

# Magnetic resonance imaging for rectal cancer

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A prospective observational study has concluded that MRI is the gold-standard method for preoperative pelvic assessment for rectal cancer.

**T**he MERCURY Study Group has recently published a prospective observational study (see opposite) on the diagnostic accuracy of MRI in predicting curative resection of rectal cancer. This multi-centre study from 11 colorectal units in Europe reported on 408 patients with rectal cancer who underwent MRI before total mesorectal excision. Standardised pathological examinations of the specimens constituted the basis against which the MRI findings were compared.

During the last two decades, surgery for rectal cancer has been optimised by implementation of total mesorectal excision. The concept of this meticulous technique is surgery for cure by removal of all malignant tissue within an undamaged mesorectal fascia. Even though the mesorectal fascia cannot be considered the same as the plane of dissection in a preoperative situation, it is most important to visualise this fascia and the outer border of the tumour or any malignant

lymph node. If this fascia is breached by tumour cells, these cells have left the primary lymphatic pathway of the rectal cancer and entered into the pathway of another organ. If there is a possibility of curative treatment, the surgeons and the oncologists then have to consider preoperative chemoradiation, extensive pelvic surgery, or both.<sup>1-4</sup> Thus, the status of the circumferential resection margin has emerged as the most important predictor of life expectancy for patients with rectal cancer treated for cure.<sup>1</sup>

The MERCURY Study Group reported a 92% accuracy for MRI for the prediction of circumferential resection margin status. By contrast, the accuracy of digital rectal examination only reached 70%. CT has been, and still is, an important adjunct in the preoperative investigation of rectal cancer, however. Some patients cannot undergo MRI examinations because of cardiac pace makers, metal implants or claustrophobia. CT is less time-consuming than MRI, tak-

ing only a few minutes, and a CT scan of the thoracic, abdominal and pelvic cavities also gives information about disseminated disease.

In a meta-analysis comparing MRI, CT and endorectal ultrasound in the prediction of tumour involvement of the circumferential resection margin, only MRI showed good accuracy, making it a useful tool with which to identify high-risk and low-risk patients.<sup>5</sup>

It is obvious that digital rectal examination alone cannot fulfill the requirements for modern work-up of rectal cancer. We need detailed pictures of the tumour and the mesorectal fascia as a guide for the precise, careful dissection down the pelvic cavity. In the same way that Global Positioning Systems can guide drivers to the right place, MRI can guide surgeons by differentiating between malignant and normal tissue.

What is a satisfying level of accuracy? The recent report by the MERCURY Study Group showing an

accuracy in excess of 90% for MRI confirms the view that pelvic MRI is now the gold-standard tool for assessment of rectal cancer. Although there are user-dependent variations in the quality of the MRI scans, it is not the case that MRI should only be performed at specialised units. The time has come for every unit giving rectal cancer treatment to employ dedicated MRI radiologists as part of the decision-making team.

#### References

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## Synopsis

MERCURY Study Group (2006) **Diagnostic accuracy of preoperative magnetic resonance imaging in predicting curative resection of rectal cancer: prospective observational study.** *BMJ* 333:779

**Background.** Rectal cancer is the most challenging of the colorectal malignancies to manage surgically, and local recurrence within the pelvis commonly follows treatment failure. To cope with preoperative decision-making a multidisciplinary team approach, including the assessment of tumour incursion into the mesorectal fascia, is recommended.

**Objective.** To determine the diagnostic accuracy, feasibility and reproducibility of preoperative staging of rectal cancer using MRI in predicting the stage of tumour close to the circumferential resection margins.

**Design and intervention.** In this prospective, multicentre, observational study, data were collected from adult patients with rectal adenocarcinomas treated by multidisciplinary teams in four European countries between January 2002 and October 2003. Patients who were pregnant, had a history of pelvic radiotherapy or malignancy, had undergone pelvic floor surgery for rectal prolapse or faecal incontinence, or who were unable to undergo MRI, were excluded. Digital rectal examination, rigid sigmoidoscopy and MRI of the pelvis were performed before surgery. Patients who received chemoradiotherapy or long-course radiotherapy before surgery underwent repeat MRI. If the MRI scan showed tumour 1 mm or less away from the mesorectal fascia, circumferential resection margins were considered potentially affected. Extension of the surgical resection, short-course or long-course radiotherapy, or chemoradiotherapy, were considered as treatment options. Histopathological assessment of presence or absence of tumour at the margins of the specimen was used as the reference standard.

**Outcome measures.** The sensitivity, specificity, and positive and negative accuracy in predicting a curative resection were determined for MRI and digital rectal examination, in comparison with histological assessment.

**Results.** Data were available from 408 patients. According to histopathology results, a clear circumferential resection margin was present in 354 patients (87%; 95% CI 83–90%). The margin was correctly predicted by MRI in 327 patients (specificity 92%; 95% CI 89–95%). Technically satisfactory high-resolution scans were obtained in 379 patients (93%). Accuracy for circumferential resection margin status was 171/245 (70%) with digital rectal examination and 226/245 (92%) with MRI in the same group of patients ( $P < 0.01$ ). Surgical specimens were graded as complete or moderate in 328 patients (80%) and a median of 12 lymph nodes (range 0–49) were removed from each patient. Of the 349 patients undergoing surgery in whom MRI predicted clear margins, 327 had clear margins (94%; 95% CI 91–96%).

**Conclusion.** MRI is the best technique available for predicting circumferential resection margin status and clinical outcome of rectal cancer, and allows staging and planning of individualised treatment by a multidisciplinary team before surgery is performed.

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