New MRI approach dramatically speeds up results

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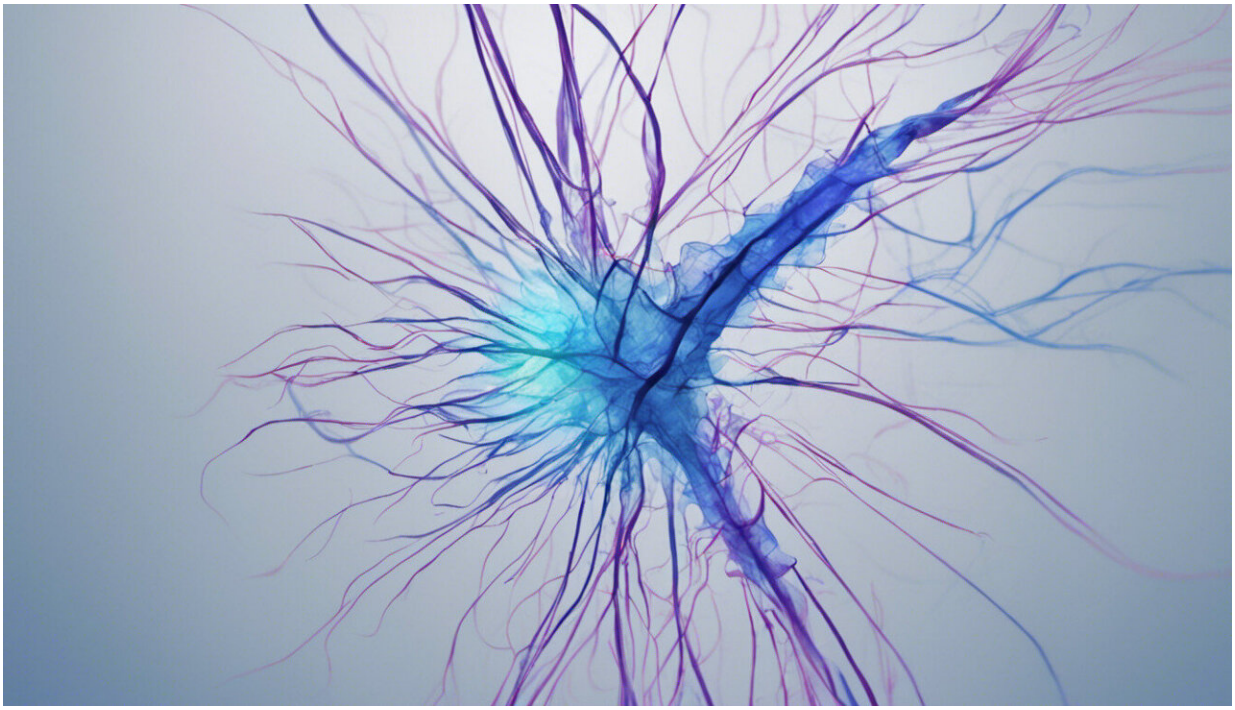

Credit: AI-generated image (disclaimer)

(Medical Xpress)—Two Yale researchers have developed a way to significantly reduce the time it takes to get magnetic resonance imaging (MRI) results by encoding an entire image with just a single line of data. Their paper appears in *PLOS ONE*.

Unlike CT or X-ray scanning, MRI has traditionally been quite slow because it requires as many as 500 lines of data for a high-quality image. The data must be acquired line by line. Typically, it takes an hour to complete an entire MRI study comprised of many different images.

The Yale researchers altered the method of acquiring data, and introduced the use of curved magnetic fields that change over time. This enabled them to encode the entire image with one line of data.

They were able to obtain a complete a single image in around four milli-seconds. This new technique could enable better resolution for cardiac and brain images, and greatly reduce clinical exam times for standard MRI.

"We endeavored to develop a technique in which each pixel in an image is assigned a unique model signature," says author Todd Constable, professor of diagnostic radiology and neurosurgery at Yale School of Medicine, and professor of biomedical engineering. "The encoding is designed in a manner that ensures any non-unique codes are well separated spatially such that parallel receiver arrays can distinguish these components."

The approach is general and can be applied to any imaging sequence or any contrast mechanism. At this time, however, most MRI systems cannot generate the curved magnetic fields required to perform acquisition of data this rapidly. The authors say these capabilities need to be built into the next generation of magnets.

"Such accelerations in spatial encoding in MRI may shorten study times for patients, increasing comfort and throughput, and leading to decreased cost and increased accessibility of MRI," Constable added.

The rapid scan time offered by this new technique may open up new

applications in diagnostic MRI and enhance other studies such as cardiac imaging applications. Fast scan times may also reduce the need for sedation of patients in pain or of children who can't stay still long enough for conventional MR imaging studies. It may also expand the use of MRI in emergency medical situations, the authors say.

More information: Galiana G, Constable RT (2014) "Single Echo MRI." *PLoS ONE* 9(1): e86008. DOI: 10.1371/journal.pone.0086008

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