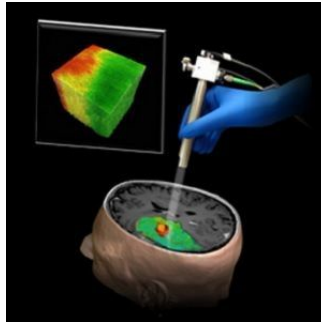

New Imaging Tool Could Make Brain Tumour Removal Safer



Johns Hopkins researchers have developed a way of using a different imaging technology, called optical coherence tomography (OCT), that could provide surgeons with a colour-coded map of a patient's brain showing which areas are and are not cancer. This innovation is expected to make surgical removal of tumours in the brain safer and more effective. Results of the study are reported in *Science Translational Medicine*.

"As a neurosurgeon, I'm in agony when I'm taking out a tumour. If I take out too little, the cancer could come back; too much, and the patient can be permanently disabled," says Alfredo Quinones-Hinojosa, MD, a professor of neurosurgery, neuroscience and oncology at the Johns Hopkins University School of Medicine and the clinical leader of the research team. "We think optical coherence tomography has strong potential for helping surgeons know exactly where to cut."

First developed in the early 1990s for imaging the retina, OCT operates on the same echolocation principle used by bats and ultrasound scanners, but it uses light rather than sound waves, producing a higher-resolution image than does ultrasound. Also, OCT delivers no ionising radiation to patients.

The Johns Hopkins team thought OCT might provide a solution to the problem of separating brain cancers from other tissue during surgery. They first built on the idea that cancers tend to be relatively dense, which affects how they scatter and reflect lightwaves. The team tried for three years to build their technique on this principle. Eventually, the researchers figured out that a second special property of brain cancer cells — that they lack the so-called myelin sheaths that coat healthy brain cells — had a greater effect on the OCT readings than did density.

Once they had found the characteristic OCT "signature" of brain cancer, the Johns Hopkins team devised a computer algorithm to process OCT data and, nearly instantaneously, generate a colour-coded map with cancer in red and healthy tissue in green (see accompanying image). "We envision that the OCT would be aimed at the area being operated on, and the surgeon could look at a screen to get a continuously updated picture of where the cancer is — and isn't," explains Xingde Li, PhD, a professor of biomedical engineering at Johns Hopkins and an author of the study.

The team has already tested the system on fresh human brain tissue removed during surgeries and in surgeries to remove brain tumours from mice. The researchers hope to begin clinical trials in patients this summer.

The system can potentially be adapted to detect cancers in other parts of the body, according to Carmen Kut, an MD/PhD student at Johns Hopkins and also co-author of the study. She is working on combining OCT with a different imaging technique that would detect blood vessels to help surgeons avoid cutting them.

Source: [Johns Hopkins Medicine](#)

Image credit: Carmen Kut, Jordina Rincon-Torroella, Xingde Li and Alfredo Quinones-Hinojosa/Johns Hopkins Medicine

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