The transactivator of transcription (TAT) protein transduction domain is an 11-amino acid positively charged peptide that has been shown to pull diverse molecules across cell membranes in vitro and in vivo. Fusion proteins constructed with TAT rapidly enter and exit cells and have been shown to cross intracellular membranes as well. Electrostatic interactions between TAT and the cell membrane have been implicated as a part of the mechanism of transduction. Here, we report that TAT transduction causes membrane phospholipid rearrangement as evidenced by detection of phosphatidylserine on the outer surface of the cell membrane. Furthermore, these rearrangements can be blocked by positively charged polylysine, further implicating electrostatic interactions as a part of the mechanism. Neither apoptosis nor necrosis is induced in these cells after exposure to TAT. We conclude that the process of TAT.GFP transduction causes phosphatidylserine to translocate from the inner to the outer leaflet of the plasma membrane. These results provide insight into the mechanism of TAT protein transduction domain transduction [1].

1)

Del Gaizo Moore V, Payne RM. Transactivator of transcription fusion protein transduction causes membrane inversion. J Biol Chem. 2004 Jul 30;279(31):32541-4. Epub 2004 May 28. PubMed PMID: 15169776.