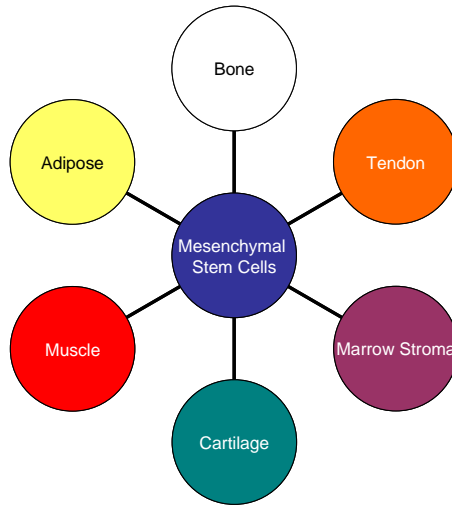


## Cultrex<sup>®</sup> Rat Mesenchymal Stem Cell Growth and Differentiation Products

**Background:**

Mesenchymal Stem Cells (MSC), also known as marrow stromal cells, are a self-renewing population of multipotent cells present in bone marrow and many other adult tissues.<sup>(1,2)</sup> MSC can be isolated from bone marrow by adherence to plastic,<sup>(1-4)</sup> and can differentiate into multiple lineage-specific cells that form bone, fat, cartilage, muscle, and tendon.<sup>(1-4)</sup> (Figure 1) Due to their multilineage potential, they can be useful tools for a wide range of therapeutic and basic research, including transplantation studies and studies examining the repair of cardiac tissue, bone, cartilage, and tendons often using 3-D matrices.<sup>(1,4)</sup>

Figure 1: Multilineage potential of Adult Mesenchymal Stem Cells



To facilitate reproducible and consistent evaluation of mesenchymal cell potential and research, Trevigen<sup>®</sup> has a line of products focused on rat mesenchymal stem cells, that includes cells, media, serum and differentiation reagents.

**Products:**

- |             |   |
|-------------|---|
| 5000-001-01 | Rat Mesenchymal Stem Cells                                    |
| 5000-001-K  | Rat Mesenchymal Stem Cell Starter Kit                         |
| 5000-001-R  | Rat Mesenchymal Stem Cell Replenisher Kit                     |
| 5010-024-K  | Adipogenic Differentiation Kit for Rat Mesenchymal Stem Cells |
| 5011-024-K  | Osteogenic Differentiation Kit for Rat Mesenchymal Stem Cells |

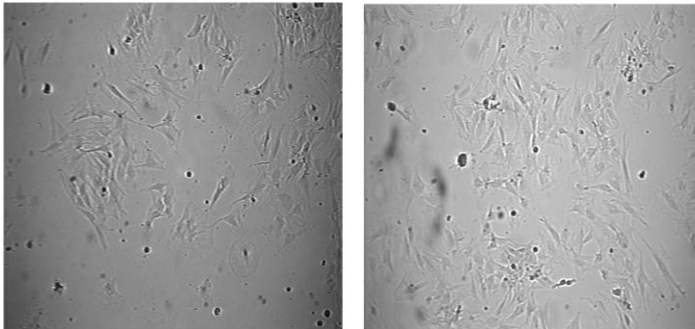
Trevigen, Inc. • 8405 Helgerman Court • Gaithersburg, MD 20877  
 Phone: 301-216-2800 • Fax: 301-560-4973  
 e-mail: [info@trevigen.com](mailto:info@trevigen.com) • [www.trevigen.com](http://www.trevigen.com)  
 ORDERS: 1-800-TREVIGEN/1-800-873-8443

## Rat Mesenchymal Stem Cells:

### Specification:

- Isolated from Bone Marrow Adult Male Fisher 344 Rat
- Isolated by Adherence to plastic
- Contain less than 1% contaminating hematopoietic cells
  - Positive for Mesenchymal Markers CD90 and CD29
  - Negative for Hematopoietic Markers: CD11b and CD45  
(Determined by Flow cytometry)
- Have similar properties as human mesenchymal stem cells in vitro, but express different cell surface markers
- Can undergo 10 doubling
- Cells provided at Passage 3
- Frozen Vial of  $1 \times 10^6$  Cells
- Can be purchased with qualified serum and FBS or alone

Figure 2: P3 Rat Mesenchymal Stem under Bright Field (10X Mag)



Rat Mesenchymal Cells	Cat # 5000-001-01	\$595
Includes:	1 vial of $1 \times 10^6$ cells	
Rat Mesenchymal Start Kit	Cat # 5000-001-K	\$625
Includes:	1 vial of cells of $1 \times 10^6$ cells	
	500 ml of qualified media	
	50 ml of qualified fetal bovine serum	
Rat Mesenchymal Replenisher Kit	Cat # 5000-001-R	\$125
Includes:	500 ml of qualified media	
	50 ml of qualified fetal bovine serum	

## References:

1. Phinney DG AND Prockop DJ 2007. Concise Review: Mesenchymal Stem/Multipotent Stromal Cells: The State of Transdifferentiation and Models of Tissue Repair-Current Views. *Stem Cells* 25: 2896-2902
2. Kolf CM, Cho E, Tuan RS. 2007. Biology of Adult Mesenchymal Stem Cells: Regulation of Niche, Self-Renewal and Differentiation. *Arthritis Research and Therapy* 9(1):204
3. Javazon EH, Colter DC, Schwarz EJ, Prockop DJ. 2001. Rat Marrow Stromal Cells are More Sensitive to Plating Density and Expand More Rapidly from Single-Cell-Derived Colonies than Human Marrow Stromal Cells. *Stem Cells* 19:219-225
4. Li Yi, McIntosh K, Chen J, Zhang C, Gao, Q, Borneman J, Ragniski K, Mitchell J, Shen L, Zhang J, Lu D, Chopp M. Allogeneic bone marrow stromal cells promote glial-axonal remodeling without immunologic sensitization after stroke in rats. *Experimental Neurology* 198(2):313-25.

## Adipogenic Differentiation Kit:

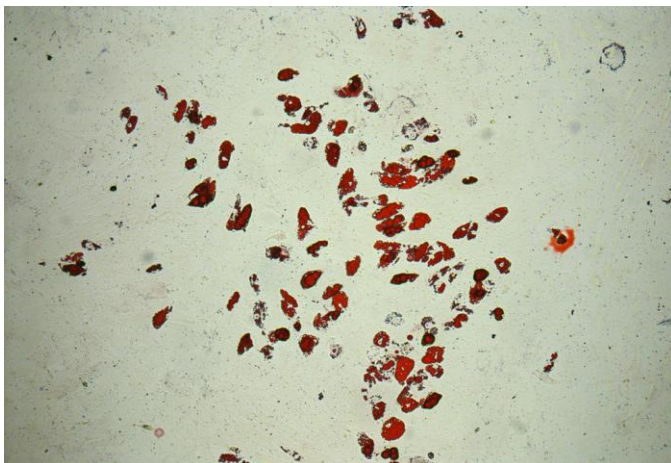
Adipogenesis is the process by which fat is formed.<sup>(5)</sup> Fat formation plays a role in obesity, cardiovascular disease, and metabolic disorders.<sup>(5)</sup> It also has a role in the maintenance of the bone marrow cavity. Adipocytes are derived from mesenchymal stem cells (MSC), which are a self-renewing population of multipotent cells present in bone marrow and many other adult tissues that can differentiate into multiple lineage-specific cells that form bone, fat, cartilage, muscle and tendon.<sup>(1-4)</sup> Differentiation of primary cells, specifically MSC, into adipocytes can be a useful tool for understanding the mechanisms involved in adipogenesis leading eventually to interventions designed to prevent obesity.

### Specifications:

- 24 well format
  - Sufficient reagents to differentiate one 24 well plate
  - Sufficient reagents to stain two 24 well plates
- Optimized traditional methods of adipogenic differentiation <sup>(6)</sup>
  - Utilized media supplemented with:
    - Insulin
    - Isobutyl methyl xanthine (IBMX)
    - Indomethasin
    - Dexamethasone
- Formation of lipid droplets detected with Oil Red O staining
- Adipogenic differentiation occurs in 14-17 days
  - Lipid droplet should be visible within 7 days of differentiation
- Optimized for use with Trevigen<sup>®</sup> Rat MSC (Cat# 5000-001-01) grown in Trevigen qualified medium (Cat# 5000-500-03) supplemented with MSC-qualified FBS (Cat# 5000-050-02)

Figure 2: Bright Field at 10X Magnification

A: Rat MSC grown on Rat Type I Collagen Coated plate for 14 days in adipogenic differentiation medium, fixed and stained with Oil Red O. Lipid droplet formation was present across the entire plate.



B: : Rat MSC grown on a Rat Type I Collagen Coated plate for 14 days in complete growth medium, fixed and stained with Oil Red O. No lipid droplets were present in the culture.



Pricing:

Adipogenic Differentiation Kit:

\$350

Includes:

5010-024-01	Dexamethasone
5010-024-02	IBMX
5010-024-03	Insulin
5010-024-04	Indomethacin
5010-024-05	Oil Red O

References:

5. Phinney DG AND Prockop DJ 2007. Concise Review: Mesenchymal Stem/Multipotent Stromal Cells: The State of Transdifferentiation and Models of Tissue Repair-Current Views. *Stem Cells* 25: 2896-2902
6. Kolf CM, Cho E, Tuan RS. 2007. Biology of Adult Mesenchymal Stem Cells: Regulation of Niche, Self-Renewal and Differentiation. *Arthritis Research and Therapy* 9(1):204
7. Javazon EH, Colter DC, Schwarz EJ, Prockop DJ. 2001. Rat Marrow Stromal Cells are More Sensative to Plating Density and Expand More Rapidly from Single-Cell-Derived Colonies than Human Marrow Stromal Cells. *Stem Cells* 19:219-225
8. Li Yi, McIntosh K, Chen J, Zhang C, Gao, Q, Borneman J, Ragniski K, Mitchell J, Shen L, Zhang J, Lu D, Chopp M. Allogeneic bone marrow stromal cells promote glial-axonal remodeling without immunologic sensitization after stroke in rats. *Experimental Neurology* 198(2):313-25.
9. Kiess W, Petzold S, Topfer M, Garten A, Bluher, Kapellen T, Korner A, Kratzsch J 2008 Adipocytes and Adipose Tissue. *Best Practice and Research Clinical Endocrinology and Metabolism* 22(1): 135-153.
10. Reger RL, Tucker AH, Wolfe MR. 2008. Differentiation and Characterization of Human MSCs. In Prockop DJ, Phinney DG, Bunnell BA (eds) *Methods in Molecular Biology Mesenchymal Stem Cells:Methods and Protocols* vol 449. Humana Press, Totawa, NJ, USA pp 93-107.

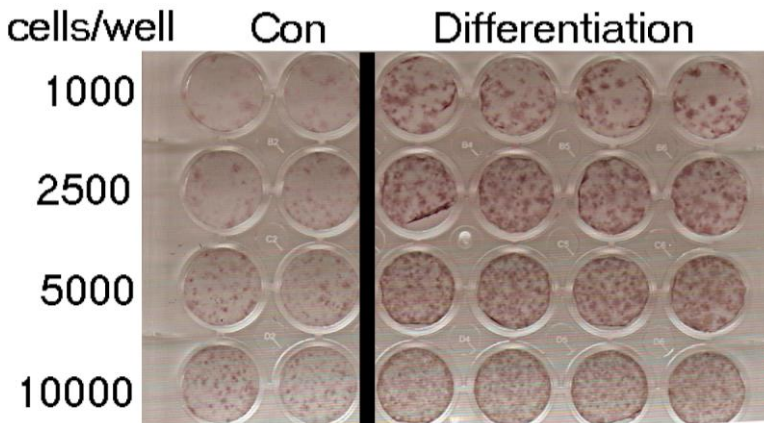
## Osteogenic Differentiation Kit:

Mesenchymal stem cells (MSC) are a self-renewing population of multipotent cells present in bone marrow and many other adult tissues that can differentiate into multiple lineage-specific cells that form bone, fat, cartilage, muscle and tendon.<sup>(1-6)</sup> Osteogenic differentiation of MSC will result in the formation of cells with osteogenic potential<sup>5,6</sup> that can be evaluated by the deposition and mineralization of extracellular matrix.<sup>6,7</sup> The mineralization of extracellular matrix is required for the formation of new bone and measuring the amount of mineralized matrix is an established method for evaluating osteogenic differentiation.<sup>6</sup> Differentiation of mesenchymal stem cells into osteogenic cells can be a useful tool for understanding the mechanisms involved in bone formation and for identifying potential treatments for bone repair and genetic disorders such as osteogenesis imperfecta.<sup>5</sup>

### Specifications:

- 24 well format
  - Sufficient reagents to differentiate one 24 well plate
  - Sufficient reagents to stain two 24 well plates
- Cell grown on Type I Rat Collagen
  - Prevent peeling of mesenchymal stem cells during assay
  - Improve osteogenic differentiation of cells<sup>(7)</sup>
- Assay utilizes standard growth media supplemented with
  - Ascorbic Acid
  - $\beta$ -glycerol phosphate
  - Dexamethasone
- Deposit of mineralized matrix detected by staining with Alizarin Red S
- Ability to quantify alizarin red stain as a relative measure of osteogenic differentiation
- Osteogenic differentiation occurs in 14 days
- Optimized for use with Trevigen<sup>®</sup> Rat MSC (Cat# 5000-001-01) grown in Trevigen qualified medium (Cat# 5000-500-03) supplemented with MSC-qualified FBS (Cat# 5000-050-02)

Figure 2: Rat MSC grown on Rat Type I Collagen Coated plate for 14 days in osteogenic differentiation medium, fixed and stained with Alizarin Red S



Pricing:

Osteogenic Differentiation Kit

\$395

Includes:

5010-024-01	Dexamethasone
5011-024-01	Ascorbic Acid
5011-024-02	$\beta$ -glycerol phosphate
3440-001-01	Rat Collagen-I
5011-024-03	Alizarin Red S
5011-024-04	Stain Solubilization Solution

References:

11. Phinney DG AND Prockop DJ 2007. Concise Review: Mesenchymal Stem/Multipotent Stromal Cells: The State of Transdifferentiation and Models of Tissue Repair-Current Views. *Stem Cells* 25: 2896-2902
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15. Li F, Wang, X, Niyibizi C 2007. *Distribution of Single-Cell Expanded Marrow Derived Progenitors in a Developing Mouse Model of Osteogenesis Imperfecta Following Systemic Treatment*. *Stem Cells*. 25:3183-3193.
16. Reger RL, Tucker AH, Wolfe MR. 2008. Differentiation and Characterization of Human MSCs. In Prockop DJ, Phinney DG, Bunnell BA (eds) *Methods in Molecular Biology Mesenchymal Stem Cells: Methods and Protocols* vol 449. Humana Press, Totawa, NJ, USA pp 93-107.
17. Salaszyk RM, Williams WA, Boskey A, Batorsky A, Plopper GE. 2004. *Adhesion to Vitronectin and Collagen I Promotes Osteogenic Differentiation of Human Mesenchymal Stem Cells*. *J. Biomedicine and Biotechnology*. 2004:1 24-34.

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