Centre for Nanoscale BioPhotonics
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MEDIA RELEASE

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Brain probe to examine drug dangers

Research reported in the scientific journal 'Biomedical Optics Express', has detailed the development of a new optical-fibre based probe, which can measure localised temperature-change deep inside the brain.

The probe will help researchers better understand the brain, its complex and biochemical pathways, and will be used to examine the effects of drug use, where discrete regions within the brain can be impacted at a cellular and even intra-cellular level.

According to lead author on the research paper, Stefan Musolino, Scientist at both the ARC Centre of Excellence for Nanoscale BioPhotonics (CNBP) and at the University of Adelaide, there is a requirement for a temperature probe that is both accurate and minimally invasive.

"There is a need to understand how the brain works, whether it be for the testing of new medical treatments or for better understanding the toxicological impacts of drug-taking, which can obviously lead to adverse health outcomes", said Musolino.

"Using this incredibly thin glass fibre we can track the changes in temperature that we see in the brain, allowing us to better understand what's happening across the neuronal and inflammatory pathways. What our probe provides, is an entirely new method for getting relevant biological measurements out of the brain, in this case rats brains, for further study and analysis."

A key focus for Musolino will be the exploration of links between MDMA (or ecstasy) use and hyperthermia (or overheating) which can lead to patient hospitalisation and in severe instances, death.

"There are large numbers of biochemical pathways in the brain that are linked to acute MDMA-induced hyperthermia" said Musolino.

"If we can understand how these pathways operate and measure the specific temperature changes taking place, then potential treatments for MDMA toxicity, as well as for other drugs, can be further explored and then tested."

Dr Erik Schartner, CNBP Researcher, also at the University of Adelaide explained further, "Our probe is unique due to its tip, which has been expertly functionalised with modified tellurite glass, making it extremely sensitive to temperature."

"With it, we can measure localised brain temperature to a level of plus or minus 0.1 degrees Celsius. This is important as the brain is the most temperature sensitive organ in the body and even small deviations in temperature can have a significant effect on well-being."

Schartner added, "The probe lets us track temperature change on a real-time basis - we can see how the brain is reacting immediately - either to a particular drug such as MDMA, or to a potential treatment."

The CNBP researchers have ambitious plans, intending to continue their research with the current probe prototype, as well as developing an even more capable sensing tool in the future.

"Our long term strategy is to take this technology and to develop a multi-functional probe that will let us track not just temperature change, but also other biochemical activity in the brain as well," said Dr Schartner.

"This has the potential to turbo-charge research outcomes in the field of neuroscience, greatly aiding our understanding of the brain, the most complex and complicated organ in the body."

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IMAGES AVAILABLE:
Stefan Musolino
https://flic.kr/p/JMs5Lw https://flic.kr/p/HU9smW https://flic.kr/p/JHBpBD

CNBP science
https://flic.kr/p/zYJw95

Above - CNBP researcher Stefan Musolino. The optical fibre probe can generate and harness light to detect temperature changes in biological systems.

RESEARCH PAPER:
https://www.osapublishing.org/boe/abstract.cfm?uri=boe-7-8-3069

ABOUT:
The Centre for Nanoscale BioPhotonics (CNBP) is an Australian Research Council Centre of Excellence led by the University of Adelaide, with research focussed nodes also at 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.
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MEDIA CONTACTS:
Stefan Musolino
Mobile: 0402600599
Email: stefan.musolino@adelaide.edu.au

Erik Schartner
Mobile: 0403526202
Email: erik.schartner@adelaide.edu.au

Tony Crawshaw
Communications and PR
Centre for Nanoscale BioPhotonics (CNBP)
Macquarie University, Sydney
0402770403
tony.crawshaw@mq.edu.au