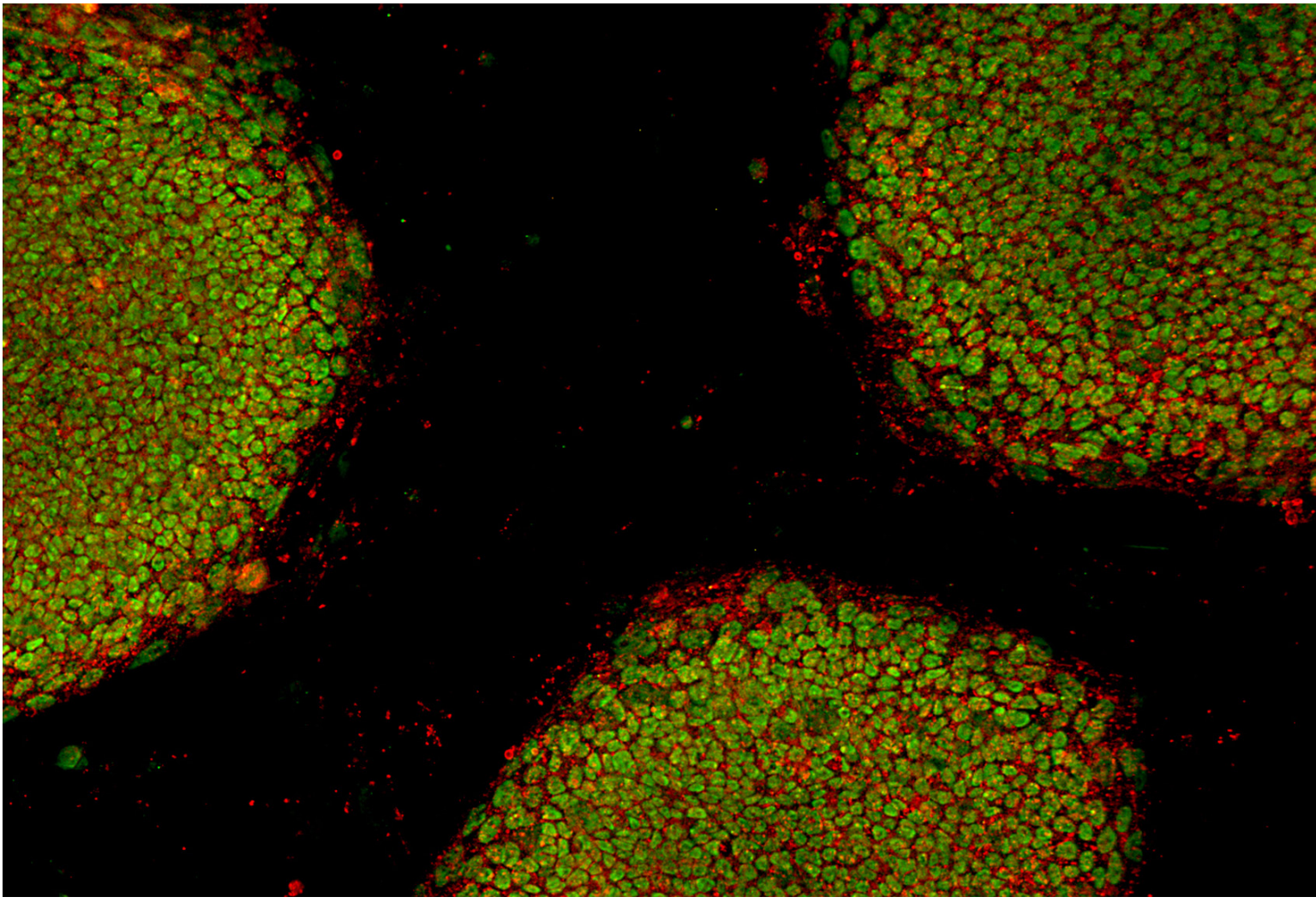
1 Stem Cells and Media



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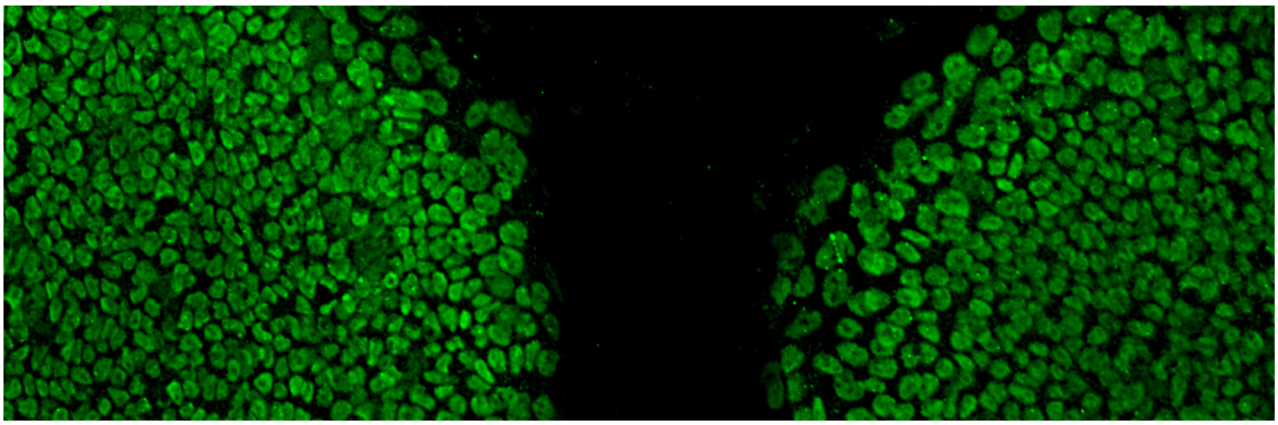
Pluripotent Stem Cells and Media

Stem Cells and Media

We do the isolation, you do the research



Stem Cells and Media

Introduction

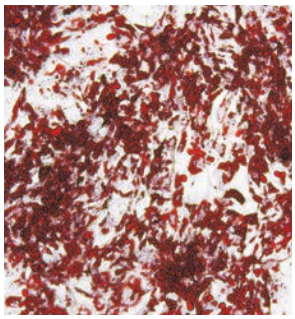
Adult stem cells are undifferentiated cells found among differentiated cells in a tissue, or organ. The adult stem cell can self-renew and differentiate to yield some, or all of the major specialized cell types of that tissue or organ. Research on adult stem cells has generated a great deal of excitement. Scientists have found adult stem cells in many more tissues than they once thought possible. Adult stem cells have been identified in many organs and tissues, including brain, bone marrow, peripheral blood, blood vessels, skeletal muscle, skin, teeth, heart, gut, liver, ovarian epithelium, and testis. Adult hematopoietic, or blood-forming, stem cells from bone marrow have been used in transplants for more than 40 years. Scientists now have evidence that stem cells exist in the brain and the heart, two locations where adult stem cells were not at first expected to reside. If the differentiation of adult stem cells can be controlled in the laboratory, these cells may become the basis of transplantation-based therapies. In addition, once removed from the body, adult stem cells' capacity to divide is limited, making generation of large quantities of stem cells difficult. Scientists in many laboratories are trying to find better ways to grow large quantities of adult stem cells in culture, and to manipulate them to generate specific cell types so they can be used to treat injury or disease.

With the revelation of induced pluripotency in 2007, there is a new avenue for therapeutic use of stem cells via allogenic and autologous methods. Human induced pluripotent stem cells (hiPSCs) are pluripotent cells that have the ability to indefinitely self- renew and become any cell type in the body. Because of these attributes, hiPSCs have become an important scientific tool and are spurring advancements in basic research, disease modeling, drug.

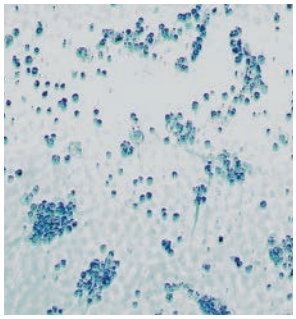
With the advances in adult stem cell research and induced pluripotency, more patient-specific therapies are being developed. To aid in multiple facets of stem cell research, Lonza offers an expansive portfolio of products that will help simplify and support your reprogramming, expansion, and differentiation needs. This includes hematopoietic stem cells from bone marrow and cord blood, mesenchymal stem cells from bone marrow, adipose and dental pulp tissues, neural progenitors, preadipocytes and osteoclast precursors.

Human Adipose-derived Stem Cells (ADSC) and Media

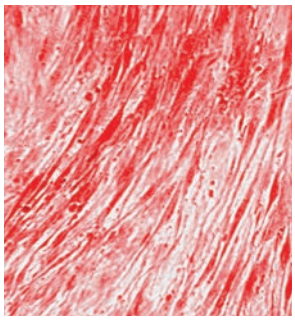
Our human ADSCs are isolated from adipose tissue from normal, Type I, or Type II diabetic donors. Cells can be selected from lots based on donor characteristics such as age, sex, race, and BMI.
The cells are cryopreserved at primary passage and have been reported in multiple publications to differentiate down various lineages including chondrogenic, osteogenic, adipogenic, myogenic, neural, and endothelial. ADSC Growth Medium BulletKit™ has been optimized for cell maintenance and expansion.



ADSC – derived adipocytes stained with Oil Red O



ADSC – derived chondrocytes stained with Alcian Blue



ADSC – derived osteoblasts stained with Alizarin Red

Applications

- Toxicology/drug screening
- Regenerative medicine/cell therapy
- Obesity
- Osteoporosis
- Cardiovascular disease
- Metabolic disorders

Specifications

- ≥1 million viable cells after thaw; >95% pure
- Positive for CD13, CD29, CD44, CD73, CD90, CD105, and CD166 surface markers
- Negative for CD14, CD31, and CD45 surface markers
- Negative for HIV-1, Hepatitis B, and Hepatitis C
- Guaranteed to expand through five passages

Ordering Information – Cells

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
Normal Cells				
PT-5006	PT-5006	hADSC – Human Adipose-Derived Stem Cells	Cryopreserved	≥1 million cells/vial
Diseased Cells				
PT-5007	PT-5007	D-hADSC – Diseased Human Adipose-derived Stem Cells – Diabetes Type I	Cryopreserved	≥1 million cells/vial
PT-5008	PT-5008	D-hADSC – Diseased Human Adipose-derived Stem Cells – Diabetes Type II	Cryopreserved	≥1 million cells/vial

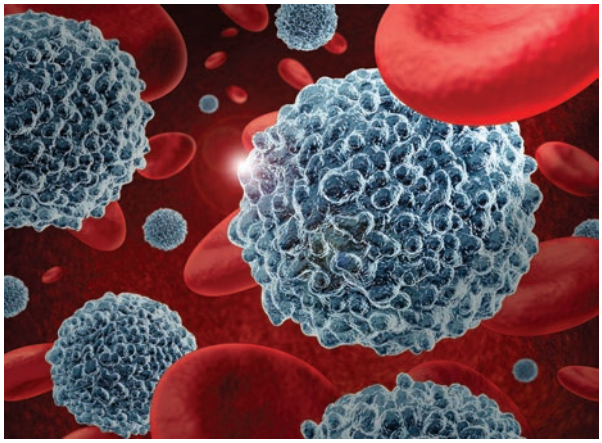
Ordering Information – Media

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
PT-4505	PT-4505	ADSC – Apidose-Derived Stem Cells Growth Medium BulletKit™	Includes basal medium and SingleQuots™ Kit	Kit
PT-3273	PT-3273	ADSC – Apidose-Derived Stem Cells Basal Medium		500 mL
PT-4503	PT-4503	ADSC – Apidose-Derived Stem Cells Growth Medium SingleQuots™ Supplements and Growth Factors	Frozen supplements	Kit

Related Products	Page
OsteoImage™ Mineralization Assay	290
PGM™ 2 Preadipocyte Growth Medium-2 BulletKit™	28
hMSC – Human Mesenchymal Stem Cells	29
Nucleofector™ Kits for Mesenchymal Stem Cells	243

Hematopoietic Research

Working with hematopoietic and immune cells requires not only a variety of donors, but also patience and skill to isolate and characterize specific cell types.
Let our 30+ years of experience help eliminate the hassle of finding donors, performing tedious cell isolations, and characterizing cells, so you can focus on your research.



Cells You Can Count On to Perform

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

Optimized Culture Systems

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

Choices in Cell Type and Tissue Source

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

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

Fresh Human Bone Marrow

More Cells

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

Relevant Results

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

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

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

Fresh Delivery

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

Donor Criteria

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

Ordering Information – Cells

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
Bone Marrow				
1M-105	1M-105	Unprocessed Human Bone Marrow	Fresh	10 mL
1M-125	1M-125	Unprocessed Human Bone Marrow	Fresh	25 mL
1W-500	1W-500	Autologous Peripheral Blood*	Fresh	100 mL

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

Ordering Information – Media

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
CC-3211	CC-3211	LGM™ 3 Lymphocyte Growth Medium-3		500 mL

Related Products	Page
HPGM™ Hematopoietic Progenitor Growth Medium	23

Bone Marrow and Cord Blood Hematopoietic Cells

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

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

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

CD34$^+$ Cells

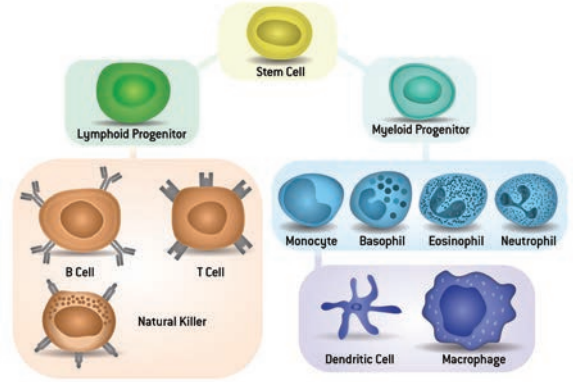
CD34$^+$ cells are known to differentiate into all the various blood cell types. In addition, there is a positive correlation between the concentration of CD34$^+$ cells and the likelihood of hematopoietic reconstitution upon transplantation. Thus, whether you are focusing on cell therapy research or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

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

Mononuclear Cells

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

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



Stromal Cells

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

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

HPGM™ Hematopoietic Progenitor Growth Medium

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

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

Bone Marrow and Cord Blood Hematopoietic Cells

Ordering Information – Cells

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
2M-101	2M-101	Human Bone Marrow CD34⁺ Progenitor Cells	Cryopreserved	≥100,000 cells/vial
2M-101A	2M-101A	Human Bone Marrow CD34⁺ Progenitor Cells	Cryopreserved	≥300,000 cells/vial
2M-101B	2M-101B	Human Bone Marrow CD34⁺ Progenitor Cells	Cryopreserved	≥500,000 cells/vial
2M-101C	2M-101C	Human Bone Marrow CD34⁺ Progenitor Cells	Cryopreserved, volume discount available	≥1 million cells/vial
2M-101D	2M-101D	Human Bone Marrow CD34⁺ Progenitor Cells	Cryopreserved	≥2 million cells/vial
2M-101F	2M-101F	Human Bone Marrow CD34⁺ Progenitor Cells	Cryopreserved	≥10 million cells/vial
2C-101	2C-101	Human Cord Blood CD34⁺ Progenitor Cells	Cryopreserved	≥1 million cells/vial
2C-101A	2C-101A	Human Cord Blood CD34⁺ Progenitor Cells	Cryopreserved	≥500,000 cells/vial
2C-101B	2C-101B	Human Cord Blood CD34⁺ Progenitor Cells	Cryopreserved	≥100,000 cells/vial
2M-302	2M-302	Human Bone Marrow Stromal Cells	Cryopreserved, non-irradiated	≥5 million cells/vial

Ordering Information – Media

Cat. No. NA	Cat. No. EU	Product Name	Size
PT-3926	PT-3926	HPGM™ Hematopoietic Progenitor Growth Medium	500 mL

Related Products	Page
Nucleofector™ Kits for Human CD34⁺ Cells	241
Iscove's Modified Dulbecco's Medium (IMDM)	127

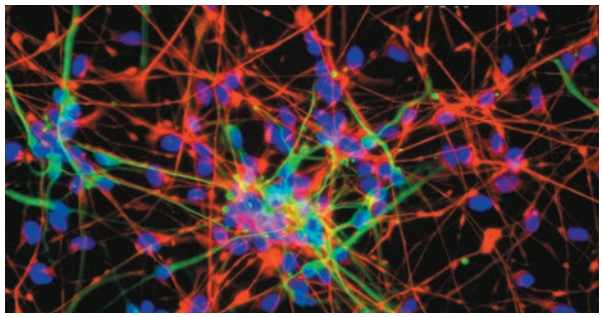
Human Neural Progenitor Cells (NHNP) and Media

Poietics™ Neural Progenitor Cells are cryopreserved as neurospheres isolated from human brain cortex. Lonza offers two optimized media kits specially formulated to support the maintenance and differentiation of the NHNP cells.

NPMM™ Neural Progenitor Maintenance Medium BulletKit™ contains the necessary supplements and media for optimal NHNP cell maintenance. This kit includes:
- CC-3210 – Neural Progenitor Basal Medium
- CC-4241 – Neural Progenitor Maintenance Medium SingleQuots™ Kit (contains hEGF and hFGF)
- CC-4242 – Neural Progenitor Supplement SingleQuots™ Kit (contains NSF-1 and GA)

NPDM™ Neural Progenitor Differentiation Medium BulletKit™ contains the necessary supplements and media for optimal NHNP differentiation. The medium can be customized by supplementation with differentiation-promoting agents such as brain-derived neurotrophic factor. This kit includes:
- CC-3210 – Neural Progenitor Basal Medium
- CC-4242 – Neural Progenitor Supplement SingleQuots™ Kit

Benefits
- Cryopreserved in primary passage
- Guaranteed marker expression when plated onto laminin and differentiated
- Media to support maintenance and differentiation



NHNP stained for -tubulin III and GFAP

Applications
- Drug development
- Neurotoxicity
- Neurogenesis and CNS function
- Neurotransmitter disorders
- Electrophysiology
- Regenerative medicine

Cell Testing and Specifications
- Cells and media tested together for optimal performance
- Cells negative for HIV-1, Hepatitis B, and Hepatitis C
- Cells negative for mycoplasma, bacteria, yeast, and fungi
- Cells test positive for β-tublin III and GFAP after differentiation

Ordering Information – Cells

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
PT-2599	PT-2599	NHNP – Human Neural Progenitor Cells*	Cryopreserved	≥1.2 million cells/vial

For cell pellets in RNALater contact Customer Service for order placement.

*Sold under license from StemCells, Inc. US patents 5,968,829 and 5,851, 832.

Ordering Information – Media

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
CC-3209	CC-3209	NPMM™ Neural Progenitor Maintenance Medium BulletKit™	Includes basal medium and SingleQuots™ Kit	Kit
CC-3210	CC-3210	NPBM™ Neural Progenitor Basal Medium		200 mL
CC-3229	CC-3229	NPDM™ Neural Progenitor Differentiation Medium BulletKit™	Includes basal medium and SingleQuots™ Kit	Kit
CC-4241	CC-4241	NPMM™ Neural Progenitor Differentiation Maintenance Medium SingleQuots™ Supplements	Frozen supplements	Kit
CC-4242	CC-4242	Neural Progenitor SingleQuots™ Supplements	Frozen supplements	Kit

See page 414–422.

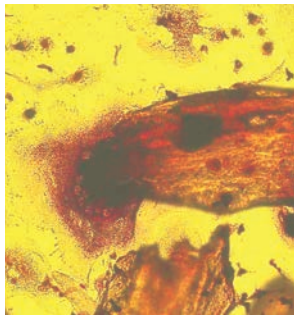
Human Osteoclast Precursor Cells (OCP) and Media

- **Poietics™ Osteoclast Precursor Cells and Media System includes:**
  - Cryopreserved human osteoclast precursors
  - OCP Osteoclast Precursor Medium BulletKit™

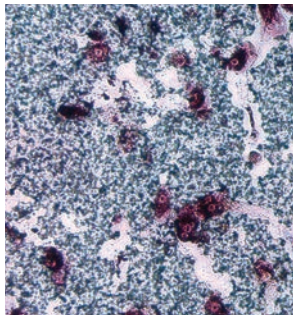
Osteoclasts are large, multinucleated cells that play an active role in bone resorption. This cell system has been designed for use in high-throughput applications to conduct research on osteoporosis, bone resorption, and other bone-related diseases.

OCP Osteoclast Precursor Medium BulletKit™ includes the basal medium and supplements needed to induce the osteoclast precursors to differentiate into mature osteoclasts; these differentiated osteoclasts stain positive for TRAP and express the calcitonin receptor.

Poietics™ Cells, Media, and Reagents are quality tested together and guaranteed to give optimum performance as a complete cell system.

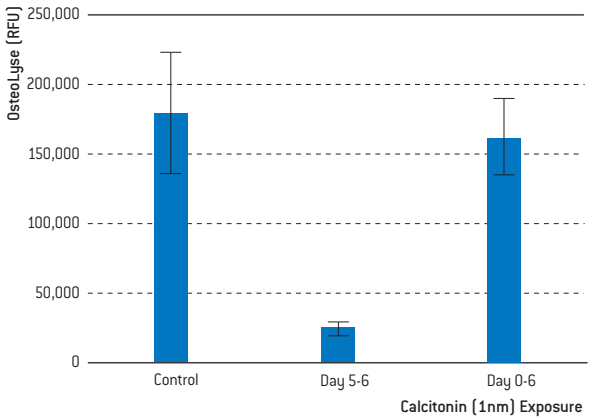


Differentiated human osteoclasts resorbing bone fragment



Pits formed from bone resorption activity of differentiated osteoclasts

Effects of Calcitonin on Osteoclast-mediated Bone Matrix Degradation *in vitro*



Inhibition of bone matrix resorption by calcitonin. Poietics™ Primary Human Osteoclast Precursors were cultured in differentiation medium containing no calcitonin, calcitonin added only at day 5 and calcitonin added on days 0 and 5 and assayed after a total of 6 days. Calcitonin, added at day 0, resulted in the osteoclasts becoming refractory to calcitonin added on day 5.

Ordering Information – Cells

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
2T-110	2T-110	hOCP – Human Osteoclast Precursor Cells	Cryopreserved	≥1 million cells/vial

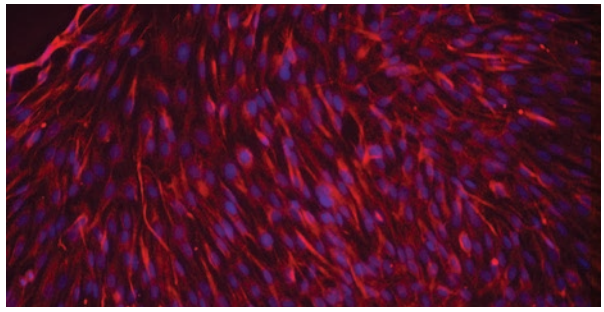
Ordering Information – Media

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
PT-8001	PT-8001	OCP – Osteoclast Precursor Medium BulletKit™	Includes basal medium and SingleQuots™ Kit	Kit
PT-8201	PT-8201	OCP – Osteoclast Precursor Basal Medium		100 mL
PT-9501	PT-9501	OCP – Osteoclast Precursor Medium SingleQuots™ Supplements	Frozen supplements	Kit

Related Products	Page
OsteoAssay™ Human Bone Plate	288
OsteoImage™ Mineralization Assay	290
OsteoLyse™ Assay Kit	289

Dental Pulp Stem Cells (DPSC) and Media

Dental Pulp Stem Cells (DPSC) are multipotent stem cells harvested from the soft living tissue inside adult teeth. Cryopreserved for ease of use and experimental flexibility, these Mesenchymal-like stem cells have the potential to differentiate into a variety of cell types including osteoblasts, adipocytes, chondrocytes and neurons. Lonza also offers DPSC Media BulletKits™, specifically optimized for cell maintenance and expansion. Each kit contains the necessary media and supplements for maximum cell growth and rapid expansion.



Dental pulp stem cells stained for dentin sialophosphoprotein (DSPP) (red) and DAPI (blue)

Source
- Adult human third molars

Applications
- Comparative stem cell studies
- Wound healing
- Stem cell differentiation
- Tissue regeneration
- Muscular Dystrophy research

Cell Testing and Specifications
- ≥ 1 million viable cells
- Guaranteed to expand through 5 passages
- Negative for HIV-1, Hepatitis B, and Hepatitis C
- Positive for CD166, CD105, CD90, CD73, and CD29 surface markers
- Negative for CD133, CD45, and CD34 surface markers

Marker Tested via Flow Cytometry	Results
CD166	>95%
CD105	>95%
CD29	>95%
CD90	>90%
CD73	>90%
CD45	<10%
CD34	<10%
CD133	<10%

Ordering Information – Cells

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
PT-5025	PT-5025	Human Dental Pulp Stem Cells	Cryopreserved	≥1 million cells/vial

Ordering Information – Media

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
PT-3005	PT-3005	Human Dental Pulp Stem Cell BulletKit™	Includes basal medium and SingleQuots™ Kit	Kit
PT-3927	PT-3927	Human Dental Pulp Stem Cell Basal Medium		500 mL
PT-4516	PT-4516	Human Dental Pulp Stem Cell SingleQuots™ Supplements and Growth Factors	Frozen supplements	Kit

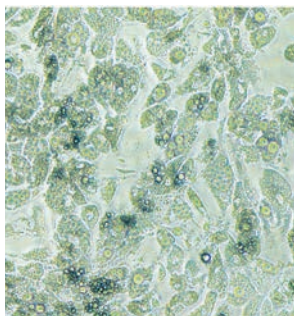
See page 414.

Human Preadipocyte Cells and Media

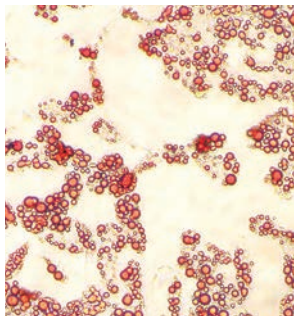
Poietics™ Preadipocyte Cells are isolated from subcutaneous or visceral fat. Subcutaneous fat is often found attached to skin in the lower abdomen area. Visceral preadipocytes are isolated from adipose tissue associated with internal organs, such as the bladder or kidney.

Relative to subcutaneous fat, visceral fat deposits are mobilized at a higher rate to produce serum fatty acids which contribute to insulin resistance, Diabetes Type 2, and other related cardiovascular disorders.

Preadipocytes are precursor cells that develop into adipocytes when fully differentiated. Adipocytes perform essential functions of energy metabolism and are characterized by the accumulation of intracellular triglycerides.



Differentiated subcutaneous preadipocyte cells

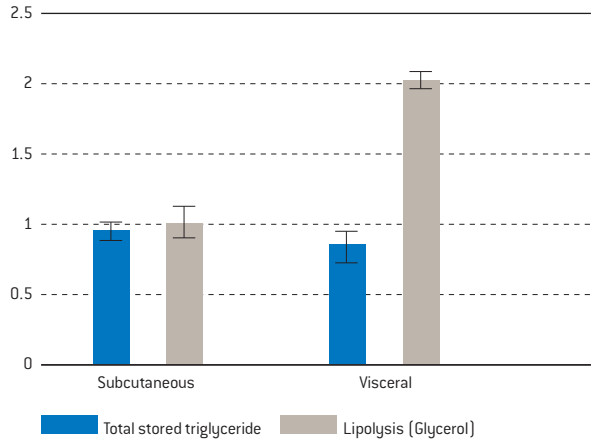


Differentiated visceral preadipocyte cells stained with Oil Red O

Poietics™ Preadipocyte Cells and Media System includes:

- Cryopreserved human preadipocyte cells isolated from subcutaneous or visceral fat
- Cells available from normal, Type I, or Type II diabetic donors
- PGM™ 2 Preadipocyte Growth Medium-2 BulletKit™, which contains the basal medium and growth supplements needed to induce growth and differentiation of the preadipocytes into mature adipocytes
- AdipoRed™ Assay Reagent, an assay reagent for high-throughput quantification of intracellular lipid

Catecholamine-induced Lipolysis in Subcutaneous and Visceral Primary Human Preadipocytes



Applications

- Lipid accumulation and metabolism
- Obesity
- Diet drug development
- Diabetes research
- Insulin sensitivity

Ordering Information – Cells

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
Normal Cells				
PT-5001	PT-5001	Human Subcutaneous Preadipocyte Cells	Cryopreserved	≥4 million cells/vial
PT-5005	PT-5005	Human Visceral Preadipocyte Cells	Cryopreserved	≥1 million cells/vial
PT-5020	PT-5020	Human Subcutaneous Preadipocyte Cells	Cryopreserved	≥1 million cells/vial
Diseased Cells				
PT-5021	PT-5021	Diseased Human Subcutaneous Preadipocyte Cells – Diabetes Type I	Cryopreserved	≥1 million cells/vial
PT-5022	PT-5022	Diseased Human Subcutaneous Preadipocyte Cells – Diabetes Type II	Cryopreserved	≥1 million cells/vial
PT-5023	PT-5023	Diseased Human Visceral Preadipocyte Cells – Diabetes Type I	Cryopreserved	≥1 million cells/vial
PT-5024	PT-5024	Diseased Human Visceral Preadipocyte Cells – Diabetes Type II	Cryopreserved	≥1 million cells/vial

Human Preadipocyte Cells and Media

Continued

Ordering Information – Media

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
PT-8002	PT-8002	PGM™ 2 Preadipocyte Growth Medium-2 BulletKit™	Includes basal medium and SingleQuots™ Kit	Kit
PT-8202	PT-8202	PBM™ 2 Preadipocyte Basal Medium-2	Contains insulin	500 mL
PT-9502	PT-9502	PGM™ 2 Preadipocyte Growth Medium SingleQuots™ Supplements and Growth Factors	Frozen supplements	Kit
PT-8200	PT-8200	PBM™ Preadipocyte Basal Medium	Insulin-free	500 mL
17-512F	BE17-512F	Dulbecco's Phosphate Buffered Saline (1X)	9.5 mM (PO_4) without calcium or magnesium	500 mL

See page 414–422.

Related Products	Page
Human Adipose-derived Stem Cells	19
AdipoRed™ Assay Reagent	287

North America – Customer Service: +1 800 638 8174 (toll free); order.us@lonza.com; Scientific Support: +1 800 521 0390 (toll free) scientific.support@lonza.com

Human Mesenchymal Stem Cells (hMSC) and Media

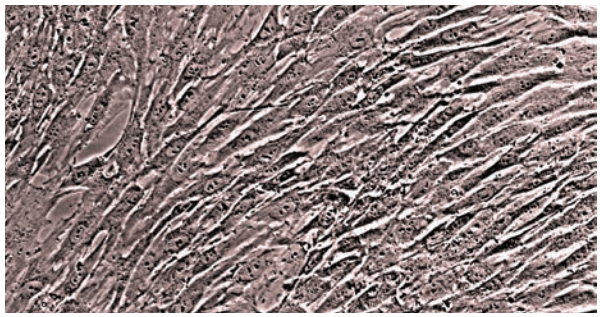
Bone marrow contains a population of rare progenitor cells known as mesenchymal stem cells (MSC) capable of replication as undifferentiated cells or differentiating into bone, cartilage, fat, muscle, tendon and marrow stroma. Poietics™ Human Mesenchymal Stem Cell System contains normal human mesenchymal stem cells and medium for their growth and differentiation. Cells are frozen after passage two and it is recommended that experiments are performed by passage five.

Each system can generate hMSC cultures for experimental studies in cell differentiation, including osteogenesis and bone mineralization, chondrogenesis and cartilage formation, adipogenesis and fat accumulation. They are excellent models for gene delivery research, functional genomics, drug screening, high-throughput screening and toxicology.

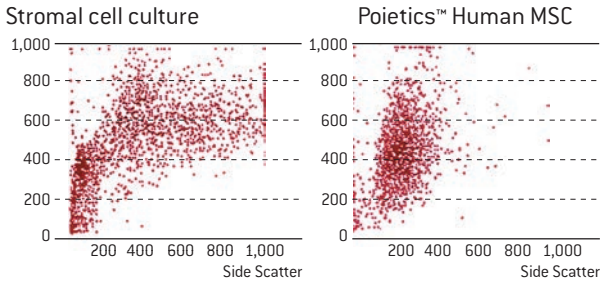
Poietics™ Cells and Media are quality tested and guaranteed to give optimum performance. hMSCs are tested using *in vitro* assays and are found to be positive for: adipogenic lineage as indicated by AdipoRed™ Assay Reagent lipid stain; chondrogenic lineage as indicated by TGF-beta staining; and osteogenic lineage as indicated by OsteoImage™ Mineralization Assay stain of calcium deposition.

Cell Testing and Specifications

- HIV-1, Hepatitis B, and Hepatitis C are not detected in all donors
- Cells are tested for purity by flow cytometry:
- Cells are positive for CD166, CD105, CD90, CD79, CD29, and CD44
- Cells are negative for CD14, CD19, CD34, CD45, and HLA-DR
- Tested for the ability to differentiate into osteogenic, chondrogenic, adipogenic lineages



hMSC in culture



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3. **Material Not Transferable: You may not transfer the Material to any other person or organization.**
4. **Patent Notice: Material under license from Osiris Therapeutics, Inc.** Material is covered by US patent 5,486,359 and others.

Ordering Information – Cells

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
PT-2501	PT-2501	hMSC – Human Mesenchymal Stem Cells	Cryopreserved	≥750,000 cells/vial

Ordering Information – Media

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
PT-3001	PT-3001	MSCGM™ Mesenchymal Stem Cell Growth Medium BulletKit™	Includes basal medium and SingleQuots™ Kit	Kit
PT-3002	PT-3002	hMSC – Human Mesenchymal Stem Cell Osteogenic Differentiation Medium BulletKit™	Includes basal medium and SingleQuots™ Kit	Kit
PT-3003	PT-3003	hMSC – Human Mesenchymal Stem Cell Chondrogenic Differentiation Medium BulletKit™	Includes basal medium and SingleQuots™ Kit, TGF-β3 sold separately	Kit

Human Mesenchymal Stem Cells (hMSC) and Media

Continued

Ordering Information – Media

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
PT-3004	PT-3004	hMSC – Human Mesenchymal Stem Cell Adipogenic Differentiation Medium BulletKit™	Includes basal medium and SingleQuots™ Kit	Kit
PT-4135	PT-4135	hMSC Adipogenic Induction SingleQuots™ Kit	hMSC Adipogenic Induction SingleQuots™ Kit	Kit
PT-3238	PT-3238	MSCBM™ Mesenchymal Stem Cell Basal Medium		440 mL
PT-4105	PT-4105	MSCGM™ Mesenchymal Stem Cell Growth Medium SingleQuots™ Supplements and Growth Factors	Frozen supplements	Kit
PT-4124	PT-4124	rhTGF-β3	For chondrocyte re-differentiation	2 µg
190632	190632	TheraPEAK™ MSCGM™ CD Serum-free Mesenchymal Stem Cell Growth Medium BulletKit™	Includes basal medium and SingleQuots™Kit	Kit
190620	190620	TheraPEAK™ MSCBM™ CD Serum-free Mesenchymal Stem Cell Basal Medium™ Chemically-Defined		500 mL
192125	192125	TheraPEAK™ MSCGM™ CD Serum-free Mesenchymal Stem Cell Growth Medium SingleQuots™ Supplements and Growth Factors		Kit

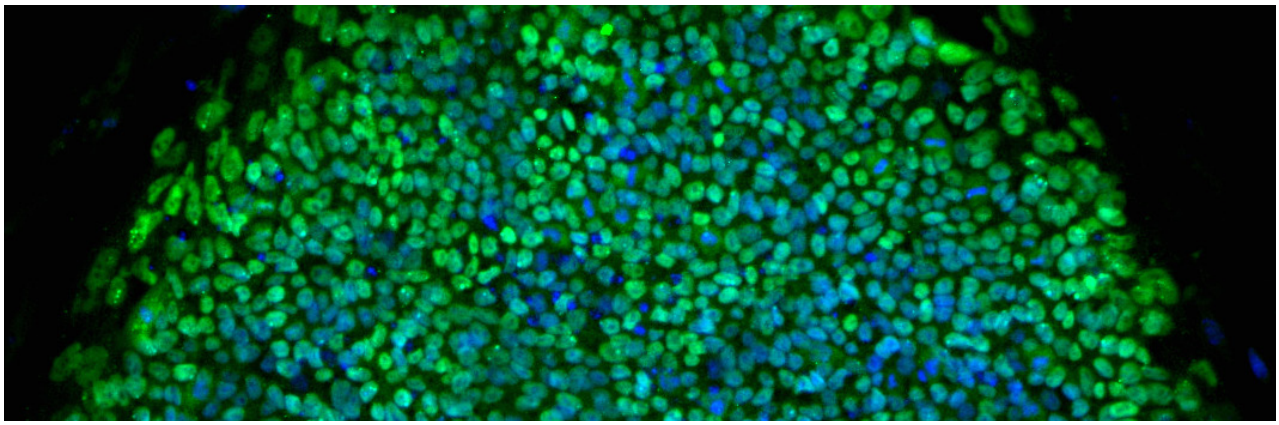
Ordering Information – Reagents

Cat. No. NA	Cat. No. EU	Product Name	Product Description	Size
17-512F	BE17-512F	Dulbecco's Phosphate Buffered Saline (1X)	9.5 mM (PO_4) without calcium or magnesium	500 mL
CC-3232	CC-3232	Trypsin/EDTA for Mesenchymal Stem Cells		100 mL

Related Products	Page
CytoSMART™ 2 System	268
OsteoImage™ Mineralization Assay	290
AdipoRed™ Assay Reagent	287
Nucleofector™ Kits for Human Mesenchymal Stem Cells	243

Notes

Pluripotent Stem Cells and Media



Pluripotent Stem Cells and Media

North America – Customer Service: +1 800 638 8174 (toll free); order.us@lonza.com; Scientific Support: +1 800 521 0390 (toll free) scientific.support@lonza.com

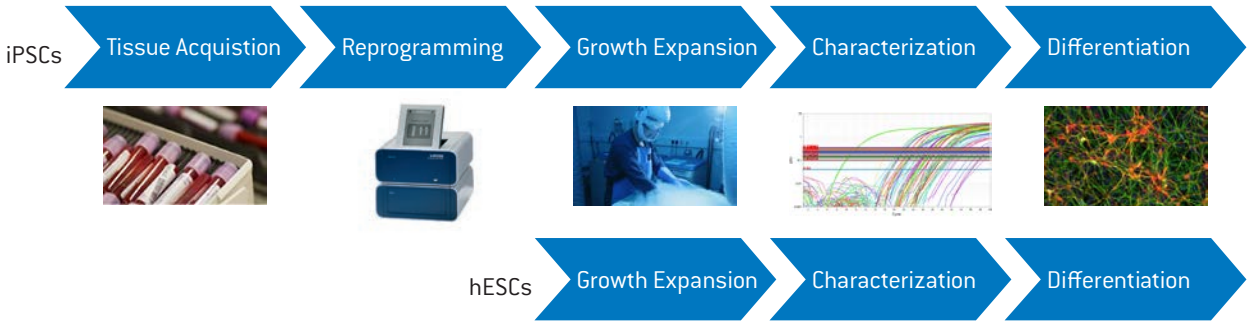
Pluripotent Stem Cells

In 1998, Dr. James Thompson's laboratory at the University of Wisconsin was the first to successfully isolate and culture human embryonic stem cells (hESCs) *in vitro*. In 2007, Dr. Shinya Yamanaka and colleagues at Kyoto University became the first to successfully convert adult human cells to an embryonic stem cell-like state or induced pluripotent stem cells (hiPSCs). Five years later, Dr. Yamanaka was awarded a Nobel Prize for this work.

By definition, hESCs and hiPSCs have the ability to indefinitely self-renew and become any cell type in the body. Because of these attributes, PSCs have become an important scientific tool and are spurring advancements in basic research, disease modeling, drug development, and regenerative medicine.

Pluripotent Stem Cell Services

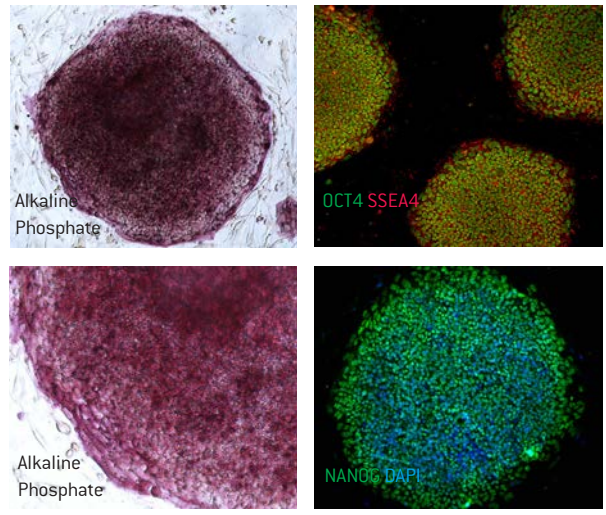
Lonza established a new strategic vision to become the leading supplier to the regenerative medicine industry. To realize this vision, Lonza created the Pluripotent Stem Cell Innovation Center. Pluripotent stem cells (PSCs) have the ability to generate any of the 220+ cell types in the human body. And because of this unique attribute, these cells have great potential in basic research, drug discovery and cell replacement therapies.



PSC Services Lonza has built up expertise, capacity, and capabilities in pluripotent stem cell research and their application to cGMP manufacturing. Researchers can now access this expertise through our PSC service offering from iPSC generation to process development and differentiation.

Our services span the full value chain of pluripotent stem cells from tissue acquisition to differentiation:

- **Tissue Acquisition** – We have a dedicated team that procures both research and cGMP grade tissue according to the highest ethical standards and in compliance with government regulations.
- **Reprogramming** – We offer cGMP and non-cGMP iPSC generation under feeder- and feeder-free conditions using a zero-footprint technology
- **Growth / Expansion / Banking** – We have established protocols using all of the common medium, matrix, and passaging methods. We also have the infrastructure and resources to support small- and large-scale culture and banking of PSCs.
- **Characterization** – We offer all the standard methods of characterizing PSCs including thawing efficiency, myoplasma and sterility testing, karyotype analysis, short tandem repeat genotyping, pluripotency marker expression (flow cytometry and immunofluorescence), and pluripotency assays (embryoid body and teratoma formation).
- **Differentiation** – We have established protocols for the production of PSC-derived motor neurons, dopaminergic neurons, and neural stem cells. We also have development programs underway to add to our differentiation portfolio of therapeutically relevant cell types
- **Process development** – Over the years we have built up expertise in the differentiation of high purity, functional cell types. Our team is well versed in technology transfer and optimization of manufacturing protocols



Human induced pluripotent stem cells express hESC-associated markers POU5F1/OCT4 (green) and SSEA4 (red) counterstained with DAPI (blue).

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