New research identifies faster detection of viruses

TRINITY COLLEGE DUBLIN

Media Contact

Caoimhe Ni Lochlainn
communications@tcd.ie
353-189-62310

🐦 @tcddublin

http://www.tcd.ie/ ➡

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. These findings have been published online in Nature News and will be published in the international peer-reviewed journal *Nature Nanotechnology** in March.

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 transmembrane 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.

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."

For further information contact, Trinity College Dublin, Press Officer, Caoimhe Ní Lochlainn, tel: +353-1-8962310 email: communications@tcd.ie

Notes to Editor:

*Quantitative time-resolved measurement of membrane protein-ligand interactions using microcantilever array sensors *Nature Nanotechnology*

Thomas Braun1,5, Murali Krishna Ghatkesar2,5, Natalija Backmann3, Wilfried Grange1, Pascale Boulanger4, Lucienne Letellier4, Hans-Peter Lang3, Alex Bietsch3, Christoph Gerber3 & Martin Hegner1

1. School of Physics and Centre for Research on Adaptive Nanostructures and Nanodevices (CRANN), Naughton Institute, Trinity College Dublin, Dublin 2, Ireland
2. California Institute of Technology, Pasadena, California 91107, USA

3. National Centre of Competence for Research in Nanoscience, Institute of Physics, University of Basel, Klingelbergstrasse 82, 4056 Basel, Switzerland
4. Institut de Biochimie et de Biophysique Moléculaire et Cellulaire, UMR CNRS 8619, Université Paris-Sud XI, 91405 Orsay, France
5. These authors contributed equally to this work