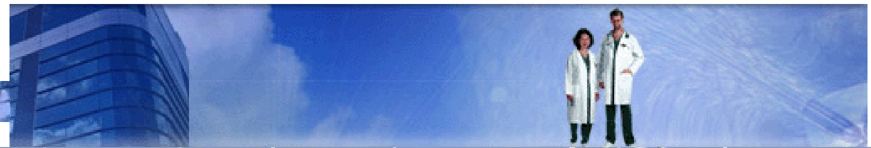

Microfluidics Gives Boost to Protein Crystallization Studies

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Proteins produced by cancer cells are among the common targets for anticancer agents, and with efforts in proteomics and cancer genomics, the number of potential protein targets is increasing exponentially.

One of the most powerful approaches to understanding protein function involves determining its three-dimensional structure in atomic detail, but this requires having pure crystals to study. Until recently, protein crystallization has been more art than science, but now, two microfluidic devices have automated the process of crystallizing proteins.

Reporting its work in the Proceedings of the National Academy of Sciences, team of investigators led by Rustem Ismagilov, Ph.D., has developed a nanoliter microfluidic device that can conduct approximately 1,900 crystallization experiments per hour.

The device can vary the chemical conditions within 10 nanoliter plugs of fluid and then screen each plug to determine if the test protein forms high-quality crystals suitable for further study.

Using their device, the researchers crystallized membrane-bound proteins, which experience has shown are among the most difficult to crystallize. The investigators were able to form crystals of a complex bacterial protein and use those crystals to determine the protein's three-dimensional structure.

The device is designed such that the investigators were able to conduct X-ray diffraction studies on the crystals while they remained in the microfluidic capillaries.

These studies were conducted using a synchrotron X-ray source. The investigators are now in the process of crystallizing as many as 30 membrane-bound proteins as a large-scale test of the device's capabilities.

Taking a slightly different approach, but still using microfluidics, a research team led by Carl Hansen, Ph.D., at the University of British Columbia developed its own version of a high-throughput crystallization device that varies crystallization parameters in an array-type format.

The device can create up to 1,000 different mixtures of protein and other reagents and then can allow these mixtures to evaporate in a controlled manner, inducing protein crystal formation in those mixtures with the proper chemical conditions. This group published its results in the Journal of the American Chemical Society.

Further Information: http://chemistry.uchicago.edu/fac/ismagilov.shtml

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