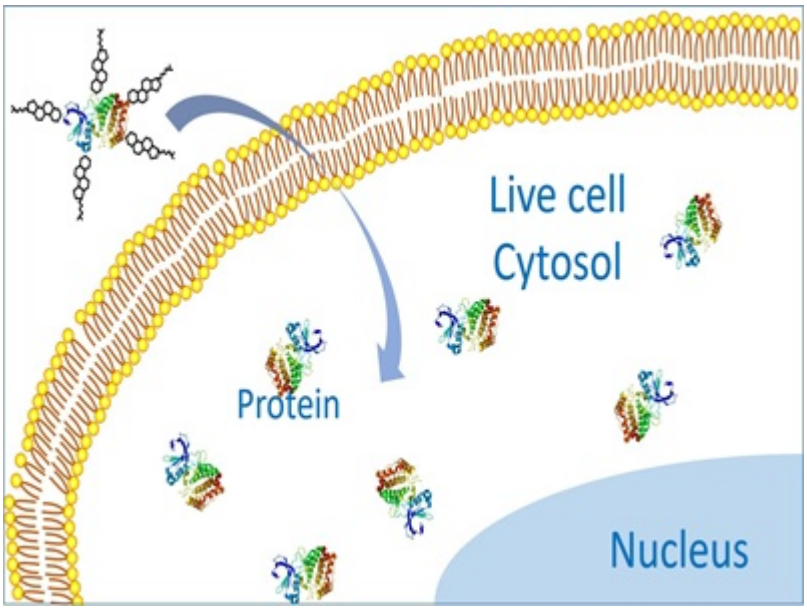
Cytosolic Delivery of Biologics

Innovative noncovalent tags enable efficient delivery of macrobiomolecules, such as siRNA and proteins, directly into the cytosol, bypassing traditional endocytic pathways.



Technology ID

BDP 7994

Category

Selection of Available Technologies

Therapeutics/Other

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What is the Problem?

Delivering therapeutic macrobiomolecules like short interfering RNA (siRNA) and proteins into the cytosol of cells presents a major challenge in biotechnology and medicine because of the difficulty in overcoming the cellular barrier. In contrast to small, nonpolar molecules that can passively diffuse across the cellular membrane, larger proteins are unable to enter cells because of their size and typically polar characteristics. Traditional delivery methods of large macrobiomolecules often rely on endocytosis, which can trap these molecules in endosomes, reducing their effectiveness. This limitation hampers the development of effective treatments for various diseases, including genetic disorders and cancers.

What is the Solution?

The technology involves the use of bifunctional noncovalent tags that facilitate the direct cytosolic delivery of macrobiomolecules. These tags consist of two main components: an affinity domain that noncovalently binds to the target molecule and a hydrophobic domain that

interacts with the cell membrane. This design allows the tagged molecules to bypass the endocytic pathway, enhancing their bioavailability and therapeutic potential. This method is particularly effective for delivering proteins, opening new opportunities for live cell imaging and development of biologic drugs against intracellular targets.

What is the Competitive Advantage?

Enhanced Bioavailability: Direct cytosolic delivery increases the therapeutic effectiveness of macrobiomolecules.

Versatility: Applicable to a wide range of macrobiomolecules, including nucleic acids and proteins.

Safety Profile: Avoids the need for cationic transfection agents or endosomolytic agents, reducing potential cytotoxicity.

Efficiency: Bypasses the endocytic pathway, preventing entrapment in endosomes and ensuring more molecules reach their target within the cell.

Patent Information:

US20220107246A1

References

1. Tai, W., Gao, X.(2018) , https://www.sciencedirect.com/science/article/pii/S0142961218300887, https://www.sciencedirect.com/journal/biomaterials, 178, 720-727