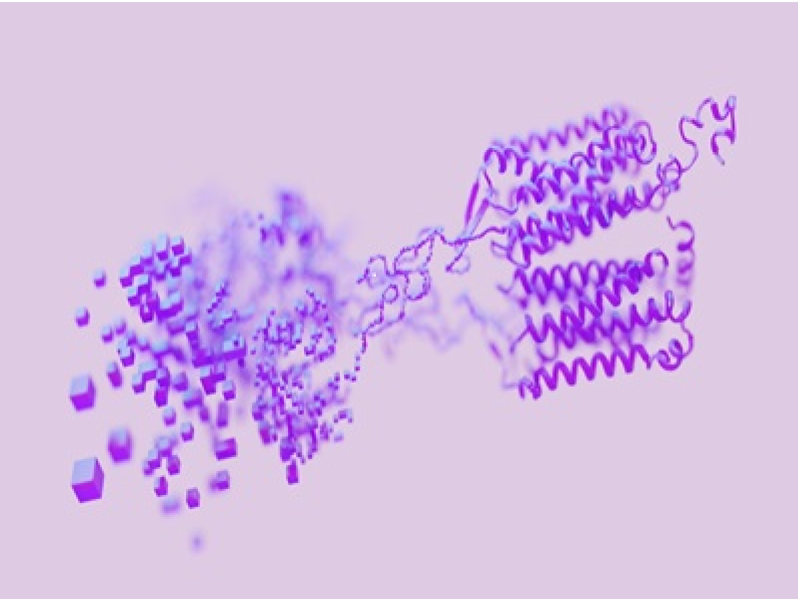
Transmembrane Protein Pores

This technology offers the computational design of protein pores that can selectively conduct ions and enable the passage of small-molecule fluorophores, offering a new approach to creating transmembrane channels with potential applications in biotechnology and medicine.



What is the Problem?

Transmembrane channels and pores play crucial roles in biological processes and have significant biotechnological applications, such as DNA nanopore sequencing. However, designing stable, functional transmembrane protein pores that can selectively conduct ions or allow the passage of small-molecule fluorophores has been a longstanding challenge. These protein channels have potential applications in areas such as drug delivery and biosensing, but designing them to be stable, selective, and functional has proven difficult.

What is the Solution?

The technology is the computational design of protein pores formed by two concentric rings of α-helices. These designed pores are stable and monodisperse in both their water-soluble and transmembrane forms. When the protein pores are expressed in cells or incorporated into liposomes, they can enable the passage of ions across the membrane with high selectivity. The transmembrane form of the 12-helix pore enables the passage of ions across the membrane with high selectivity for potassium over sodium, while the 16-helix pore enables the passage of larger molecules, such as biotinylated Alexa Fluor 488. This approach enables the ability to

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Category

Research Tools
Therapeutics/Platform Technology
Selection of Available Technologies

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generate membranes with selective permeabilities, sense molecules in the environment, and control cellular behavior.

What is the Competitive Advantage?

-Design Flexibility: The computational design approach allows for the creation of protein channels with varying properties, enabling the passage of different types of molecules.

-High Selectivity: The 12-helix pore demonstrates high selectivity for potassium over sodium, a feature that could be useful in applications such as ion-selective biosensors.

-Stability: The designed protein pores are stable in both their water-soluble and transmembrane forms, which is crucial for their potential applications in biotechnology and medicine.

-Versatility: The ability to produce structurally and functionally well-defined transmembrane pores opens the door to the creation of designer channels and pores for a wide variety of applications.

Patent Information:

US20230192773A1

References

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