DATA SHEET

Jena Bioscience

Penetratin

Cell penetrating peptide for transduction of peptides and proteins into live cells

Cat. No.	Amount
CPP-P01S	0,5 mg

For *in vitro* use only!

Shipping: shipped on blue ice

Storage Conditions: store at -20 °C

Shelf Life: 12 months after date of delivery

Molecular Weight: 2247 Da confirmed by MALDI-MS.

Purity: > 95 % (HPLC)

Form: Synthetic peptide, water soluble powder, contains CF_3COO^- (trifluoro acetate) as counter ion.

Description:
Penetratin is a cell penetrating peptide from the first generation, which is derived from Drosophila Antennapedia Homeodomain. It contains a nuclear localization sequence and facilitates internalization of cargo into living cells. Transport of the cargo requires in most cases the formation of a conjugate or fusion protein. Addition of a 10- to 20-fold excess of free penetratin to these constructs increases rate and efficiency of internalization. In some cases penetratin is able to form non-covalent complexes with the cargo. Penetratin shows only small cytotoxic effects on a number of cell lines (including HeLa, Jurkat, Swiss 3T3, NIH 3T3, NB-4, HT-1080, COS-7 and Leishmania tarentolae) and can used for internalization of proteins, nucleic acids as well as single nucleotides and nucleotide analogs. For cell survival the critical concentration of Penetratin in serum-free transduction medium is in the range of 20 µg/ml at which cell viability and cell membrane integrity are only marginally reduced (approx. 10-30 %).

Sequence:
RQIKIWFQNRRMKWKK

Positive Charges:
Peptide provides 8 positive charges for complex formation. Due to ε-amino and guanido groups up to 11 trifluoro acetate residues may be present resulting in an apparent MW of about 3.1 kDa.

Stock solution:
Dissolve 0.5 mg in 1.5 ml sterile and oxygen-free water according to the **general manual**. Use the solution immediately or aliquot and store at -20 °C. Avoid freeze / thaw cycles. Please note that the peptide may form S-oxide (Met) when stored in solution.

Usage:
Perform calculation, complex formation and cargo transduction according to detailed protocols given in the **general manual**.

Jena Bioscience Publications using Penetratin:
Formation of non-covalent complexes with different cargos, transport into different cell lines, uptake efficiencies and cytotoxicity's are described in four publications:
Mussbach *et al.* (2011). Internalization of nucleoside phosphates into live cells by complex formation with different cell penetrating peptides and JBS-Nucleoducin. In: Langel U., Editor. Cell penetrating peptides Methods and Protocols. Methods in Molecular Biology, vol. 683, Humana Press, Springer, New York, Dordrecht, Heidelberg, London. pp. 375-389.
Mussbach *et al.* (2011). Transduction of peptides and proteins into live cells by cell penetrating peptides. J. Cell. Biochem. 112: 3824.
Keller *et al.* (2013). Relationships between cargo, cell penetrating peptides and cell type for uptake of non-covalent complexes into live cells. Pharmaceuticals **6**: 184.
Keller *et al.* (2014). Transduction of proteins into Leishmania tarentolae by formation of non-covalent complexes with cell-

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penetrating peptides. J. Cell. Biochem. **115**: 243.

Activity:
1 µl of stock solution is able to form a non-covalent complex with 1 µg of a protein of MW of 100 kDa. 10 to 20 µl of stock solution are necessary for complexation of 1 µg of a nucleoside triphosphate (MW approx. 0.5 kDa carrying 4 negative charges). For different MWs and/or different charges adjust amount of stock solution accordingly.

Selected References:

Handbook of Cell-Penetrating Peptides, Second Edition, Ed. by Ü. Langel, CRC Taylor and Francis, Boca Raton, London, New York (2007).

Cell-Penetrating Peptides, Methods and Protocolls, Edited by Ülo Langel, Methods in Molecular Biology **683**, Springer New York, Dodrecht, Heidelberg, London (2011).

Pharmaceuticals, Special Issue 'Cell penetrating Peptides' (2010-2013).

Morris *et al.* (2008) Cell penetrating peptides: from molecular mechanisms to therapeutics Bio.Cell **100**:201.

Gros *et al.* (2006) A non-covalent peptide-based strategy for protein and peptide nucleic acid transduction. *Biochim. Biophys. Acta* **1758**:384.

Lundberg *et al.* (2002) Positively charged DNA-binding proteins cause apparent cell membrane translocation. *Biochem. Biophys. Res. Comm.* **291**:367.

Balayssac *et al.* (2006) Comparison of Penetratin and other homeodomain-derived cell-penetrating peptides: interaction in a membrane-mimicking environment and cellular uptake efficiency. *Biochemistry* **45**:1408.

Albrizio *et al.* (2006) Driving force in the delivery of Penetratin conjugated G Protein fragment. *J. Med. Chem.* **50**:1458.

Yesylevsky *et al.* (2009). Alternative mechanisms for the interaction of the cell-penetrating peptides penetratin and the TAT peptide with lipid bilayers. *Biophysical J.* **97**: 40.

Ghibaudi *et al.* (2005). The interaction of the cell-penetrating peptide penetratin with heparin, heparansulfates and phospholipid vesicles investigated by ESR spectroscopy. *J. Peptide Sci.* **11**: 401.

Ryves and Harwood (2006). Use of a penetratin-linked peptide in Dictostelium. *Mol. Biotech-nology* **33**: 123.

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