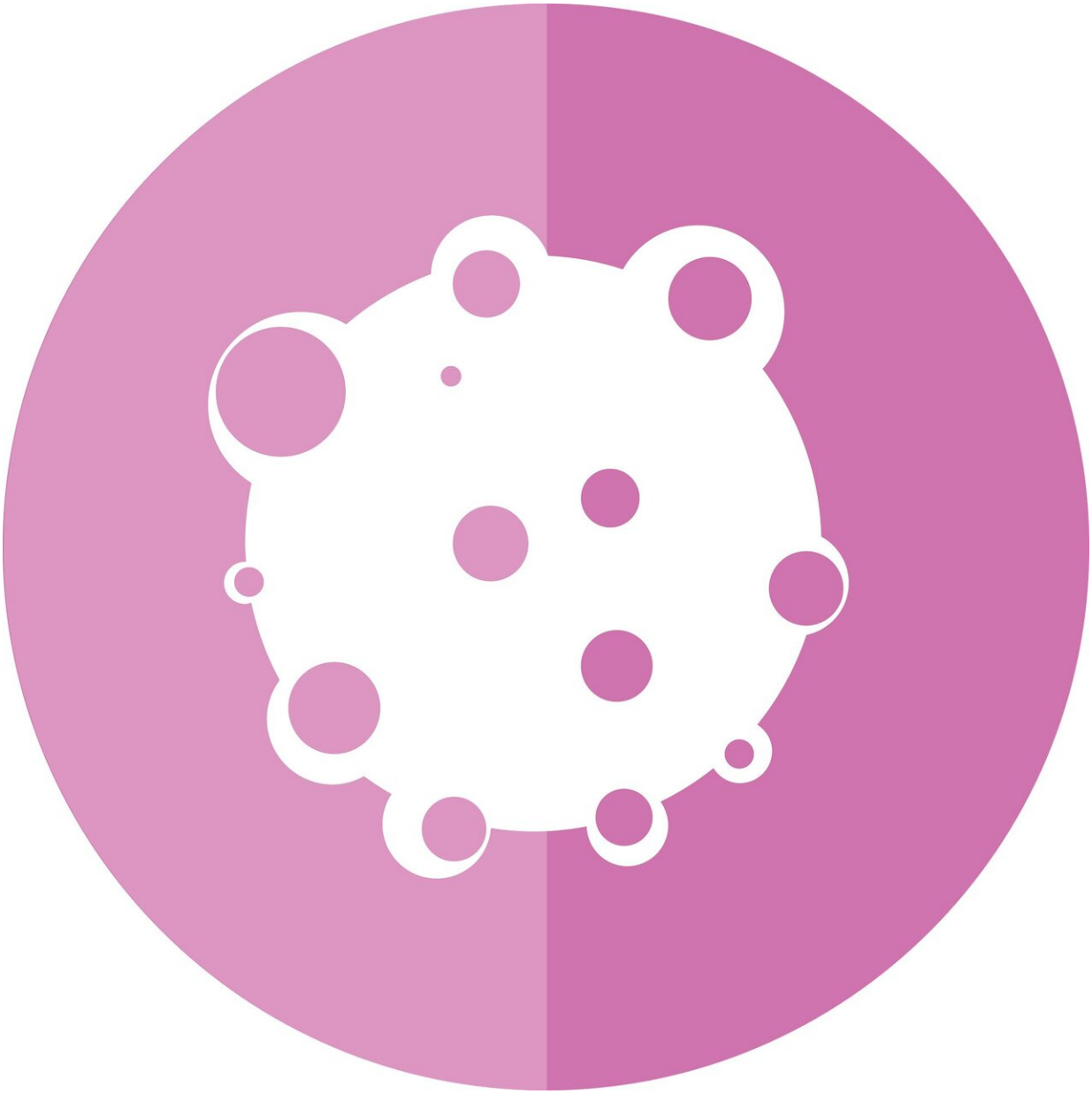
# New imaging technique doubles visibility of brain tumors in scans

October 28 2020



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A new three-dimensional imaging technique has been developed that greatly improves the visibility of brain tumors in magnetic resonance imaging (MRI) scans. The technique, invented by a scientist at Northwestern University Feinberg School of Medicine, will potentially enable earlier diagnosis of tumors when they are smaller and more treatable.

The study will be published Oct. 28 in *Science Advances*.

In a study of 54 patients with brain tumors, the technique was found to provide a two-fold improvement in the contrast between tumors and normal brain tissue, compared with existing MRI techniques in widespread use. It greatly improved tumor visibility and ease of detection.

"Our goal is for the new technique—$T_1$RESS—to help thousands of patients by allowing malignant tumors to be detected at an earlier, more curable stage," said inventor and lead author Dr. Robert Edelman, a professor of radiology at Northwestern.

The benefit of the new technique is particularly noticeable for very small malignant tumors, which are difficult to see and may be missed with standard imaging techniques. For patients undergoing treatment by surgery or radiotherapy, it is hoped the improved visibility of the tumor margins on contrast-enhanced scans will ensure the entire tumor is treated and result in better outcomes, Edelman said.

To better understand the mechanism by which $T_1$RESS improves tumor visibility on MRI scans, consider the challenge of trying to see stars

during the daytime.

"There just isn't enough contrast between the stars and the sunlit sky to make them visible," Edelman said. "In the case of brain tumors, $T_1$RESS doubles the contrast between tumors and normal brain, so the tumors are more easily detected. It's like looking at the stars on a dark night instead of on a sunny day."

While the current study focused on imaging brain tumors, the investigators plan to apply the technique to detect cancer in the breast and prostate.

More than 700,000 Americans are living with a brain tumor and nearly 16,000 will die from their tumor this year, according to the American Brain Tumor Association.

MRI techniques for cancer imaging have evolved relatively slowly over the past decade. $T_1$RESS applies the radio waves and magnetic fields used to generate the MRI signal differently from existing cancer imaging techniques. As a result, $T_1$RESS is able to manipulate the signals from various brain tissues in a unique way so as to produce a very significant improvement in tumor visibility.

The findings of this initial study will need to be confirmed in a larger multi-site trial, Edelman said.

If the benefits are confirmed, it will be straightforward to make the technology widely available on MRI scanners throughout the world, Edelman noted. This is because the technology only involves installation of a specialized software package.

**More information:** "Twofold improved tumor-to-brain contrast using a novel T1 relaxation-enhanced steady-state (T1RESS) MRI technique"

*Science Advances* (2020). advances.sciencemag.org/lookup … .1126/sciadv.abd1635