Synthetic Membrane Nanopores Made from DNA

Stefan Howorka

University College London, Department of Chemistry, London WC1H0AJ, UK
s.howorka@ucl.ac.uk

Replicating biological channels with artificial nanostructures is intellectually exciting and can lead to new applications. I describe members of a new class of nanopores that are rationally designed from DNA. The DNA channels are composed of interlinked duplexes and carry lipid anchors to hold the negatively charged channels in the membrane[1,2,3]. One DNA version mimics the function of biological ligand-gated channels where a DNA ligand can re-open the channel lumen[2]. The synthetic analogue may be used for controlled drug release and the building of cell-like networks. Related DNA channels show other hallmarks of the biological templates such as tunable channel closing at transmembrane voltages[2,3,4]. The artificial pores can furthermore be programmed to function as cytotoxic agents by killing cancer cells via membrane-rupturing[5]. The synthetic pores complement existing engineered channels[6] and expand the range of DNA nanostructures that mimic biological functions of membrane proteins to control cellular bilayer shape[7].

References:
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