MEDIA RELEASE

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Big data to help see small cells

Researchers have successfully combined computer analysis with microscopy, to extract highly detailed cellular information that will help distinguish between healthy and diseased cells, in areas as diverse as cancer, injury and inflammation.

The approach, reported in the journal 'Scientific Reports', has shown that subtle biochemical signatures of cells can be captured and then categorized, to an extent that has never been seen before.

Co-author on the journal paper, Ewa Goldys, Deputy Director of the Centre for Nanoscale BioPhotonics (CNBP) and Professor at Macquarie University is excited by the outcomes of the work, "We've already been able to successfully detect genetic mutations in cancer cells and bio-markers related to diabetes, as well as to non-invasively distinguish stem cells from other cells in the body."

"Key to our approach has been the development of a highly bespoke piece of software and building on twenty-first century computing capability. It has allowed us to quantitatively characterise the cell populations being viewed under the microscope, and to then identify colours and patterns related to specific conditions."

Goldys explained further, "To achieve this, we analysed individual cells and the many thousands of parameters that can be recorded for that particular cell. From this, and after extensive testing, we were able to determine which cellular features were indicative of a particular condition. We were able to differentiate between cell classes – that is, we were to be able to determine good cells from bad, healthy from unhealthy and higher functioning cells versus lesser functioning cells."

Dr Martin Gosnell, primary author of the paper, CNBP research affiliate and Director at Quantitative Pty Ltd, considers the label-free and non-invasive aspects of the technique to also be of a major benefit.

"In this work we show for the first time, how to extract rich, biologically relevant and quantitative information from selected cells using relatively standard microscopy imaging."

"Unlike other methods of cellular analysis, there is no need to add potentially damaging chemicals to bind and label the cells being examined. We simply use the power of light as well as the power of technology to give us unprecedented levels of information. In this research, the innovation is a clear result of our high-powered data

analysis. The applications are vast and Quantitative is actively engaged in multiple areas in order to translate the technology."

Professor Goldys concluded, "The use of big data in biology is a rapidly evolving field with a great potential to impact positively on many lives. Our methods will be able to form the framework for future diagnostic tools that will help aid understanding of disease, drug response and therapeutics. It's an exciting time to be a researcher. Big data is having a big biological impact!"

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RESEARCH PAPER AVAILABLE:
www.nature.com/articles/srep23453

IMAGES AVAILABLE:
CNBP Deputy Director Prof. Ewa Goldys
https://flic.kr/p/F7XrPh
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ABOUT:
The Centre for Nanoscale BioPhotonics (CNBP) is an Australian Research Council Centre of Excellence, with research focussed nodes at the University of Adelaide, Macquarie University and RMIT University. A $40m initiative, the CNBP is focused on developing new light-based imaging and sensing tools, that can measure the inner workings of cells, in the living body. http://cnbp.org.au/

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