New method could lower radiotherapy doses for some cancer patients

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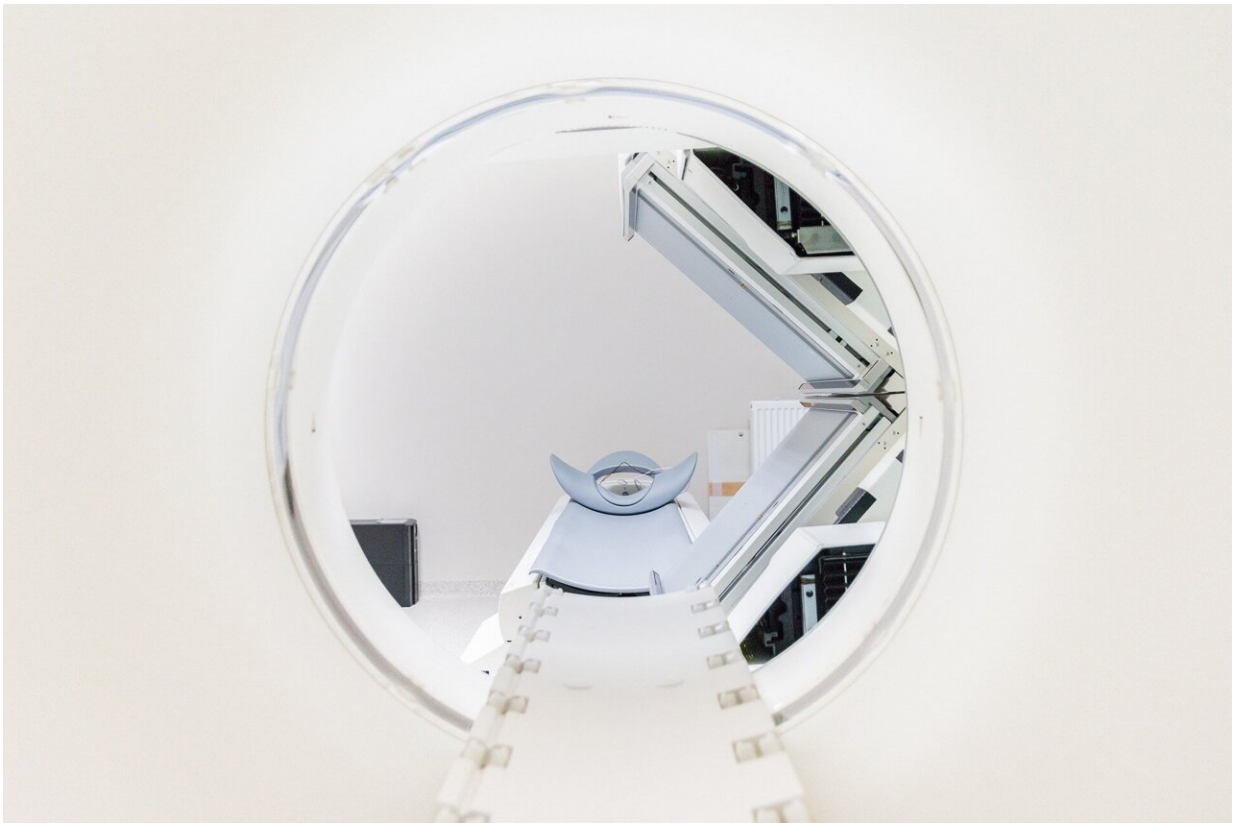

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A special type of MRI scan where patients inhale 100% oxygen could result in lower radiotherapy doses for some cancer patients.

The study led by scientists at The University of Manchester and The Institute of Cancer Research, London, could potentially benefit patients by using a technique called oxygen-enhanced magnetic resonance imaging (OE-MRI).

Using the non-invasive technique, the scientists were able to map parts of tumors that had oxygen deficiency—known as hypoxia—in patients with head and neck cancer. Patients with hypoxia in their tumors respond less well to treatment.

This will enable future practitioners to use the MRI technique to target and fine tune treatment more precisely, reducing damage to healthy tissue in some patients.

The study is published in the journal *Clinical Cancer Research*.

Though the study was performed on patients with head and neck cancer, it raises the prospect that OE-MRI could be useful in patients with other cancers.

The oxygen enhanced imaging provides detail similar to an expensive PET scan, but can be performed on standard—and much cheaper—MRI systems.

The researchers enrolled 27 patients who were given OE-MRI scans of their primary and nodal tumors before they began their standard chemotherapy or radiotherapy treatments.

Additional scans were then performed during their treatment.

Using sophisticated mathematical modeling, the method was found to have the potential to help patients whose tumors had reduced levels of hypoxia by the second week.

Michael Dubec, principal clinical scientist at The University of Manchester and The Christie NHS Foundation Trust said, "Cancers can be destroyed by radiation and chemotherapy, but the problem is healthy tissues and organs can be destroyed as well.

"So our aim is to destroy the tumor while preserving healthy tissue, thus reducing toxicity.

"Using oxygen-enhanced magnetic resonance imaging to map hypoxia in patients' tumors, may improve the accuracy of their treatment.

"Now we have proved the principle, we hope to move on to clinical trials so it can be validated on greater numbers of patients."

Professor James O'Connor of The Institute of Cancer Research, London and The University of Manchester led the study. He added, "Few studies have compared the hypoxia modification observed in both primary tumor and nodal metastases following treatment, or the timing of these changes.

"So our findings amount to a potentially important way to determine optimum radiotherapy planning for patients with locally advanced disease."

More information: Michael J. Dubec et al, Oxygen-enhanced MRI detects incidence, onset and heterogeneity of radiation-induced hypoxia modification in HPV-associated oropharyngeal cancer, *Clinical Cancer Research* (2024). DOI: 10.1158/1078-0432.CCR-24-1170

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