Researchers develop low-cost, portable brain imaging scanner

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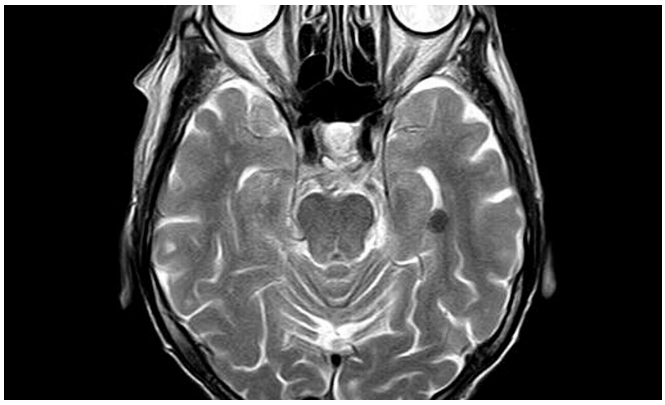

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When it comes to brain scans for assessing head trauma, detecting brain cancer, and performing numerous other tests, magnetic resonance imaging (MRI) is the best option, but MRI scanners are costly, require special infrastructure, and are immobile. Now a team led by investigators at Massachusetts General Hospital (MGH) has developed a low-cost, compact, portable and low-power "head only" MRI scanner that could be mounted in an ambulance, wheeled into a patient's room, or put in small clinics or doctors' offices around the world. The advance is described in a study published in *Nature Biomedical Engineering*.

"Although MRI is the premier imaging modality for brain imaging, the purchase and installation of traditional high-field MRI scanners can be prohibitively expensive and difficult," says lead author Clarissa Zimmerman Cooley, Ph.D., an investigator in Radiology at MGH's Athinoula A. Martinos Center for Biomedical Imaging. "Even in a hospital where MRI scanners are available, there are cases where it may be too difficult or dangerous to transport the patient to scanner suites. The work in this paper was really motivated by this need for more accessible MRI."

Cooley and her colleagues designed and tested a portable prototype scanner for brain MRI that can be plugged into a standard outlet and emits much less noise than traditional MRI scanners. The magnet itself is about the size of a laundry basket, and the total weight of the full scanner system (including the magnet, coils, amplifiers, console and cart) is 230kg, or about 500 pounds, and the cart can be pushed by a single person for transport. If the standard equipment components are replaced with custom efficient lightweight designs, the total weight could be reduced to 160 kg, or approximately 350 pounds.

When tested in three healthy adult volunteers, the scanner generated 3-D brain images, typically within 10 minutes.

"This type of technology could really extend the reach of MRI," says Cooley. "With some further development, this could allow truly point-of-care, bedside brain imaging for patients or scanning in remote locations, where MRI has traditionally been unavailable."

More information: Clarissa Z. Cooley et al, A portable scanner for magnetic resonance imaging of the brain, *Nature Biomedical Engineering* (2020). DOI: 10.1038/s41551-020-00641-5

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