

New chemical probe for visualising brain immune cells

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A collaboration of research institutes in South Korea and Singapore has developed a fluorogenic marker that successfully allows scientists to visualise microglia at cellular resolution in a live brain



Researchers in South Korea and Singapore have, for the first time, developed a chemical probe that enables live-imaging of a type of immune cells in the brain, known as microglia, in a live animal brain.

This discovery, led by the Institute for Basic Science (IBS) at Pohang University of Science and Technology (POSTECH), South Korea; the Singapore Bioimaging Consortium (SBIC) and Singapore Immunology Network (SIgN) of the Agency for Science, Technology and Research (A*STAR); and Duke-NUS Medical School, Singapore, will enable critical imaging studies to help scientists understand the development of brain diseases, such as stroke, autism, Alzheimer's, and Parkinson's disease.

Being able to study microglia separately from other cells in the brain is critical for understanding brain development and disease. Although several biochemical markers and molecular imaging tools have been developed to study these specialised cells, no current methods have enabled the visualisation of microglia at cellular resolution in a live brain, which is clinically more relevant.

This collaborative study by two laboratories, led by Professor and Associate Director Young-Tae Chang, from IBS, who is also affiliated with A*STAR's SBIC, and Associate Professor Hyunsoo Shawn Je, from Duke-NUS, identified a fluorescent marker for microglial cells, screened from a library of potential probes. The researchers then undertook extensive *ex vivo* and *in vivo* studies to demonstrate that one of the probes, named CDr20, could indeed label microglia in live cells. Immunostaining was used to verify the selective staining of microglia. The authors then used knock-out cell lines to identify the enzyme present in the microglia that 'switched on' the fluorescence of the probe.

The authors state that they will continue work to improve the functionality and utility of CDr20. Furthermore, the Chang laboratory is screening new molecules that only label activated microglia, which scientists suspect to play a role in

neuroinflammation in neurodegenerative disorders.