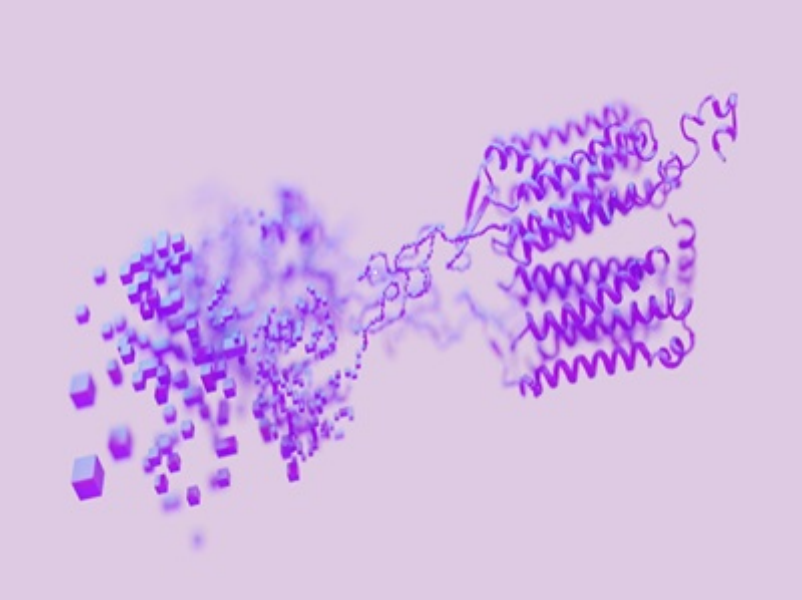
Custom Transmembrane β-Barrel Proteins

This technology involves the design of eight-stranded transmembrane β-barrel proteins (TMBs) with no homology to known TMBs, offering potential for a wide range of synthetic biology applications.



Technology ID

BDP 8319

Category

Research Tools
Selection of Available Technologies
Therapeutics/Other

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What is the Problem?

Transmembrane β-barrel proteins (TMBs) play crucial roles in biological systems, yet their design has been a challenge due to the complexity of β-sheet proteins and limited understanding of TMB folding. Despite their potential in biotechnology and single-molecule analytical applications, no TMB has been designed de novo to date. Traditional methods often rely on modifying existing proteins, which can limit the scope of possible applications. There is a need for a more flexible approach that allows for the creation of entirely new TMBs.

What is the Solution?

This technology involves the de novo computational design of eight-stranded transmembrane β-barrel proteins (TMBs) with no homology to known TMBs. The design process uses a “hypothesis, design, and test” approach to determine TMB design principles. The designed TMBs can insert and fold reversibly into synthetic lipid membranes, forming stable pores. Their structures have been confirmed to be very similar to the computational models. This advancement opens up possibilities for custom engineering of TMB nanopores.

What is the Competitive Advantage?

-De novo Design: Unlike existing proteins, these TMBs are designed de novo, allowing for greater control over their properties.

-Flexibility: The design process can be adjusted based on the desired function of the protein, allowing for a wide range of potential applications.

-Confirmed Structure: The structures of the designed proteins have been confirmed through nuclear magnetic resonance and x-ray crystal structures, providing confidence in the accuracy of the design process.

-Stable Pores: The designed TMBs can form stable pores in synthetic membranes, making them suitable for various applications.

-Potential Applications: The designed TMBs have potential uses in biotechnology and single-molecule analytical applications.

Patent Information:

US20230295230A1

References

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