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Membrane Proteins

Syracuse University Reports Research in Membrane Proteins

2011 APR 26 -- According to a study from Syracuse, United States, "The redesign of biological nanopores is focused on bacterial outer membrane proteins and pore-forming toxins, because their robust beta-barrel structure makes them the best choice for developing stochastic biosensing elements. Using membrane protein engineering and single-channel electrical recordings, we explored the ferric hydroxamate uptake component A (FhuA), a monomeric 22-stranded beta-barrel protein from the outer membrane of Escherichia coli." "FhuA has a luminal cross-section of 3.1 x 4.4 nm and is filled by a globular N-terminal cork domain. Various redesigned FhuA proteins were investigated, including single, double, and multiple deletions of the large extracellular loops and the cork domain. We identified four large extracellular loops that partially occlude the lumen when the cork domain is removed. The newly engineered protein, FhuA Delta C/Delta 4L, was the result of a removal of almost one-third of the total number of amino acids of the wild-type FhuA (WT-FhuA) protein. This extensive protein engineering encompassed the entire cork domain and four extracellular loops. Remarkably, FhuA Delta C/Delta 4L forms a functional open pore in planar lipid bilayers, with a measured unitary conductance of similar to 4.8 nanosiemens, which is much greater than the values recorded previously with other engineered FhuA protein channels," wrote M.M. Mohammad and colleagues, Syracuse University. The researchers concluded: "There are numerous advantages and prospects of using such an engineered outer membrane protein not only in fundamental studies of membrane protein folding and design, and the mechanisms of ion conductance and gating, but also in more applicative areas of stochastic single-molecule sensing of proteins and nucleic acids." Mohammad and colleagues published the results of their research in the *Journal of Biological Chemistry* (Redesign of a Plugged beta-Barrel Membrane Protein. *Journal of Biological Chemistry*, 2011;286(10):8000-8013). For additional information, contact L. Movileanu, Syracuse University, Dept. of Physics, 201 Physics Bldg, Syracuse, NY 13244, United States. The publisher of the *Journal of Biological Chemistry* can be contacted at: American Society Biochemistry Molecular Biology Inc., 9650 Rockville Pike, Bethesda, MD 20814-3996, USA. Keywords: City:Syracuse, State:New York, Country:United States, Region:North and Central America, Amino Acids, Biological Chemistry, Chemicals, Engineering, Membrane Proteins, Peptides. This article was prepared by Life Science Weekly editors from staff and other reports.