Nanoprobe development will enable scientists to uncover more DNA secrets

January 14 2016

Scientists at the University of Kent have led a study that has developed a 'nanoprobe', a tenth of the size of a human hair, to help uncover more of the secrets of DNA.

New research directed by Dr Neil Kad, of the University's School of Biosciences, has led to the use of the nanoprobe to study how individual proteins interact with DNA. Invisible to the human eye, this tiny triangular probe can be captured using laser tweezers and then moved around inside a microscope chamber.

Proteins interact with each other and with other chemical components such as DNA. These interactions are classically studied multiple molecules at a time to provide an average view of their behaviour. This makes understanding how molecules respond to force much more difficult.

Scientists at Kent have previously developed a new technology that involves suspending single long strands of DNA between microscopic platforms to form 'tightropes'. Now, by using the nanoprobe, developed at the Rutherford Appleton Laboratory, it is possible to manipulate proteins bound to these tightropes; enabling the action of these proteins to be investigated with unprecedented detail.

The development will lead to greater understanding of how proteins attach to DNA, and represents an important step towards a marriage of complex nanodevices and single molecule biology. Researchers hope that

in the future the development will enable them to study a large range of molecular interactions directly.

This research, entitled Directly interrogating single quantum dot labelled UvrA2 molecules on DNA tightropes using an optically trapped nanoprobe was performed in collaboration with the Rutherford Appleton Laboratory at Harwell, UK and also with the University of Pittsburgh, USA. The paper was published in the online journal *Scientific Reports* on 22 December.

More information: Michelle Simons et al. Directly interrogating single quantum dot labelled UvrA2 molecules on DNA tightropes using an optically trapped nanoprobe, *Scientific Reports* (2015). DOI: 10.1038/srep18486

Provided by University of Kent