



## Achieve **99% Transfection Efficiency** In a Single Stroke



With Lipofectamine™ 2000 Reagent, you'll get:

- High transfection efficiencies and high protein expression levels
- Easy transfection of a wide range of cell types
- Optimized protocols for high-throughput applications

# Successful Transfection Every Time



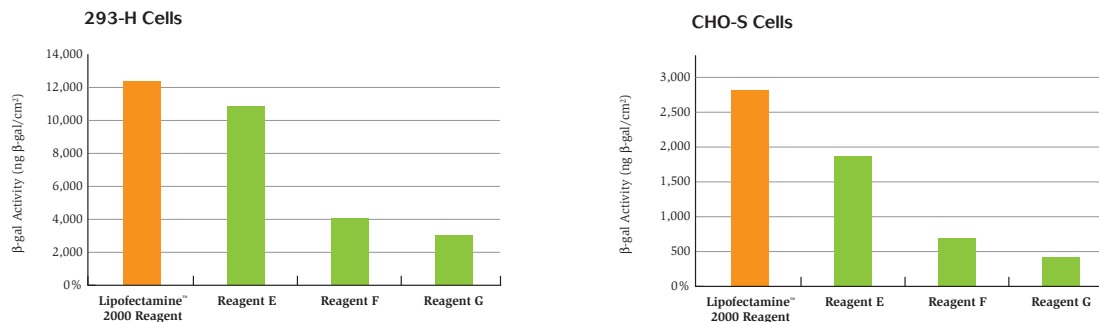
Achieve transfection success at every shot. With Lipofectamine™ 2000, you'll get the highest transfection efficiencies and protein expression levels possible. This cationic lipid surpasses all other reagents for efficient gene delivery and expression in the widest variety of mammalian cell types.

## Transfection power

Transfection reagents provide a simple yet powerful tool to introduce DNA into mammalian cells for expression of protein. Of all transfection reagents, Lipofectamine™ 2000 enables you to achieve the highest transfection efficiencies and protein expression levels possible in the widest variety of mammalian cell types (Figure 1) and with minimal

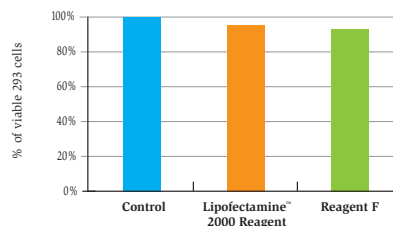
effect on cell viability (Figure 2). With fast, easy-to-use protocols, you'll save time and can even extend your transfection success to high-throughput applications.

**Figure 1 - Expression results achieved with Lipofectamine™ 2000 versus other reagents**



β-galactosidase activity in cell lines transfected with pCMV•SPORT-βgal DNA using Lipofectamine™ 2000 Reagent or other commercially available transfection reagents.

**Figure 2 - Post transfection cell viability**



293-H cells were transfected following the protocol provided with each reagent with pCMV•SPORT-βgal. Cells were stained 24 hours post transfection with trypan blue. Percentage of white cells is reported.

## Unmatched versatility, high efficiency

With transfection success across multiple cell lines, Lipofectamine™ 2000 gives you the most versatile route to efficient gene delivery and protein expression (Table 1). You'll get the high efficiency you need in whatever cell line you

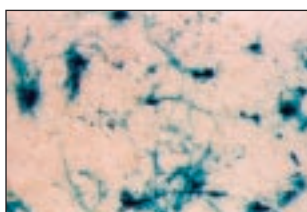
need to work with. High efficiency in even hard-to-transfect cells such as primary neurons (Figure 3)(1) means that you, not your transfection reagent, choose which cells to use for your experiments.

**Table 1 - Partial list\* of cell lines successfully transfected with Lipofectamine™ 2000 with observed efficiencies**

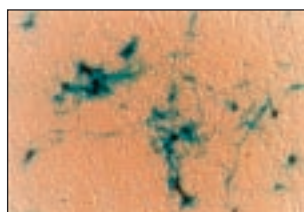
| Cell Line               | Cell Type                | Transfection efficiency (%) |
|-------------------------|--------------------------|-----------------------------|
| 293-F                   | Human kidney             | 99                          |
| 293-H                   | Human kidney             | 99                          |
| CHO-S                   | Hamster ovary            | 96                          |
| COS-7L                  | Monkey kidney            | 99                          |
| BE(2)C                  | Human neuroblastoma      | 77                          |
| SKBR3                   | Human breast cancer      | 49                          |
| MDCK                    | Dog kidney               | 43                          |
| HT1080                  | Human fibrosarcoma       | 81                          |
| Human fibroblasts       | Primary passaged         | 48                          |
| HeLa                    | Human cervical carcinoma | 94                          |
| CV-1                    | Monkey kidney            | 70                          |
| Vero                    | Monkey kidney            | 86                          |
| PC12                    | Rat pheochromocytoma     | 85                          |
| Murine ES               | Mouse embryonic stem     | 75                          |
| Rat Hepatocytes         | Primary liver            | 50                          |
| E18 Cortical Neurons    | Rat primary              | 25                          |
| E18 Hippocampal Neurons | Rat primary              | 30                          |

\* Additional cell lines available at [www.invitrogen.com](http://www.invitrogen.com)

**Figure 3 - Transfection of difficult-to-transfect cells with Lipofectamine™ 2000**



**Hippocampal neurons**



**Cortical neurons**

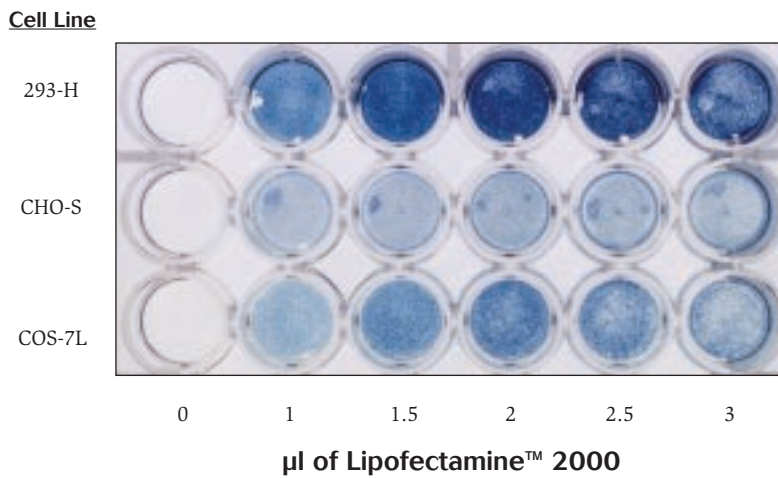
E18 rat neurons transfected using Lipofectamine™ 2000 with pCMV•SPORT-βgal plasmid on day 4 after plating. Cells were stained for β-gal activity 24 hours after transfection and plates were scored 24 hours following staining.

## Higher activity **saves you money**

Save money while getting the best transfection possible. Because of its high transfection efficiency (Figure 4)(2,3), Lipofectamine™ 2000 is also cost-effective. When you use Lipofectamine™ 2000, you'll use less transfection reagent per reaction than you

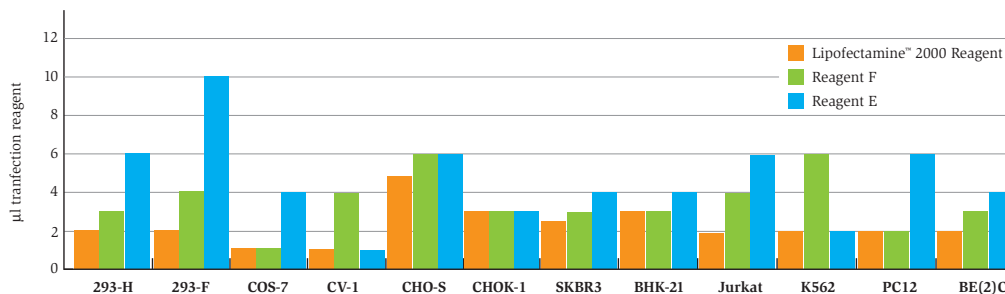
would with other transfection reagents (Figure 5), resulting in significant savings. Just 1.5 ml of Lipofectamine™ 2000 Reagent is sufficient for 500 to 1,000 transfections in 24-well plates, or 100-200 transfections using 6-well plates.

**Figure 4 - High-efficiency transfection of common cell lines with varying volumes of Lipofectamine™ 2000**



Cells were plated in a 24-well plate one day prior to transfection as follows: 293-H at a density of  $2 \times 10^5$ , CHO-S at  $1.5 \times 10^5$ , and COS-7L at  $8 \times 10^4$  cells per well resulting in cultures that were 90-95% confluent on the day of transfection. Cells were transfected with the volume of Lipofectamine™ 2000 indicated and 0.8 µg of pCMV•SPORT-βgal. Cells were stained with X-gal 24 hours after the addition of Lipofectamine™ 2000:DNA complexes.

**Figure 5 - Volumes of various transfection reagents required for peak activity**



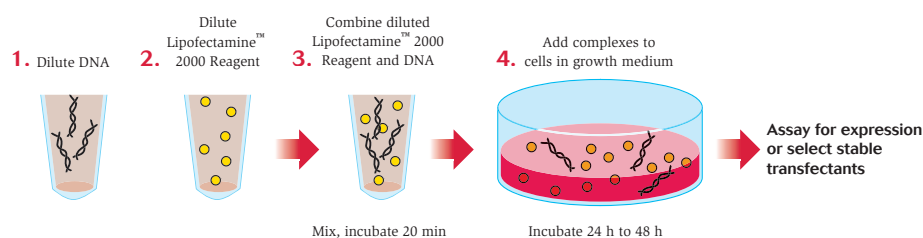
Transfections were performed in 24 well plates according to manufacturer's recommended conditions. Data shown is the amount of reagent used to obtain the maximal expression of β-gal following transient transfection of pCMV•SPORT-βgal.

## Transfection made fast and easy

With Lipofectamine™ 2000's rapid, simple protocol (Figure 6) you'll spend your time getting results, not optimizing transfection conditions. Just mix Lipofectamine™ 2000 with DNA, add to cells, and you're finished. Transfect with or without serum. There are no washes and no media changes to slow

your research. Complete protocols describing required amounts of cells, Lipofectamine™ 2000 Reagent, and DNA for common cell lines are included with the product. Guides for easy transfection of not-so-common cell lines are also available at [www.invitrogen.com/lipofectamine2000](http://www.invitrogen.com/lipofectamine2000).

**Figure 6 - Outline of transfection procedure for Lipofectamine™ 2000 Reagent**

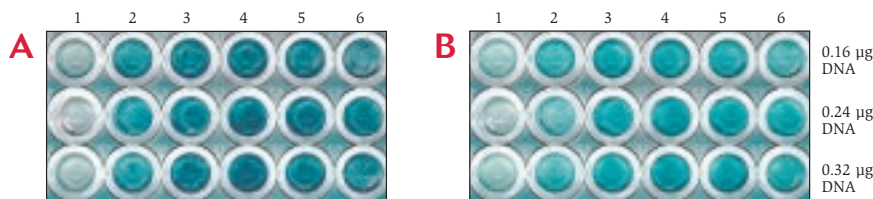


## Ideal for high-throughput applications

The simple, rapid protocol and high transfection efficiency of Lipofectamine™ 2000 make it ideal for high-throughput transfections for transient protein expression and cDNA library screening (Figure 7)(4). The high performance of Lipofectamine™ 2000 will give you the large signal-to-noise ratio needed for today's

cell-based assays. Transfection conditions can be easily established for automated or robotic systems. For multi-well plate formats, you can plate cells and transfect simultaneously, cutting 24 hours off the standard transfection protocol.

**Figure 7 - Transfection using the short protocol for 96-well plates**



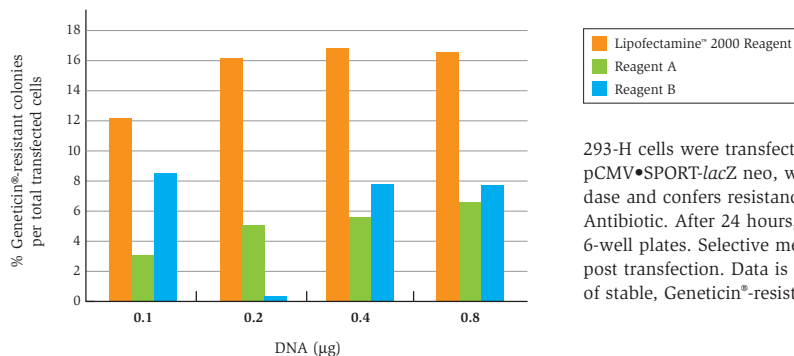
CHO-S cells were transfected with pCMV•SPORT-βgal DNA (0.16 µg to 0.32 µg) and Lipofectamine™ 2000 Reagent (0.2 µl to 1.2 µl, columns 1-6 respectively) in 96-well plates. After 24 hours, cells were stained with X-gal. **Panel A:** Cells ( $2 \times 10^4$ ) were plated the day before transfection in growth medium containing serum. **Panel B:** The day of transfection, cells were trypsinized, counted, and  $5 \times 10^4$  cells were added directly to the wells containing the complexes.

## Reliable stable expression

Lipofectamine™ 2000 provides a reliable means to establish stable cell lines with integrated copies of your DNA of interest. You'll get high frequencies of stable integration (Figure 8) allowing you to produce multiple clones. This allows you to more easily choose a cell line with the growth and

expression characteristics that match your experimental needs. The resulting cell lines are invaluable for large-scale protein production, long-term functional studies, or development of transgenic organisms.

**Figure 8 - Stable transfection of 293-H cells**



293-H cells were transfected in 24-well plates with pCMV•SPORT-lacZ neo, which expresses β-galactosidase and confers resistance to Geneticin® Selective Antibiotic. After 24 hours, cells were subcultured into 6-well plates. Selective medium was added 48 hours post transfection. Data is expressed as the frequency of stable, Geneticin®-resistant colonies.

## Superior transfection results

For superior transfection results, choose Lipofectamine™ 2000. You'll achieve the highest transfection efficiencies and expression levels

with all cell types. Call Invitrogen or contact your account manager to inquire about special packaging to meet any experimental need\*. Order today.

| Product                     | Size    | Cat. no.  |
|-----------------------------|---------|-----------|
| Lipofectamine™ 2000 Reagent | 0.75 ml | 11668-027 |
|                             | 1.5 ml  | 11668-019 |

\*Minimum order required.

### References:

- Ohki, E. *et al.* (2001) *J Neurosci. Methods* **112**: 95-99.
- Ciccarone, V. *et al.* (1999) *Focus*® **21**: 54-55.
- Roy, L. *et al.* (1999) *Focus*® **21**: 62-63.
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