Lab on chip for membrane proteins

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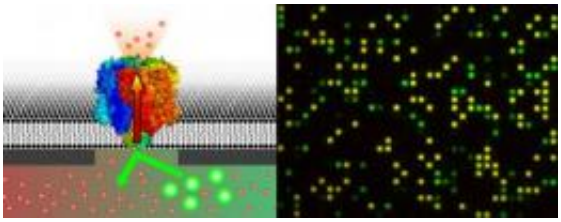

The transport of fluorescence-labeled compounds across the lipid membrane can be monitored in real-time by accumulation or release from micro-compartments on the chip. Each nanopore is connected individually to one such compartment. Hence, one can analyze thousands of different drug compounds on a single chip. Credit: Institute for Biochemistry, Goethe-University, Frankfurt, Germany

A novel nanopore array structure can be used to monitor the transport kinetics of membrane proteins by fluorescence microscopy. Due to the parallel design of the nanopore chip, a large number of samples can be analyzed simultaneously.

Membrane-associated receptors, channels and transporters are among the most important drug targets for the pharmaceutical industry. The search for new drugs resembles looking for a needle in a haystack. Therefore new analytical techniques are required which facilitate the simultaneous screening of a large library of compounds across a variety of membrane proteins. However, this class of methods is still at the early stages of development. The group of Prof. Dr. Robert Tampe at the Goethe University Frankfurt, in collaboration with the Walter Schottky Institute at Technical University Munich, has now presented a novel, automatable

lab-on-chip device for high-throughput screening of sensitive membrane proteins.

The work is detailed in the journal Nano Letters, where the scientists describe the analysis of membrane proteins on a nano-fabricated chip surface that contains almost 50,000 nanopores. These pores are covered by a freely suspended lipid membrane that incorporates the proteins to be analyzed. Because the lipid membrane is free of organic solvents and the proteins do not touch the solid support, the fragile structure (and therefore function) of the proteins is preserved.

The system can be used to monitor the transport kinetics of membrane proteins by fluorescence microscopy. Due to the parallel design of the nanopore chip, a large number of samples can be analyzed simultaneously.

More information: Alexander Kleefen et al.: Multiplexed Parallel Single Transport Recordings on Nanopore Arrays, Nano Lett. [Epub ahead of print]PMID: 20979410. DOI:10.1021/nl1033528

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