# TRANSPORTAN 10 INTERACTION WITH GIANT VESICLES: INSERTION EFFECTS AND PORE FORMATION

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Transportan 10 (TP10) is a 21 residues peptide that belongs to the family of the antimicrobial and cytolytic or cytotoxic amphipathic peptides. It contains a high proportion of positively charged amino acids (four lysines), no negative charges and the N-terminus that impart it a formal +5 charge at neutral pH.[1] This large number of positive charges is an essential feature for the electrostatic interaction of TP10 with microbial and tumoral membranes, which are characherized by a net negative charge and also by a higher fluidity if compared with mammalin ones.[2]

Here, combining spectroscopic and fluorescence lifetime imaging techniques, we analyse the fate of the multifunctional[3-4] TP10 and its effects on giant lipid vesicles.

Structural and conformational changes of the peptide at the membrane interface are highlighted leading to reorganization at molecular level and progressive dehydration of the membrane.

Our study, based on the use of suitable fluorescence reporters, exploits the advantages of phasor plot analysis to distinguish whether the peptide is adsorbed or inserted in the membrane with high spatial resolution.[5] The coupled use of Laurdan and di-4-ANEPPDHQ, fluorescent dyes allowed to highlight events at different depth of phospholipid bilayers.[6] Carpeting, insertion and pore formation are observed at different peptide concentrations.

Under the same conditions, the interaction of TP10 with plasma membrane vesicles, which directly mirror the composition of the cells from which they originated[7], is also analyzed. The presented approach allowed to disentangle diverging aspects of the peptide-membrane interaction and clarified profound differences in TP10 modifications induced on cell mimicking systems with respect to synthetic vesicles.

1. Yandek L.E, Pokorny A., Florén A., Knoelke K., Langel Ü., Almeida P.F.F. *Biophys J.* **92(7)**,2434-2444, (2007).
2. Mahlapuu M, Håkansson J, Ringstad L, Björn C. *Front Cell Infect Microbiol*.6:194, (2006).
3. Saar K., Lindgren M., Hansen M., Eiriksdottir E., Jiang Y., Rosenthal-Aizman K., Sassian M.,Langel U. *Anal Biochem.* **345(1)**, 55-65, (2005).
4. Nekhotiaeva N., Elmquist A., Rajarao G.K, Hällbrink M., Langel U., Good L. *FASEB J.* **18(2)**,394-396 (2004).

5. Anselmo S., Sancataldo G., Nielsen H.M., Foderà V., Vetri V., *Langmuir*. **37(44)**, 13148-13159, (2021)
6. Amaro M., Reina F., Hof M., Eggeling C., Sezgin E. *J Phys D Appl Phys.* **50(13)**:134004 (1-9) (2017).
7. Einfalt T., Garni M., Witzigmann D., Sieber S., Baltisberger N., Huwyler J., Meier W., Palivan C.G. Adv Sci (Weinh) **7(4)**, 1901923, (2020).