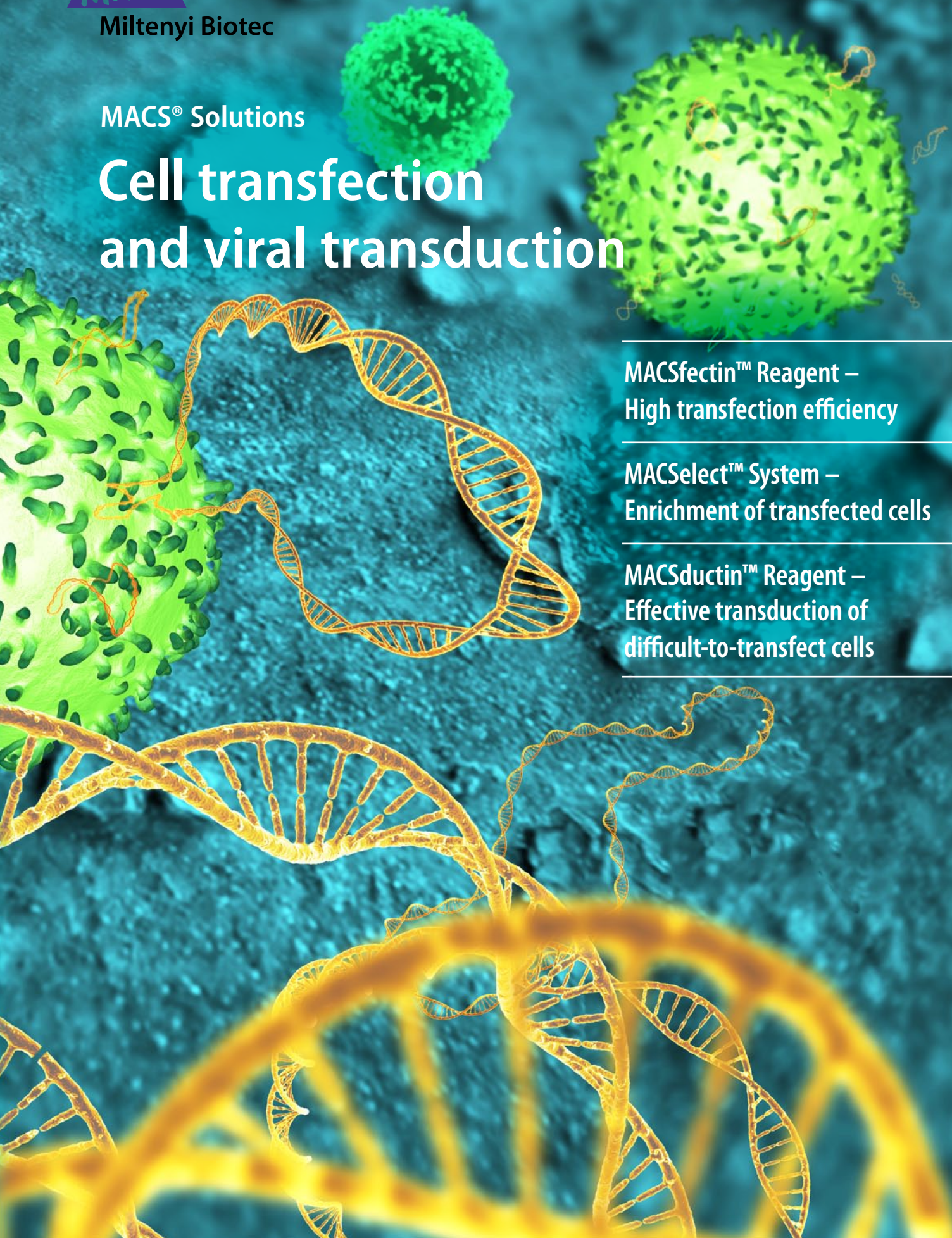
Miltenyi Biotec

MACS® Solutions

Cell transfection and viral transduction



MACSfectin™ Reagent – High transfection efficiency

MACSelect™ System – Enrichment of transfected cells

MACSductin™ Reagent – Effective transduction of difficult-to-transfect cells

MACSfectin™ Reagent

For efficient transfection with high cell viability

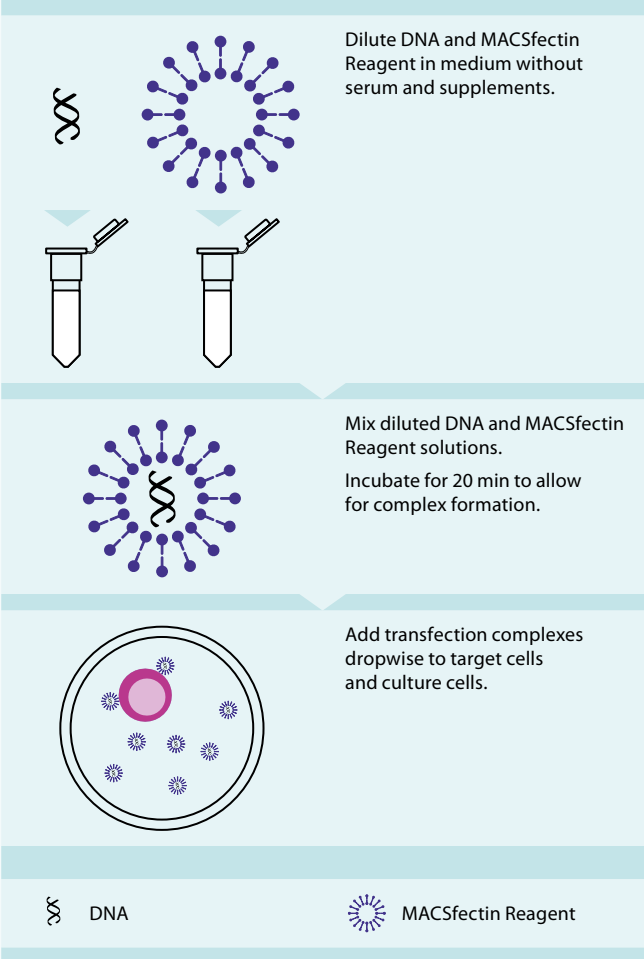


Figure 2: Overview of MACSfectin Reagent transfection protocol.

MACSfectin™ Reagent enables optimized transfection of plasmid DNA for a wide range of adherent and suspension cells in immunology, cancer, stem cell, and neuroscience research. Additionally, MACSfectin Reagent supports tranfection with RNA such as mRNA or siRNA.

This unique transfection reagent is based on a novel class of cationic lipopolyamines designed to optimize nucleic acid condensation and augment the cytoplasmic release of the nucleic acid cargo. Additionally, good transgene expression with high cell viability is achieved due to MACSfectin Reagent's excellent biodegradation characteristics.

- **Efficient:** Higher transfection efficiency than standard lipid transfection reagents
- **Versatile:** Transfection of plasmid DNA, mRNA, siRNA
- **Reliable:** Successfully tested in over 30 cell types, including mouse embryonic stem cells
- **Non-toxic:** Maintains high cell viability

MACSfectin Reagent complements Miltenyi Biotec's transfection portfolio and Stemgent transfection reagents distributed by Miltenyi Biotec.

Visit **www.miltenyibiotec.com/transfection_transduction** for more information.

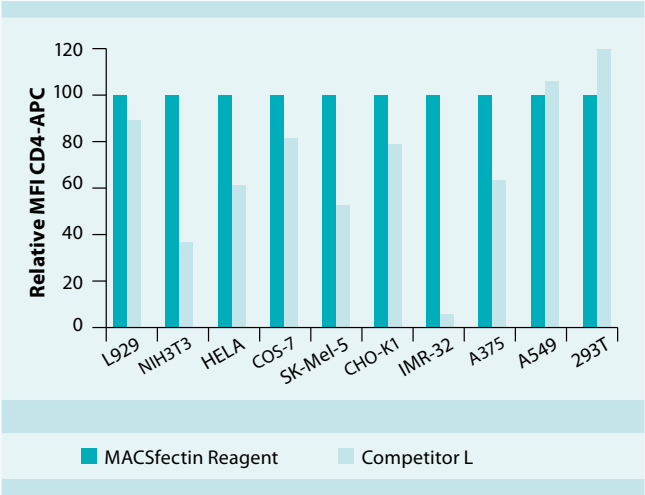


Figure 1: Efficient transfection with MACSfectin Reagent
Ten adherent cell lines were transfected with a plasmid expressing cell surface human CD4 with MACSfectin Reagent or a competitor product using standard transfection conditions. The number of transfected cells was assessed 48 hours post-transfection by staining with CD4-APC and performing flow cytometric analysis using a MACSQuant® Analyzer. The mean fluorescence intensity (MFI) value of cells transfected with MACSfectin Reagent was set to 100% for comparison with the competitor product.

MACSelect™ System

For selective enrichment of transfected cells

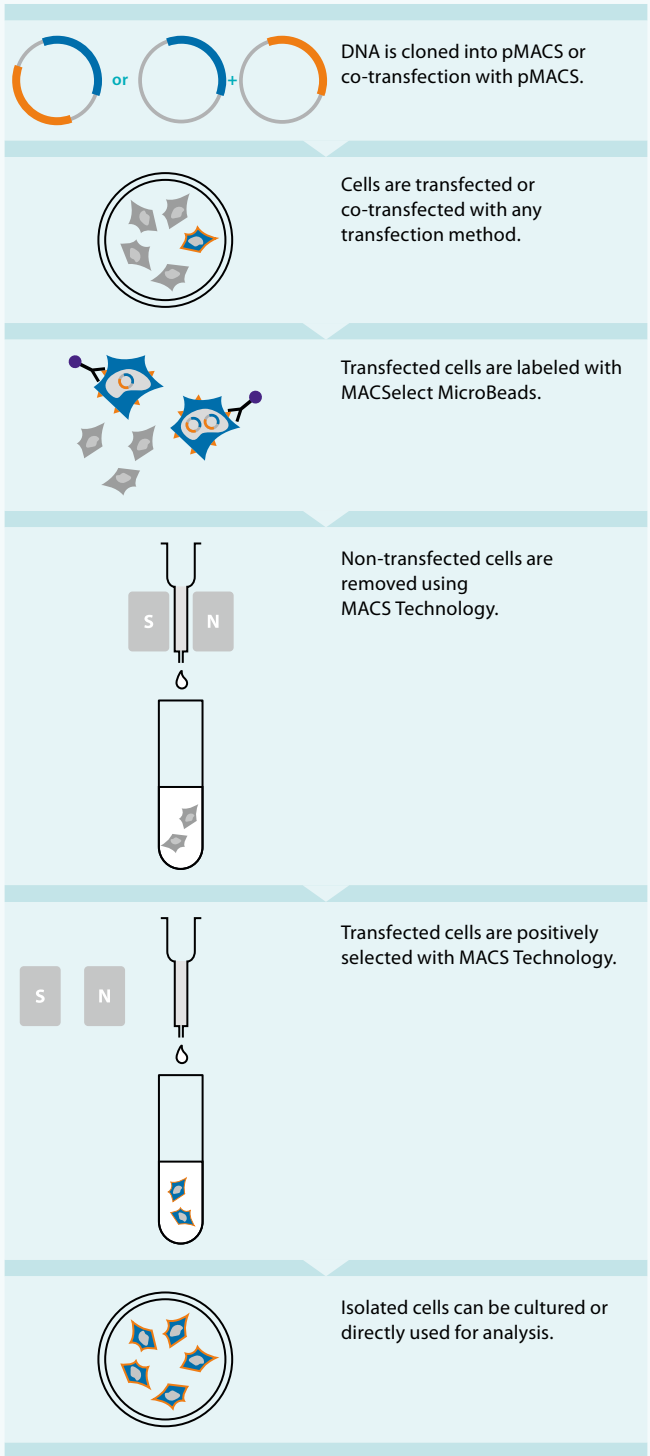


Figure 3: Principle of the enrichment of transfected cells using the MACSelect System.

The MACSelect™ System provides an effective method for cell enrichment after transient transfection for virtually all adherent or suspension cell lines and primary cells.

This system uses the transiently expressed truncated human CD4 molecule, mouse MHC class I H-2K^k, and human low-affinity nerve growth factor receptor (LNGFR) as surface markers to select transfected cells.

- **Fast:** Avoid stable cell transfection and antibiotic selection
- **Efficient:** 50-fold enrichment of transfected cells
- **Versatile:** Compatible with MACSfectin™ Reagent and other transfections methods

The MACSelect System has been widely applied in immunology, cancer, stem cell, and neuroscience research and can be used with common transfection methods.

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"As monitored by flow cytometry and luciferase assay, three round of magnetic cell sorting (MACS) yielded ≥90% CD4t-positive cells … luciferase expression was uniformly high and stable over a test period of three months … Thus, pIRES-CD4t should prove useful in the direct and rapid selection of relevant stably or transiently transfected cells."

Gaines, P. *et al.* (1999) Biotechniques, 26: 683–688.

Selected references

MacCorkle, R.A. *et al.* (1998) Proc. Natl. Acad. Sci. 95: 3655–3660.
Chen, Q. *et al.* (2001) Blood 98: 2183–2192.
David, R. *et al.* (2005) Stem Cells 23: 477–482.
Uesaka, T. *et al.* (2007) Development 134: 2171–2181.

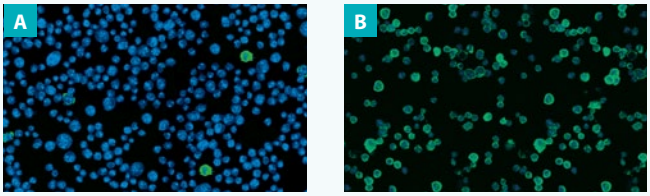


Figure 4: Efficient enrichment of transfected cells using the MACSelect 4 System. CHO cells were transfected with pMACS 4-IRES. II vector. Transfected cells were magnetically labelled and enriched using MACSelect 4 MicroBeads. Cells were fixed either before or after enrichment and stained with CD4-FITC or MACSelect Control FITC antibodies (green), respectively. Cell nuclei were counterstained with Toto 3 (blue). A: Less than 4% of transfected cells before MACSelect enrichment. B: More than 90% of transfected cells after MACSelect enrichment.

MACSductin™ Reagent

For effective transduction of difficult-to-transfect cells

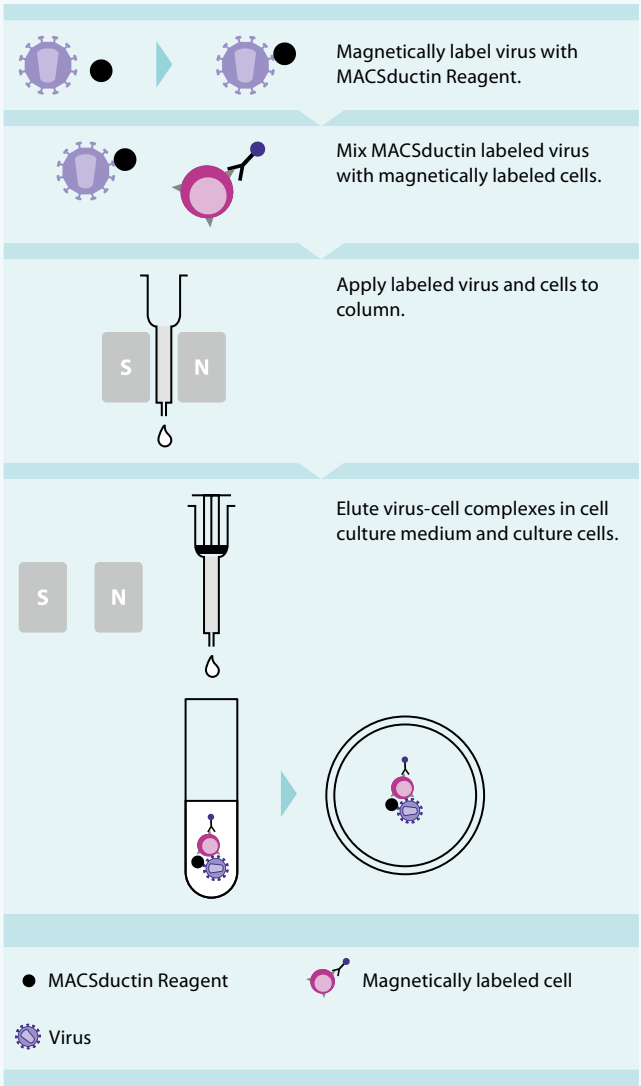


Figure 5: Principle of transduction with MACSductin Reagent and MACS Technology. The MACSductin Reagent binds to the adeno- or retro-/lentivirus. Concurrently, the target cells are specifically labeled with antibody-conjugated, superparamagnetic MACS® MicroBeads. The target cells and virus are retained in close proximity on the column by the magnetic field. Consequently the virus can easily attach to the cell surface, which results in high infection or transduction efficiency.

MACSductin™ Reagent supports transduction of difficult-to-transfect cells, including primary cells and stem cells, using adeno- or retro-/lentiviral vectors.

This polycationic magnetic reagent enables transduction of target cells with low-titer virus preparations with efficiency superior to standard transduction methods. It has been used in immunology, cancer, stem cell, and neuroscience research.

- **Sensitive:** Transduction with low-titer virus particles preparations
- **Efficient:** Maximal concentration of virus near cells for effective transduction
- **Specific:** MACS® Technology ensures specificity in transduction of cells

Visit **www.miltenyibiotec.com/transfection_transduction** for more information.

Selected references

Plank, C. *et al.* (2003) Biol. Chem. 384: 737–747.
Sanchez-Antequera, Y. *et al.* (2011) Blood, 117, 171–181.

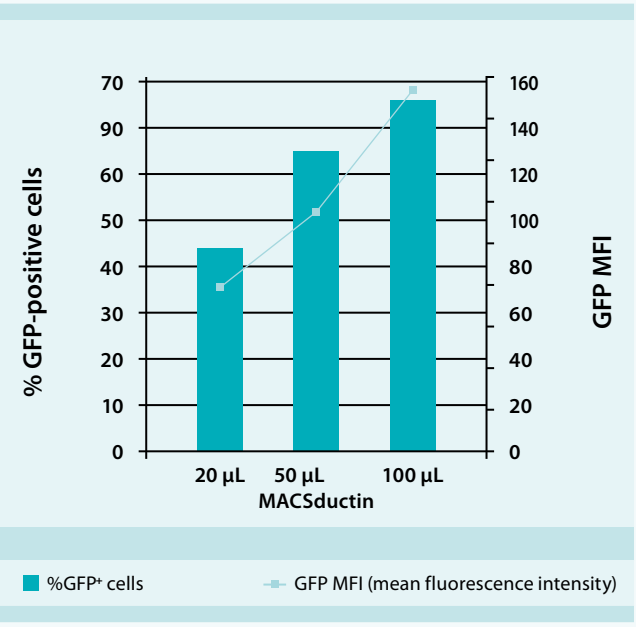
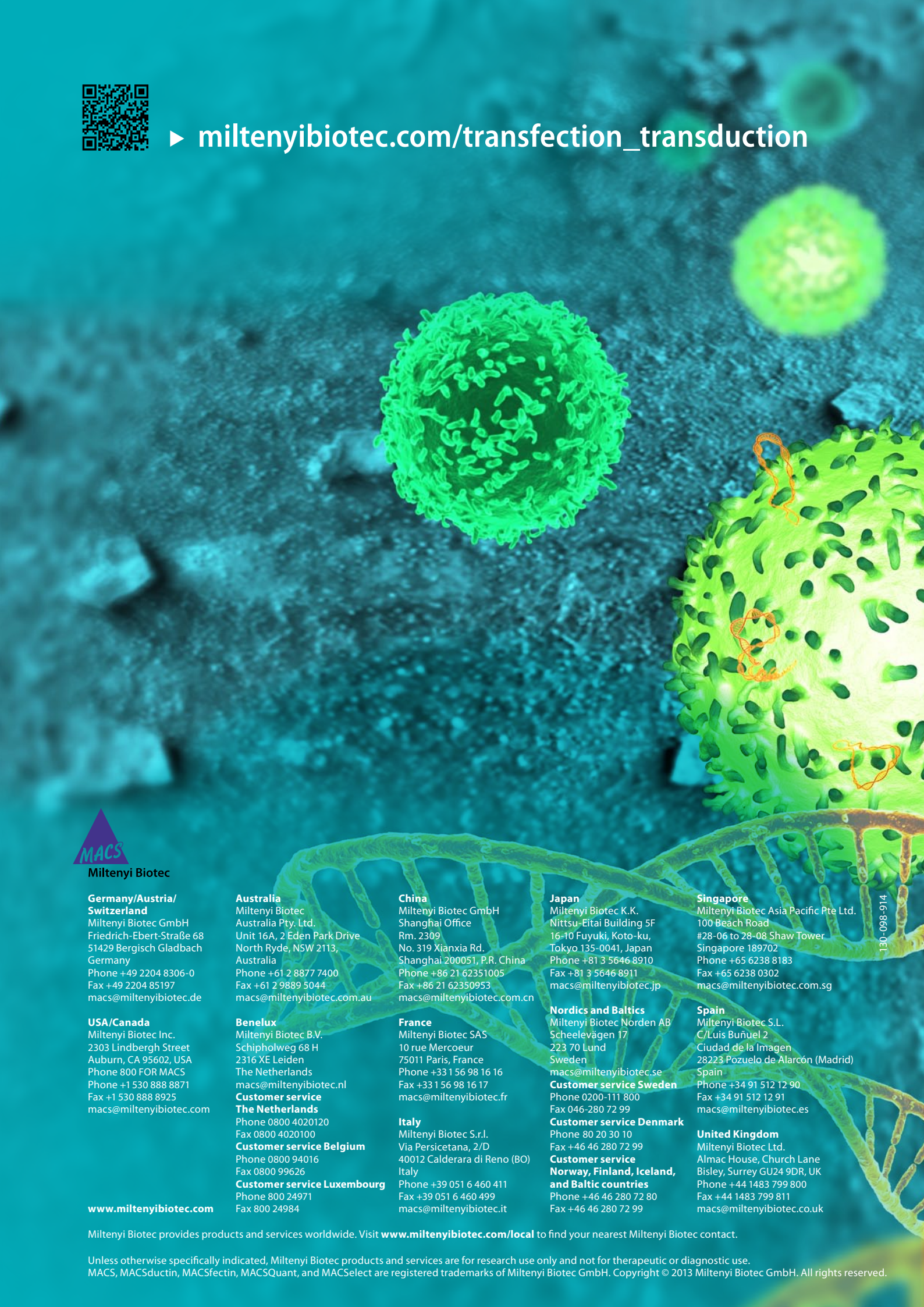


Figure 6: Efficient transduction of primary human CD34+ cells. Primary CD34+ cells were isolated from PBMCs using the CD34 MicroBead Kit, human. Cells were cultured for 24 hours in 24-well plates in supplemented media. Cells labelled with CD34 Microbeads were then transduced in MS Columns with unpurified supernatant containing a GFP-encoding, replication-incompetent SIN lentiviral vector, complexed with different concentrations of MACSductin Reagent. GFP expression of transduced CD34+ cells was measured 48 hours post-transduction in a MACSQuant® Analyzer.

Product overview

Product	Capacity	Components	Order no.
Transfection			
MACSfectin™ Reagent	Up to 500 transfections*	0.5 mL transfection reagent	130-098-410
MACSfectin Reagent	Up to 1000 transfections*	1.0 mL transfection reagent	130-098-411
MACSfectin Reagent	Up to 5000 transfections*	5×1.0 mL transfection reagent	130-098-412
Transfected cell enrichment			
MACSelect™ 4 – Transfected Cell Selection Kit	25 enrichments	25 µg pMACS 4-IRES.II Vector 25 µg pMACS 4.1 Vector 25 µg pMACS 14.1 Control Vector 2 mL MACSelect 4 MicroBeads 0.25 mL MACSelect Control FITC Antibody 0.25 mL CD4-FITC Antibody, human 0.25 mL CD14-FITC Antibody, human	130-091-988
MACSelect K^k – Transfected Cell Selection Kit	25 enrichments	25 µg pMACS K^k.II Vector 25 µg pMACS 14.1 Control Vector 2 mL MACSelect K^k MicroBeads 0.25 mL MACSelect Control FITC Antibody 0.25 mL Anti-H- $2K^k$-FITC Antibody, mouse 0.25 mL CD14-FITC Antibody, human	130-091-986
MACSelect LNGFR – Transfected Cell Selection Kit	25 enrichments	25 µg pMACS LNGFR-IRES Vector 25 µg pMACS LNGFR Vector 25 µg pMACS 14.1 Control Vector 2 mL MACSelect LNGFR MicroBeads 0.25 mL MACSelect Control FITC Antibody 0.25 mL Anti-LNGFR-FITC Antibody, human 0.25 mL CD14-FITC Antibody, human	130-091-879
Transduction			
MACSductin™ Reagent	For transduction of 1×10^7–5×10^8 cells	0.25 mL transduction reagent	130-097-256
MACSductin Reagent	For transduction of 2×10^7–1×10^9 cells	0.5 mL transduction reagent	130-097-257
MACSductin Reagent	For transduction of 6×10^7–3×10^9 cells	3×0.5 mL transduction reagent	130-097-259

*In 24-well plates.



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MACS

Miltenyi Biotec

Germany/Austria/ Switzerland
Miltenyi Biotec GmbH
Friedrich-Ebert-Straße 68
51429 Bergisch Gladbach
Germany
Phone +49 2204 8306-0
Fax +49 2204 85197
macs@miltenyibiotec.de

USA/Canada
Miltenyi Biotec Inc.
2303 Lindbergh Street
Auburn, CA 95602, USA
Phone 800 FOR MACS
Phone +1 530 888 8871
Fax +1 530 888 8925
macs@miltenyibiotec.com

www.miltenyibiotec.com

Australia
Miltenyi Biotec
Australia Pty. Ltd.
Unit 16A, 2 Eden Park Drive
North Ryde, NSW 2113,
Australia
Phone +61 2 8877 7400
Fax +61 2 9889 5044
macs@miltenyibiotec.com.au

Benelux
Miltenyi Biotec B.V.
Schipholweg 68 H
2316 XE Leiden
The Netherlands
macs@miltenyibiotec.nl
Customer service The Netherlands
Phone 0800 4020120
Fax 0800 4020100
Customer service Belgium
Phone 0800 94016
Fax 0800 99626
Customer service Luxembourg
Phone 800 24971
Fax 800 24984

China
Miltenyi Biotec GmbH
Shanghai Office
Rm. 2309
No. 319 Xianxia Rd.
Shanghai 200051, P.R. China
Phone +86 21 62351005
Fax +86 21 62350953
macs@miltenyibiotec.com.cn

France
Miltenyi Biotec SAS
10 rue Mercoeur
75011 Paris, France
Phone +33 1 56 98 16 16
Fax +33 1 56 98 16 17
macs@miltenyibiotec.fr

Italy
Miltenyi Biotec S.r.l.
Via Persicetana, 2/D
40012 Calderara di Reno (BO)
Italy
Phone +39 051 6 460 411
Fax +39 051 6 460 499
macs@miltenyibiotec.it

Japan
Miltenyi Biotec K.K.
Nittsu-Eitai Building 5F
16-10 Fuyuki, Koto-ku,
Tokyo 135-0041, Japan
Phone +81 3 5646 8910
Fax +81 3 5646 8911
macs@miltenyibiotec.jp

Nordics and Baltics
Miltenyi Biotec Norden AB
Scheelevägen 17
223 70 Lund
Sweden
macs@miltenyibiotec.se
Customer service Sweden
Phone 0200-111 800
Fax 046-280 72 99
Customer service Denmark
Phone 80 20 30 10
Fax +46 46 280 72 99
Customer service Norway, Finland, Iceland, and Baltic countries
Phone +46 46 280 72 80
Fax +46 46 280 72 99

Singapore
Miltenyi Biotec Asia Pacific Pte Ltd.
100 Beach Road
#28-06 to 28-08 Shaw Tower
Singapore 189702
Phone +65 6238 8183
Fax +65 6238 0302
macs@miltenyibiotec.com.sg

Spain
Miltenyi Biotec S.L.
C/Luis Buñuel 2
Ciudad de la Imagen
28223 Pozuelo de Alarcón (Madrid)
Spain
Phone +34 91 512 12 90
Fax +34 91 512 12 91
macs@miltenyibiotec.es

United Kingdom
Miltenyi Biotec Ltd.
Almac House, Church Lane
Bisley, Surrey GU24 9DR, UK
Phone +44 1483 799 800
Fax +44 1483 799 811
macs@miltenyibiotec.co.uk

130-098-914

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