



# Transfecting Plasmid DNA into Human Mesenchymal Stem Cells (hMSC) Using Lipofectamine™ LTX Reagent

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## Introduction

Lipofectamine™ LTX Reagent is a proprietary, animal-origin free formulation for the transfection of DNA into eukaryotic cells with **low cytotoxicity**. This reference provides a recommended procedure to transfect plasmid DNA into primary human mesenchymal stem cells (hMSC) using Lipofectamine™ LTX Reagent (Cat. No. 15338-100).

## Important Guidelines for Transfection

Follow these important guidelines when transfecting DNA into hMSC using Lipofectamine™ LTX Reagent:

- The addition of antibiotics to media during transfection may result in cell death, and has not been tested for hMSC. If you wish to use antibiotics during transfection, test your conditions thoroughly.
- Maintain the same seeding conditions between experiments. Use low-passage cells; make sure that cells are healthy and greater than 90% viable before transfection.
- Transfection can be performed both in the presence or absence of serum. Test serum-free media for compatibility with Lipofectamine™ LTX Reagent.
- Using PLUS™ Reagent (Cat. No. 11514-015) enhances transfection performance in hMSC.
- We recommend Opti-MEM® I Reduced Serum Medium (Cat. No. 31985-062) to dilute the DNA and Lipofectamine™ LTX Reagent before complexing.
- Visit [www.invitrogen.com/transfection](http://www.invitrogen.com/transfection) or contact Technical Support for other specialized transfection protocols (including cell-type specific advice on use of PLUS™ Reagent and antibiotics, and a protocol for vector-based RNAi).
- Lipofectamine™ LTX Reagent performs well with vector-based RNAi experiments. For siRNA and Stealth™ RNAi transfections, we recommend Lipofectamine™ RNAiMAX (Cat. No. 13778-075). Go to [www.invitrogen.com/RNAi](http://www.invitrogen.com/RNAi) or contact Technical Support for more information.

## Materials Needed

- hMSC maintained in MSC media consisting of D-MEM, Low Glucose (Cat. No 11054) supplemented with 1X GlutaMax™-1 (Cat. No. 35050), 10% fetal bovine serum (Cat. No. 16000-044) and 5 µg/ml Gentamicin (Cat No. 10131). Grow cells at 37°C with 5% CO<sub>2</sub>.
- Plasmid DNA of interest (100 ng/µl or higher)
- Lipofectamine™ LTX Reagent (store at 4°C until use), and PLUS™ Reagent (if desired; store at 4°C)
- Opti-MEM® I Reduced Serum Medium
- Appropriate tissue culture plates and supplies

## Transfecting hMSC Cells

Use this procedure to transfect plasmid DNA into hMSC in a **24-well format** (for other formats, see **Scaling Up or Down Transfections**, below). All amounts and volumes are given on a per well basis.

1. Cells previously isolated from donated human bone marrow were thawed and used to seed a T-75 culture flask. Media was exchanged every 3–4 days until the cells reached 80% confluency. Cells were dislodged with TrypLE™ and used to seed one well of a 24-well plate in 0.5 ml of complete growth medium. Cell density should be 50–80% confluent on the day of transfection.
2. For each well of cells to be transfected, dilute 0.5 µg of DNA into 100 µl of Opti-MEM® I Reduced Serum Medium without serum.
3. If using PLUS™ Reagent: Mix PLUS™ Reagent gently before use, then add 0.5 µl PLUS™ Reagent (a 1:1 ratio to DNA) directly to the diluted DNA. Mix gently and incubate for 5–15 minutes at room temperature.
4. **Optional:** On the day of transfection remove growth medium from cells and replace with 0.5 ml of hMSC media.
5. For each well of cells, dilute 2.25–3.25 µl of Lipofectamine™ LTX into the above diluted DNA solution, mix gently and incubate for 25 minutes at room temperature to form DNA-Lipofectamine™ LTX complexes.
6. Remove growth medium from cells and replace with 0.5 ml of complete growth medium. Add 100 µl of the DNA-Lipofectamine™ LTX complexes directly to each well containing cells and mix gently by rocking the plate back and forth.
7. Complexes do not have to be removed following transfection. Incubate the cells at 37°C in a CO<sub>2</sub> incubator for 18–24 hours post-transfection before assaying for transgene expression.

## Scaling Up or Down Transfections

To transfect hMSC cells in different tissue culture formats, vary the amounts of Lipofectamine™ LTX Reagent, DNA, cells, medium and PLUS™ Reagent used in proportion to the relative surface area, as shown in the table (amounts given on a per well basis).

Culture vessel	Surface area per well <sup>1</sup>	Volume plating medium	Volume dilution medium <sup>2</sup>	DNA	Lipofectamine™ LTX Reagent	PLUS™ Reagent
96-well	0.3 cm <sup>2</sup>	100 µl	20 µl	100 ng	0.45–0.65 µl	0.1 µl
48-well	1 cm <sup>2</sup>	200 µl	40 µl	200 ng	0.9–1.3 µl	0.2 µl
24-well	2 cm <sup>2</sup>	500 µl	100 µl	500 ng	2.25–3.25 µl	0.5 µl
12-well	4 cm <sup>2</sup>	1 ml	200 µl	1 µg	4.5–6.5 µl	1.0 µl
6-well	10 cm <sup>2</sup>	2 ml	500 µl	2.5 µg	11.25–16.25 µl	2.5 µl

<sup>1</sup>Surface area may vary depending on the manufacturer.

<sup>2</sup>If the volume of Lipofectamine™ LTX Reagent is too small to dispense accurately, and you cannot pool dilutions, predilute Lipofectamine™ LTX Reagent 10-fold in Opti-MEM® I Reduced Serum Medium, and dispense a 10-fold higher amount (should be at least 1.0 µl per well). Discard any unused diluted Lipofectamine™ LTX Reagent.

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