555690**
		35	Mouse IgG_1, κ	IF, WB	RUO	Purified	50 µg	**611314**
				IF, WB	RUO	Purified	150 µg	**611315**
CD109	Hu	TEA 2/16	Mouse IgG_1, κ	FCM, IHC(Fr)	RUO	Purified	0.1 mg	**556039**
				FCM	RUO	PE	100 tests	**556040**
CD117 (c-kit)	Hu	104D2	Mouse IgG_1, κ	FCM	RUO (GMP)	PE	50 tests	**340529**
				FCM	RUO (GMP)	PerCP-Cy5.5	50 tests	**333944**
				FCM	RUO (GMP)	APC	100 tests	**341096**
		28	Mouse IgG_{2a}, κ	WB	RUO	Purified	50 µg	**612318**
				WB	RUO	Purified	150 µg	**612319**
	Dog, Hu, Rab	YB5.B8	Mouse IgG_1, κ	FCM, IF	RUO	Purified	0.1 mg	**555713**
				FCM	RUO	PE	0.1 mg	**555714**
				FCM	RUO	APC	0.1 mg	**550412**
				FCM	RUO	PE-Cy5	0.1 mg	**559879**
CD144 (VE-cadherin)	Hu	55-7H1	Mouse IgG_1, κ	IHC	RUO	Purified	0.1 mg	**555661**
CD184 (CXCR4, Fusin)	Hu	12G5	Mouse IgG_{2a}, κ	FA, FCM	RUO	NA/LE	0.5 mg	**555971**
				FCM	RUO	Purified	0.1 mg	**555972**
				FCM	RUO	Biotin	100 tests	**555973**
				FCM	RUO	PE	100 tests	**555974**
				FCM	RUO	APC	100 tests	**555976**
				FCM	RUO	PE-Cy5	100 tests	**555975**
		1D9	Rat IgG_{2a}, κ	FCM	RUO	Purified	0.1 mg	**551413**
				FCM	RUO	Biotin	100 tests	**551970**
				FCM	RUO	PE	0.2 mg	**551510**
CD318 (CDCP1)	Hu	CUB1	Mouse IgG_{2b}, κ	FCM	RUO	PE	0.1 mg	**558209**
				FCM	RUO	Alexa Fluor® 647	0.1 mg	**558212**
CDw338 (ABCG2)	Hu	5D3	Mouse IgG_{2b}, κ	FCM	RUO	Purified	0.1 mg	**552823**
γ Enolase (NSE)	Hu, Ms	NSE-P2	Mouse IgG_1, κ	IHC, WB	RUO	Purified	100 µg	**557820**
Disialoganglioside GD2	Hu	14.G2a	Mouse IgG_{2a}, κ	FCM, IF, IHC(Fr)	RUO	Purified	0.1 mg	**554272**
Disialoganglioside GD3	Hu	MB3.6	Mouse IgG_3, κ	FA, FCM, IF, IHC(Fr)	RUO	Purified	0.1 mg	**554274**

Reagents for Human Stem Cell Research

Antibodies to Stem Cell Markers (continued)

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
EGF Receptor	Hu, Ms	13	Mouse IgG_1	IF, IP, WB	RUO	Purified	50 µg	**610016**
				IF, IP, WB	RUO	Purified	150 µg	**610017**
				IF	RUO	FITC	50 µg	**612554**
				IF	RUO	FITC	150 µg	**612555**
	Hu	EGFR1	Mouse IgG_{2b}, κ	FCM, IF	RUO	Purified	0.1 mg	**555996**
				FCM	RUO	PE	100 Tests	**555997**
				FCM	RUO	PE-Cy7	0.1 mg	**558018**
GAD65	Hu, Ms, Pig, Rat	GAD-6	Mouse IgG_{2a}, κ	IHC(Fr), IP, WB	RUO	Purified	0.1 mg	**559931**
HLA-DR	Dog, Hu	G46-6 (L243)	Mouse IgG_{2a}, κ	FCM	RUO	NA/LE	0.5 mg	**555809**
				FCM	RUO	Purified	0.1 mg	**555810**
				FCM	RUO	FITC	100 tests	**555811**
				FCM	RUO	PE	100 tests	**555812**
				FCM	RUO	APC	100 tests	**559866**
				FCM	RUO	PE-Cy5	100 tests	**555813**
	Hu	L243	Mouse IgG_{2a}, κ	FCM	RUO (GMP)	Purified	100 tests	**347360**
				FCM	RUO (GMP)	Biotin	100 tests	**347361**
				FCM	RUO (GMP)	FITC	100 tests	**347363**
				FCM	RUO (GMP)	PE	100 tests	**347367**
				FCM	RUO (GMP)	PerCP	100 tests	**347364**
				FCM	RUO (GMP)	APC	100 tests	**340549**
	Dog, Hu, Rab	TÜ36	Mouse IgG_{2b}, κ	FCM	RUO	Purified	0.1 mg	**555559**
				FCM	RUO	PE	100 tests	**555561**
				FCM	RUO	APC	100 tests	**559868**
				FCM	RUO	PE-Cy5	100 tests	**551375**
HLA-DR/CD34	Hu	L243, 8G12		FCM	RUO (GMP)	FITC, PE	50 tests	**341146**
Leukemia Inhibitory Factor (LIF, HILDA)	Hu	1F10	Mouse IgG_1, κ	FCM	RUO	PE	100 tests	**558571**
Nestin	Hu, Ms, Rat	25	Mouse IgG_1, κ	WB	RUO	Purified	50 µg	**611658**
				WB	RUO	Purified	150 µg	**611659**
p63	Hu, Ms	4A4	Mouse IgG_{2a}, κ	IHC(F), IHC(Fr), WB	RUO	Purified	0.1 mg	**559951**
		5G8	Mouse IgG_1, κ	WB	RUO	Purified	0.1 mg	**559952**
		Y4A3	Mouse IgG_{2a}, κ	IHC(F), IHC(Fr), WB	RUO	Purified	0.1 mg	**550025**
RIP	Hu	G322-2	Mouse IgG_1, κ	IP, WB	RUO	Purified	50 µg	**551041**
				IP, WB	RUO	Purified	150 µg	**551042**
		Polyclonal	Rabbit	WB	RUO	Serum	0.1 ml	**559689**

Reagents for Human Stem Cell Research

Magnetic Cell Separation Reagents

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
CD4 Magnetic Particles - DM	Hu, Rhe	L200	Mouse IgG_1, κ	Sep	RUO	BD IMag-DM	1 x 10^9 cells	**557767**
CD4 Magnetic Particles - MSC	Hu, Rhe	L200	Mouse IgG_1, κ	Sep	RUO	BD IMag-MSC	1 x 10^9 cells	**557768**
CD4 T Lymphocyte Enrichment Set - DM	Hu			Sep	RUO	BD IMag-DM, Biotin	1 x 10^9 cells	**557939**
CD8 Magnetic Particles - DM	Hu, Rhe	SK1	Mouse (BALB/c) IgG_1, κ	Sep	RUO	BD IMag-DM	1 x 10^9 cells	**557766**
CD8 Magnetic Particles - MSC	Hu, Rhe	SK1	Mouse (BALB/c) IgG_1, κ	Sep	RUO	BD IMag-MSC	1 x 10^9 cells	**557765**
CD8 T Lymphocyte Enrichment Set - DM	Hu			Sep	RUO	BD IMag-DM, Biotin	1 x 10^9 cells	**557941**
CD56 Magnetic Particles - DM	Hu	NCAM16.2	Mouse (BALB/c) IgG_{2b}, κ	Sep	RUO	BD IMag-DM	1 x 10^9 cells	**557775**

Reagents for Mouse Stem Cell Research

Antibodies to Stem Cell Growth Factors

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
basic FGF	Chick, Dog, Hu, Ms, Rat	3	Mouse IgG_1	IF, WB	RUO	Purified	50 µg	610870
				IF, WB	RUO	Purified	150 µg	610871
				WB	RUO	HRP	150 µg	610873
		6	Mouse IgG_1	IF, IHC, IP, WB	RUO	Purified	50 µg	610072
				IF, IHC, IP, WB	RUO	Purified	150 µg	610073
EGF Receptor	Hu, Ms	13	Mouse IgG_1	IF, IP, WB	RUO	Purified	50 µg	610016
				IF, IP, WB	RUO	Purified	150 µg	610017
GM-CSF	Ms	MP1-22E9	Rat IgG_{2a}	Neu	RUO	NA/LE	0.5 mg	554403
				ELISA Cap., FCM, WB	RUO	Purified	0.5 mg	554404
				IC/FCM	RUO	PE	0.1 mg	554406
		MP1-31G6	Rat IgG_1	ELISA Det., IP/WB	RUO	Biotin	0.5 mg	554407
IL-3	Ms	MP2-43D1	Rat IgG_{2a}	ELISA Det., WB	RUO	Biotin	0.5 mg	554384
		MP2-8F8	Rat IgG_1	Neu	RUO	NA/LE	0.5 mg	554379
				ELISA Cap., IC/FCM, Block	RUO	Purified	0.5 mg	554381
				IC/FCM	RUO	PE	0.1 mg	554383
IL-6	Ms	MP5-20F3	Rat IgG_1	Neu	RUO	NA/LE	0.5 mg	554398
				ELISA Cap., IC/FCM, Block, WB	RUO	Purified	0.5 mg	554400
				IC/FCM	RUO	PE	0.1 mg	554401
		MP5-32C11	Rat IgG_{2a}	ELISA Det., WB	RUO	Biotin	0.5 mg	554402

Reagents for Mouse Stem Cell Research

Antibodies to Stem Cell Markers

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
CD4 (L3T4)	Ms	GK1.5	Rat (Lewis) IgG_{2b}, κ	Block, Cost, Cyt, FCM	RUO	NA/LE	0.5 mg	**553726**
				FCM, IP	RUO	Purified	0.5 mg	**553727**
				FCM	RUO	Biotin	0.5 mg	**553728**
				FCM	RUO	FITC	0.1 mg	**557307**
				FCM	RUO	FITC	0.5 mg	**553729**
				FCM	RUO	PE	0.1 mg	**557308**
				FCM	RUO	PE	0.2 mg	**553730**
				FCM	RUO	APC-Cy7	0.1 mg	**552051**
		H129.19	Rat (Lou/WS1) IgG_{2a}, κ	Block, Cyt, FCM	RUO	NA/LE	0.5 mg	**553646**
				FCM, IP	RUO	Purified	0.5 mg	**553647**
				IHC(Fr), IHC(Zn)	RUO	Purified	1 ml	**550278**
				FCM	RUO	Biotin	0.1 mg	**553648**
				FCM	RUO	Biotin	0.5 mg	**553649**
				FCM	RUO	FITC	0.1 mg	**553650**
				FCM	RUO	FITC	0.5 mg	**553651**
				FCM	RUO	PE	0.1 mg	**553652**
				FCM	RUO	PE	0.2 mg	**553653**
				FCM	RUO	PE-Cy5	0.1 mg	**553654**
		RM4-4	Rat (SD) IgG_{2b}, κ	FCM	RUO	Purified	0.5 mg	**553053**
				FCM	RUO	Biotin	0.1 mg	**557443**
				FCM	RUO	FITC	0.5 mg	**553055**
		RM4-5	Rat (DA) IgG_{2a}, κ	FCM, IP	RUO	Purified	0.5 mg	**553043**
				IHC(Fr), IHC(Zn)	RUO	Purified	1 ml	**550280**
				FCM, Sep	RUO	Biotin	0.1 mg	**553044**
				FCM, Sep	RUO	Biotin	0.5 mg	**553045**
				FCM	RUO	FITC	0.1 mg	**553046**
				FCM	RUO	FITC	0.5 mg	**553047**
				FCM*	RUO	PE	0.1 mg	**553048**
				FCM*	RUO	PE	0.2 mg	**553049**
				FCM	RUO	PerCP	0.1 mg	**553052**

Reagents for Mouse Stem Cell Research

Antibodies to Stem Cell Markers (continued)

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
				FCM	RUO	PerCP-Cy5.5	0.1 mg	**550954**
				FCM	RUO	APC	0.1 mg	**553051**
				FCM	RUO	Alexa Fluor® 488	0.1 mg	**557667**
				FCM	RUO	Alexa Fluor® 647	0.1 mg	**557681**
				FCM	RUO	Alexa Fluor® 700	0.1 mg	**557956**
				FCM	RUO	PE-Cy7	0.1 mg	**552775**
				FCM	RUO	PE-Cy5	0.1 mg	**553050**
				FCM	RUO	Pacific Blue®	0.1 mg	**558107**
CD24 (Heat Stable Antigen)	Ms	30-F1	Rat (LOU/Ws1/M) IgG_{2c}, κ	FCM	RUO	Purified	0.1 mg	**558777**
				FCM	RUO	Biotin	0.5 mg	**555296**
		J11d	Rat (Lewis) IgM, κ	FCM, IHC(Fr), WB	RUO	Purified	0.5 mg	**553146**
		M1/69	Rat (DA) IgG_{2b}, κ	Cyt, FCM, IHC(F), IHC(Fr), IHC(Zn), WB	RUO	Purified	0.1 mg	**557436**
				FCM	RUO	Biotin	0.5 mg	**553260**
				FCM	RUO	FITC	0.5 mg	**553261**
				FCM*	RUO	PE	0.1 mg	**553262**
CD30	Ms	mCD30.1	Armenian Hamster IgG_1, κ	FCM	RUO	Biotin	0.5 mg	**553824**
				FCM*	RUO	PE	0.2 mg	**553825**
CD34	Ms	RAM34	Rat IgG_{2a}, κ	FCM	RUO	Purified	0.5 mg	**553731**
				IHC(Fr), IHC(Zn)	RUO	Purified	1 ml	**550537**
				FCM	RUO	Biotin	0.5 mg	**553732**
				FCM	RUO	FITC	0.5 mg	**553733**
				FCM	RUO	PE	0.2 mg	**551387**
				FCM	RUO	APC	0.1 mg	**558038**
CD38	Ms	90	Rat IgG_{2a}, κ	FCM	RUO	Biotin	0.5 mg	**553762**
				FCM	RUO	FITC	0.1 mg	**558813**
				FCM*	RUO	PE	0.2 mg	**553764**
CD45 (Leukocyte Common Antigen)	Hu, Ms, Rat	69	Mouse IgG_1, κ	IF, IP, WB	RUO	Purified	150 µg	**610266**
CD45 (Leukocyte Common Antigen, Ly-5)	Ms	30-F11	Rat (LOU/Ws1/M) IgG_{2b}, κ	Cyt, FCM, IP	RUO	Purified	0.5 mg	**553076**
				IHC(F), IHC(Fr), IHC(Zn)	RUO	Purified	1 ml	**550539**
				FCM	RUO	Biotin	0.1 mg	**553077**
				FCM	RUO	Biotin	0.5 mg	**553078**
				FCM	RUO	FITC	0.1 mg	**553079**
				FCM	RUO	FITC	0.5 mg	**553080**
				FCM	RUO	PE	0.1 mg	**553081**
				FCM	RUO	PerCP	0.1 mg	**557235**
				FCM	RUO	PerCP-Cy5.5	0.1 mg	**550994**
				FCM	RUO	APC	0.1 mg	**559864**
				FCM	RUO	APC-Cy7	0.1 mg	**557659**
				FCM	RUO	PE-Cy5	0.1 mg	**553082**
				FCM	RUO	PE-Cy7	0.1 mg	**552848**
CD56 (N-CAM)	Chick, Hu, Ms, Rat	12F11	Rat IgG_{2a}	IHC(Fr), WB	RUO	Purified	0.1 mg	**556323**
	Hu, Ms, Rat	12F8	Rat IgM	IHC(Fr), WB	RUO	Purified	0.1 mg	**556325**
	Ms, Rat	N-CAM 13	Mouse IgG_{2a}	IHC(Fr), WB	RUO	Purified	0.1 mg	**556324**
CD71 (Transferrin Receptor)	Ms	C2	Rat (Wistar/Furth) IgG_1, κ	FCM, IF, IHC(Fr)	RUO	Purified	0.5 mg	**553264**
				FCM	RUO	Biotin	0.1 mg	**557416**
				FCM	RUO	FITC	0.5 mg	**553266**
				FCM	RUO	PE	0.1 mg	**553267**
CD90 (Thy-1)	Ms	G7	Rat (Lewis) IgG_{2c}, κ	Cost, FCM	RUO	NA/LE	0.5 mg	**553015**
				FCM, IHC(Fr), IHC(Zn)	RUO	Purified	0.5 mg	**553016**
CD90.1 (Thy-1.1)	G Pig, Ms, Rab, Rat	OX-7	Mouse (BALB/c) IgG_1, κ	EM, FCM, IHC(Fr), IHC(Zn), IP, WB	RUO	Purified	0.5 mg	**554895**
				IHC(Fr), IHC(Zn)	RUO	Purified	1 ml	**550571**
				FCM	RUO	Biotin	0.5 mg	**554896**

Reagents for Mouse Stem Cell Research

Antibodies to Stem Cell Markers

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
				FCM	RUO	FITC	0.5 mg	**554897**
				FCM	RUO	PE	0.1 mg	**551401**
				FCM	RUO	PE	0.2 mg	**554898**
				FCM	RUO	PerCP	0.1 mg	**557266**
CD90.2 (Thy-1.2)	Ms	30-H12	Rat (LOU/Ws1/M) IgG_{2b}, κ	Cost, Cyt, FCM	RUO	NA/LE	0.5 mg	**553008**
				Cyt, FCM	RUO	Purified	0.5 mg	**553009**
				FCM, Sep	RUO	Biotin	0.1 mg	**553010**
				FCM, Sep	RUO	Biotin	0.5 mg	**553011**
				FCM	RUO	FITC	0.1 mg	**553012**
				FCM	RUO	FITC	0.5 mg	**553013**
				FCM	RUO	PE	0.1 mg	**553014**
		53-2.1	Rat (LOU/Ws1/M) IgG_{2a}, κ	Cyt, EM, FCM, IP	RUO	Purified	0.5 mg	**553000**
				IHC(Fr)	RUO	Purified	1 ml	**550543**
				FCM	RUO	Biotin	0.1 mg	**553001**
				FCM	RUO	Biotin	0.5 mg	**553002**
				FCM	RUO	FITC	0.1 mg	**553003**
				FCM	RUO	FITC	0.5 mg	**553004**
				FCM	RUO	PE	0.1 mg	**553005**
				FCM	RUO	PE	0.2 mg	**553006**
				FCM	RUO	APC	0.1 mg	**553007**
CD105 (Endoglin)	Ms	MJ7/18	Rat IgG_{2a}, κ	IHC(Fr)	RUO	Purified	1 ml	**550546**
CD117 (c-kit)	Ms	2B8	Rat (Wistar) IgG_{2b}, κ	FCM, IP	RUO	Purified	0.5 mg	**553352**
				FCM	RUO	Biotin	0.5 mg	**553353**
				FCM	RUO	FITC	0.5 mg	**553354**
				FCM	RUO	PE	0.2 mg	**553355**
				FCM	RUO	APC	0.1 mg	**553356**
				FCM	RUO	PE-Cy7	0.1 mg	**558163**
		ACK45	Rat IgG_{2b}, κ	Block, FCM	RUO	NA/LE	0.5 mg	**553867**
				FCM	RUO	Purified	0.5 mg	**553868**
				FCM	RUO	PE	0.2 mg	**553869**
CD127 (IL-7 Receptor a chain)	Ms	B12-1	Rat (Wistar) IgG_{2a}, λ	FCM	RUO	Biotin	0.5 mg	**555288**
		SB/14	Rat IgG_{2a}, κ	Block, FCM	RUO	NA/LE	0.5 mg	**550426**
		SB/199	Rat IgG_{2b}, κ	FCM	RUO	PE	0.2 mg	**552543**
CD144 (VE-Cadherin)	Ms	11D4.1	Rat (Lewis) IgG_{2a}, κ	FCM, IP	RUO	Purified	0.5 mg	**555289**
				IHC(Fr)	RUO	Purified	1 ml	**550548**
CD153 (CD30 Ligand)	Ms	RM153	Rat (Sprague-Dawley) IgG_{2b}, κ	FCM	RUO	PE	0.1 mg	**559232**
CD184 (CXCR4)	Ms	2B11/CXCR4	Rat IgG_{2b}	FCM	RUO	Purified	0.1 mg	**551852**
				FCM	RUO	Biotin	0.1 mg	**551968**
				FCM	RUO	FITC	0.1 mg	**551967**
				FCM	RUO	PE	0.1 mg	**551966**
Early B Lineage	Ms	493	Rat (Lewis) IgG_{2a}, κ	FCM, IP	RUO	Purified	0.1 mg	**550433**
				FCM	RUO	Biotin	0.1 mg	**550434**
		AA4.1	Rat (Sprague-Dawley) IgG_{2b}, κ	FCM	RUO	FITC	0.5 mg	**559156**
				FCM	RUO	PE	0.1 mg	**558039**
GFAP	Bov, Chick, Dog, G Pig, Hu, Ms, Pig, Rab, Rat, Sheep	2.00E+01	Mouse IgG_{2b}	IF, IHC(F), WB	RUO	Purified	0.5 mg	**556329**
		4A11	Mouse IgG_{2b}	IF, IHC(F), WB	RUO	Purified	0.5 mg	**556327**
Lineage Panel	Ms	145-2C11, M1/70, RA3-6B2, RB6-8C5, TER-119		FCM, Sep	RUO	Biotin	1,000 tests	**559971**
Lineage Cocktail, with Isotype Control	Ms	145-2C11, M1/70, RA3-6B2, RB6-8C5, TER-119		FCM	RUO	APC	100 tests	**558074**

Reagents for Mouse Stem Cell Research

Antibodies to Stem Cell Markers (continued)

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
Ly-6A/E (Sca-1)	Ms	D7	Rat (Lewis) IgG_{2a}, κ	FCM, IHC(Fr), IP, WB	RUO	Purified	0.1 mg	**557403**
				FCM	RUO	Biotin	0.1 mg	**557404**
				FCM	RUO	FITC	0.1 mg	**557405**
				FCM	RUO	PE	0.2 mg	**553108**
				FCM	RUO	PE-Cy7	0.1 mg	**558162**
		E13-161.7	Rat (Wistar) IgG_{2a}, κ	Cyt, FCM, IHC(Fr), IP	RUO	Purified	0.5 mg	**553333**
				FCM	RUO	Biotin	0.5 mg	**553334**
				FCM	RUO	FITC	0.5 mg	**553335**
				FCM	RUO	PE	0.2 mg	**553336**
Notch1	Hu, Ms	mN1A	Mouse IgG_1, κ	ELISA, IC/FCM, IHC, WB	RUO	Purified	0.1 mg	**552466**
				IC/FCM	RUO	PE	0.1 mg	**552768**
3-Oct	Ms	40	Mouse IgG_1	WB	RUO	Purified	50 µg	**611202**
				WB	RUO	Purified	150 µg	**611203**
Tyrosine Hydroxylase	Ms, Rat	45	Mouse IgG_1	WB	RUO	Purified	50 µg	**612300**
				WB	RUO	Purified	150 µg	**612301**

Reagents for Mouse Stem Cell Research

Magnetic Cell Separation Reagents

DESCRIPTION	REACT	CLONE	ISOTYPE	APPS	REG	FORMAT	SIZE	CAT. NO.
Hematopoietic Progenitor Cell Enrichment Set - DM	Ms			Sep	RUO	BD IMag-DM, Biotin	2×10^9 cells	**558451**

Reagents for Mouse Stem Cell Research

Stem Cell Growth Factors

DESCRIPTION	REACT	APPS	REG	SIZE	CAT. NO.
GM-CSF, Recombinant mouse	Ms	ELISA Std., FA, IC/FCM Block	RUO	10 µg	**554586**
IL-3, Recombinant mouse	Ms	ELISA Std., FA, IC/FCM Block	RUO	10 µg	**554579**
IL-6, Recombinant mouse	Ms	ELISA Std., FA, IC/FCM Block	RUO	5 µg	**554582**
IL-7, Recombinant mouse	Ms	FA	RUO	2 µg	**554583**

Other Reagents for Stem Cell Research

Extracellular Matrix Molecules and Growth Factors

DESCRIPTION	SIZE	CAT. NO.
Lymphokine Products		
Colony-Stimulating Factors		
GM-CSF, human recombinant	1 µg	354048
Interleukins		
IL-1ß, human recombinant	2 µg	354042
IL-2, human recombinant	10,000 µg	354043
IL-2, human recombinant	50,000 µg	356043
IL-2, mouse recombinant	10,000 µg	356078
IL-2, mouse recombinant	25,000 µg	354078
IL-2, rat natural	4,000 µg	354110
IL-3, mouse recombinant	10 µg	354058
IL-4, human recombinant	5 µg	354068
Stem Cell Factor		
SCF, human recombinant	10 µg	354105
Tumor Necrosis Factor		
TNF-ß, human recombinant	10 µg	354066
TNF-ß, human recombinant	5x10 µg	356066
Growth Factor Products		
Epidermal Growth Factors		
EGF, mouse natural, (culture grade)	100 µg	354001
EGF, mouse natural, (culture grade) (1 mg)	10x100 µg	356001
EGF, mouse natural, (receptor grade)	100 µg	354010
EGF, mouse natural, (receptor grade) (0.5 mg)	5x100 µg	356010
EGF, human recombinant	100 µg	354052
EGF, human recombinant (1 mg)	10x100 µg	356052
Fibroblast Growth Factors		
bFGF, bovine natural	10 µg	356037
bFGF, human recombinant	10 µg	354060
bFGF, human recombinant (50 µg)	5x10 µg	356060
bFGF, human recombinant (100 µg)	10x10 µg	356061
Hepatocyte Growth Factor		
HGF/SF, human recombinant	5 µg	354103
Insulin-Like Growth Factors		
IGF-I, human recombinant (culture grade)	10 µg	354037
Nerve Growth Factors		
2.5S NGF, mouse natural	10 µg	354005
2.5S NGF, mouse natural	100 µg	356004
2.5S NGF, mouse natural (1 mg)	2x500 µg	356005
7S NGF, mouse natural	100 µg	354009
Platelet-Derived Growth Factors		
PDGF-BB, human recombinant	10 µg	354051
PDGF-BB, human recombinant (0.1 mg)	10x10 µg	356051
Transforming Growth Factors		
TGF-ß, human natural	1 µg	354039
TGF-ß, human natural (5 µg)	5x1 µg	356039
TGF-ß, human natural (10 µg)	5x2 µg	356040
Vascular Endothelial Growth Factor		
VEGF, human recombinant	10 µg	354107
Extracellular Matrix Products		
BD Matrigel™ Basement Membrane Matrix		
BD Matrigel Matrix	5 ml	356234
BD Matrigel Matrix	10 ml	354234
BD Matrigel Matrix (5x10 ml)	50 ml	356235
BD Matrigel Matrix Phenol-Red Free	10 ml	356237

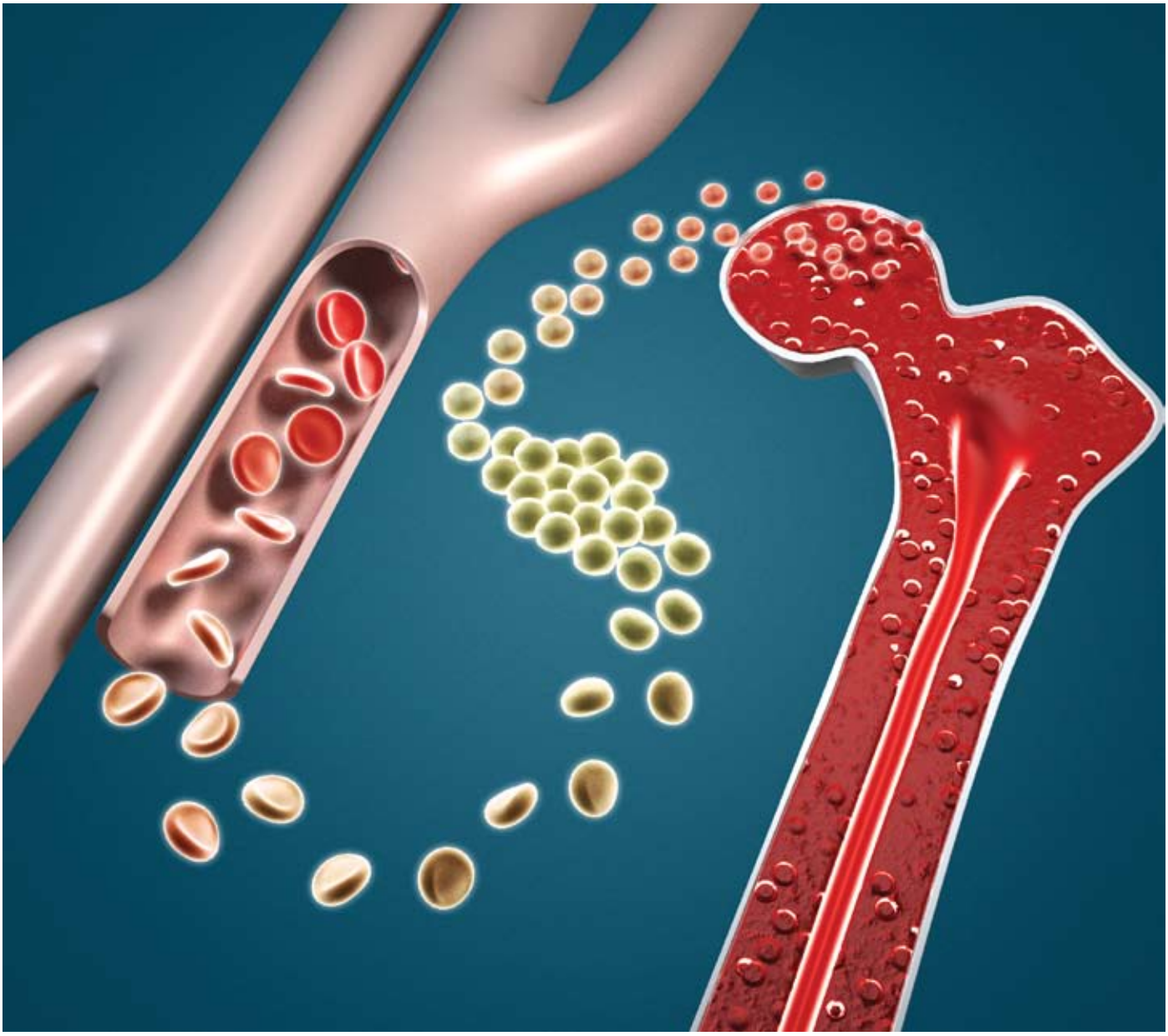
DESCRIPTION	SIZE	CAT. NO.
Extracellular Matrix Products *(continued)*		
BD Matrigel™ Matrix		
BD Matrigel Matrix High Concentration (HC)	10ml	**354248**
BD Matrigel Matrix High Concentration (HC) Phenol-Red Free	10ml	**354262**
BD Matrigel Matrix High Concentration (HC) Growth Factor Reduced	10ml	**354263**
Growth Factor Reduced (GFR) BD Matrigel Matrix	5 ml	**356230**
GFR BD Matrigel Matrix	10 ml	**354230**
GFR BD Matrigel Matrix Phenol-Red Free	10 ml	**356231**
Dispase	100 ml	**354235**
BD Cell Recovery Solution	100 ml	**354253**
Extracellular Matrix, human	1 mg	**354237**
BD Cell-Tak™ Cell and Tissue Adhesive		
BD Cell-Tak Cell and Tissue Adhesive	1 mg	**354240**
BD Cell-Tak Cell and Tissue Adhesive	5 mg	**354241**
BD Cell-Tak Cell and Tissue Adhesive (2x5 mg)	10 mg	**354242**
Collagens		
Collagen I, bovine	30 mg	**354231**
Collagen I, human	0.25 mg	**354243**
Collagen I, rat tail	100 mg	**354236**
Collagen I, rat tail (10x100 mg)	1 g	**356236**
Collagen I, human recombinant	250 ug	**354254**
Collagen II, bovine	5 mg	**354257**
Collagen III, human	0.25 mg	**354244**
Collagen I High concentration rat tail	100mg	**354249**
Collagen IV, human	0.25 mg	**354245**
Collagen IV, mouse	1 mg	**354233**
Collagen IV, mouse (10x1 mg)	10 mg	**356233**
Collagen V, human	0.25 mg	**354246**
Collagen VI, Human	500 µg	**354261**
Fibronectin		
Fibronectin, human	1 mg	**354008**
Fibronectin, human	5 mg	**356008**
Fibronectin, human (5x5 mg)	25 mg	**356009**
Laminin		
Laminin, mouse	1 mg	**354232**
Ultra-pure Laminin, mouse	1 mg	**354239**
Laminin/Entactin High Concentration	500 µg	**354259**
Poly-D-Lysine		
Poly-D-Lysine	20 mg	**354210**
BD™ PuraMatrix™ Peptide Hydrogel		
BD™ PuraMatrix™ Peptide Hydrogel	5 ml	**354250**
Vitronectin		
Vitronectin, human	0.25 mg	**354238**
BD™ 3D Scaffold products		
BD 3D Collagen Composite scaffold	24 scaffolds in one BD Falcon™ 48-well plate	**354613**
BD 3D OPLA® scaffold	24 scaffolds in one BD Falcon™ 48-well plate	**354614**
BD 3D Calcium Phosphate scaffold	24 scaffolds in one BD Falcon™ 48-well plate	**354617**

Other Reagents for Stem Cell Research *(continued)*

IVD Reagents

For In Vitro Diagnostic Use.

DESCRIPTION	REACT	APPS	REG	SIZE	CAT. NO.
BD Procount Progenitor Cell Enumeration Kit	Hu	FCM	IVD	25 tests	**340498**
BD Stem Cell Control Kit (Bi-Level Control)	Hu	FCM	IVD	15 tests	**340991**
BD Procount v2.1 (OS9 and G4 computers or earlier only) for Macintosh		FCM	IVD		**341158**



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Additional Resources

bdbiosciences.com/stemcellsource

Listed below are additional resources that can be ordered free of charge or easily downloaded from our website at **bdbiosciences.com**

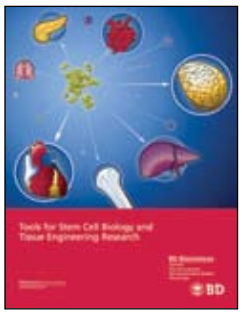
BD Procount™
Setting the standard for progenitor cell enumeration. Those of you interested in a standardized, accurate assay approach to counting $CD34^+$ cells will find the BD Procount white paper reports an effective and more convenient method for progenitor cell enumeration.

BD Oncomark™
Multicolor reagents designed for your clinical testing.

BD Oncomark™ Poster
The evolution of blood cells.

BD IMag™ Cell Separation System
The BD IMag™ Cell Separation System is based on a simple yet highly effective direct magnet technology that allows for the rapid positive and/or negative selection (enrichment) of cell populations without the use of magnetic separation columns.

BD™ PuraMatrix™ Peptide Hydrogel
BD™ PuraMatrix™ Peptide Hydrogel, a novel synthetic matrix ideal for creating optimized 3D cell culture environments.



Tools for Stem Cell Biology and Tissue Engineering Research
BD™ Extracellular Matrix Proteins, Growth Factors, and Three Dimensional Scaffolds.

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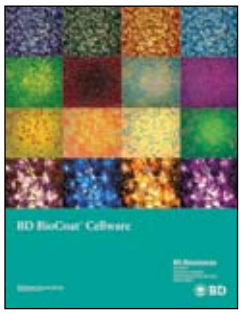
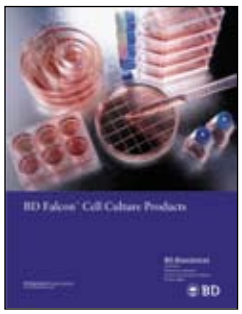


BD BioCoat™ Cellware
BD Falcon™ Tissue Culture Plates, Dishes, Flasks, Coverslips, and Culture Slides are available pre-coated with a variety of ECM proteins and attachment factors.



BD Falcon™ Cell Culture Products
BD Falcon™ Cell Culture Plates, Dishes, Flasks, Roller Bottles and CultureSlides.

Notes

Notes

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East Africa
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Fax 254.2.341161
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Eastern Europe
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Fax 49.6221.305.418
bdb.ema@europe.bd.com

Egypt
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Fax 202.266.7562

Finland
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Fax 358.9.88.70.7817
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France
Tel 33.4.76.68.36.09
Fax 33.4.76.68.35.06
customerservice.bdb.france@europe.bd.com

Germany
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Fax 49.6221.303.609
customerservice.bdb.de@europe.bd.com

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bdbiosciences_maghreb@europe.bd.com

Norway
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bdb_pak@bd.com

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