

## Efficient Functional Protein Delivery

BioPORTER is the first and only lipid-based protein delivery system that efficiently transports proteins into living cells.<sup>1</sup> It is a unique cationic lipid mixture that interacts non-covalently with the protein, creating a protective vehicle for immediate protein delivery. BioPORTER makes studying protein functionality faster and easier than ever before by bypassing the traditional DNA transfection, transcription, and protein translation processes.

### The Power of BioPORTER.

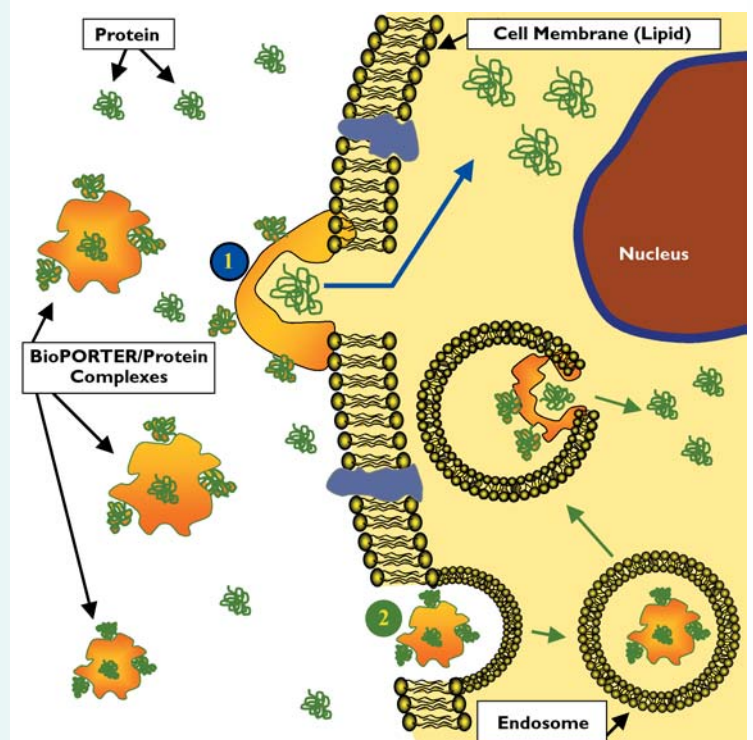
Once the positively charged BioPORTER/protein complexes are applied to cells, they attached to the negatively charged cell surface. The BioPORTER reagent fuses directly with the plasma membrane and the captured protein is internalized into the cell, or alternatively, the BioPORTER/protein complexes are endocytosed and fuse with the endosome, releasing the captured protein into the cytoplasm (figure 1). Because of its simple delivery mechanism and because there's no fusion partner or covalent bond formation, BioPORTER can efficiently deliver functionally active proteins into a wide range of cell types.



*We have successfully used the BioPORTER reagent to study the molecular mechanism of apoptosis and we are using it to investigate host/pathogen relationships. BioPORTER reagent is a new and powerful tool in the functional genomics arsenal.*

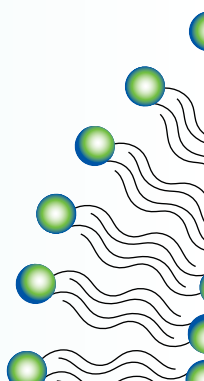
**Genomics Core Laboratory**  
Univ. of California at San Diego

**Figure 1. BioPORTER-mediated Protein Delivery Process**



*"Thanks to the BioPORTER reagent, we are quickly getting into a very exciting phase of apoptosis research."*

**Dr. John C. Reed**  
Burnham Institute

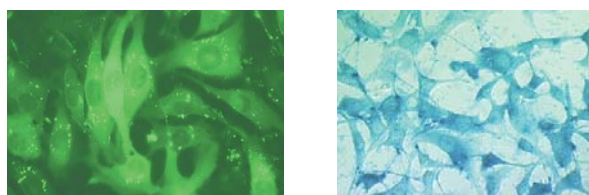


# Robust Performance in Diverse Cell Types

## The Results Say It All

To demonstrate the excellent translocation efficiency that can be achieved using BioPORTER many different proteins were successfully delivered into a variety of cell lines (Table 1, Figure 2). Depending on the protein tested, the efficiency varies from 20 –100% of the cells transduced and up to 50% of the input protein was incorporated into the cells.

**Figure 2. FITC-Antibody or  $\beta$ -gal Delivery Into Mouse Fibroblasts**



**A** Antibody/BioPORTER reagent      **B**  $\beta$ -gal/BioPORTER reagent  
FITC-labeled antibody (2  $\mu$ g) or  $\beta$ -gal (0.5  $\mu$ g) were delivered with 2.5  $\mu$ l of BioPORTER reagent into NIH/3T3 cells grown on coverslips in serum free conditions. Cells were examined 4 hours after protein delivery.

## Functionality is key.

When delivering proteins with BioPORTER protein delivery reagent there's no fusion partner or covalent bond formation, allowing the translocated protein to remain functionally intact. To demonstrate, active recombinant human caspase-3 and granzyme-B were delivered into Ki-Ras 267  $\beta$ 1 prostate cancer cells using BioPORTER. Figure 3 shows that both proteins are functionally active after delivery and can successfully induce apoptosis. For studies in which protein functionality is key, such as apoptosis, cell cycle control, and protein complementation, BioPORTER has proven to be an easy and effective tool.

**Table 1. Examples of Proteins and Cell Lines Successfully Tested with BioPORTER Reagent**

### Proteins delivered

Fluorescently labeled antibodies  
High MW dextran  
Low MW dextran  
Phycoerythrin-BSA (MW 300 kD)  
Caspase 3  
Caspase 8  
Granzyme B  
 $\beta$ -galactosidase

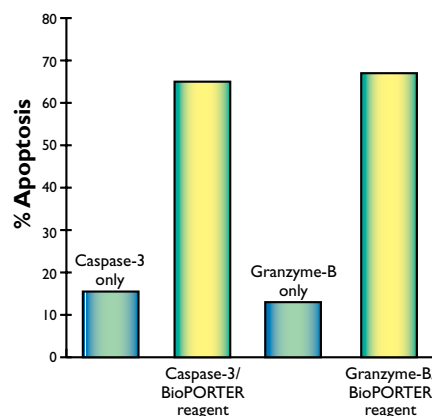
### Cell lines tested

HeLa-S3  
COS-7  
BHK-21  
B16-F0  
Acute Myelocytic leukemia  
CHO-K1  
293  
MDCK  
COS-1  
RAW macrophage  
NIH-3T3  
Jurkat  
P19  
CV-1  
Ki-Ras 267  $\beta$ 1  
Chronic myelocytic leukemia

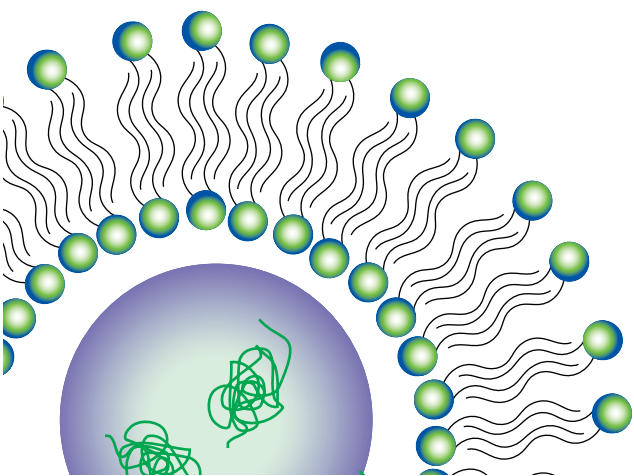
**Table 2. Applications using BioPORTER Protein Delivery Reagent**

- Apoptosis
- Cell cycle control
- Protein localization
- Transcriptional regulation
- Intracellular signal pathways
- Peptide library screening
- Expression monitoring
- Protein complementation

**Figure 3. Functional Apoptotic Protein Delivery in Ki-Ras 267 Cells**



Granzyme B (450 ng) or Caspase-3 (3.3 ng) were added to Ki-Ras 267 cells (prostate cancer) with or without BioPORTER reagent. 24 hours after protein delivery, cells were directly analyzed for apoptosis by flow cytometry using an Annexin V-FITC assay kit.



## Easy-to-use System.

Figure 4 shows the protocol for using BioPORTER. Simply add the protein solution to a tube containing a dry film of BioPORTER reagent, incubate for 5 minutes, add the serum free medium, and you are ready to apply the mixture to cells for protein delivery. It's that easy.

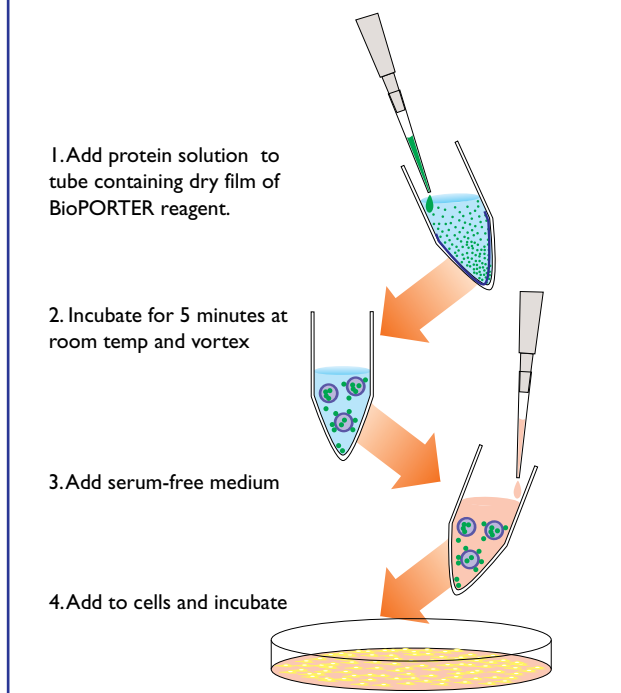
## Single Use or High Throughput.

For maximum speed and convenience, use the new BioPORTER QuikEase™ Kit (Figure 5). Each QuikEase kit contains 96 single-reaction size vials that are pre-coated with BioPORTER reagent. You can either separate each vial for single use or use the entire pack for high-throughput experiments. The BioPORTER QuikEase kit provides hours of time savings because you don't need to coat BioPORTER reagent onto the vials.

Figure 5. BioPORTER QuikEase Kit



Figure 4. How to use BioPORTER



## Ordering Information

Speed up your protein functionality studies with BioPORTER. Call and order BioPORTER today.

### BioPORTER QuikEase Kit

Quantity  
24 pre-coated single-use vials  
96 pre-coated single-use vials

Catalog no.  
BP502424  
BP509696

### BioPORTER Protein Delivery Reagent

Quantity  
24 reactions  
96 reactions

Catalog no.  
BP502401  
BP509604

## Orders: 888-428-0558

Fax: 858-623-9494

10190 Telesis Court, San Diego, CA 92121, USA

For more information visit the Gene Therapy Systems web site @  
<http://www.genetherapysystems.com>

1. Zelphati, O *et al* (2001) Paper in press: *J. Biol Chem.* published on July 10, 2001 as manuscript M104920200

\* Patents pending

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