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New Research Identifies Faster Detection Of Viruses

Date: February 25, 2009

Source: University of Dublin (Trinity College)

Summary: Scientists can now detect viruses more specifically and faster than ever before. Viruses can currently be detected in fluids and their detection is of major importance in medical diagnostics. However, despite recent advances, current assays are time consuming and labor intensive. New research shows a more efficient and practical system in detecting the viruses by using micro-sized cantilevers to directly detect viruses binding to membrane proteins.

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FULL STORY

A more specific and faster detection of viruses has been identified in new research by Trinity College Dublin's Professor of Physics, Martin Hegner at Trinity College's Centre of Research on Adaptive Nanostructures and Nanodevices (CRANN) and an international team of researchers.

Viruses can be now detected in fluids and their detection is of major importance in medical diagnostics. However, despite these recent advances, current assays are time consuming and labour intensive. Professor Hegner's research shows a more efficient and practical system in detecting the viruses by using micro-sized cantilevers to directly detect viruses binding to membrane proteins.

Micro-cantilevers, which look like springboards are .5 millimetres long and 1 micrometre thick, bend in response to different forces. By measuring changes in the frequencies at which these tiny planks vibrate, researchers have turned them into super-sensitive virus-weighing scales.

Membrane proteins are the most important target for present-day drug discovery programmes. The interactions between trans-membrane protein receptors and their ligands are responsible for viral detection and central to medical research. However, measuring these interactions is challenging due to the special architecture and consistency of transmembrane proteins in liquids.

For the first time, Trinity College Dublin's Professor Martin Hegner and his team have discovered how to perform these measurements in physiological conditions using nanotechnology devices. Their work shows that nanomechanical sensors based on resonating silicon micro-cantilevers can measure such interactions rapidly in such conditions.

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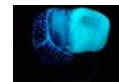
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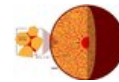


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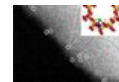


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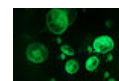
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The researchers used the protein receptor, FhuA of Escherichia coli known to bind to the T5 virus. Professor Hegner and his colleagues coated the cantilever surfaces with a molecular layer of FhuA proteins sensitised to recognise molecules from the environment. When the array was submerged in a T5 containing fluid, the researchers detected the virus binding to FhuA by measuring shifts in the vibrational frequency of the cantilevers.

Commenting on the significance of the discovery, Professor Hegner said: "These findings could lead to more specific blood tests and also will enable portable diagnostic devices in a hospital environment for a range of testing not just viruses, but also genomic markers and marker proteins."

Story Source:

Materials

provided by **University of Dublin (Trinity College)**. *Note: Content may be edited for style and length.*

Journal Reference:

1. Braun et al. **Quantitative time-resolved measurement of membrane protein–ligand interactions using microcantilever array sensors.** *Nature Nanotechnology*, March 2009; DOI: 10.1038/nnano.2008.398

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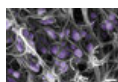
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