

# How accurate and consistent can we predict mesorectal lymph node involvement in primary rectal cancer using new MR morphological criteria?

J. KIM<sup>1</sup>, B. L. Geerard<sup>2</sup>, M-J. Kim<sup>1</sup>, K. Kim<sup>1</sup>, R. G. Beets-Tan<sup>3</sup>

<sup>1</sup>Diagnostic Radiology, Yonsei University College of Medicine, Seoul, Korea, Republic of, <sup>2</sup>Surgery, Maastricht University Hospital, Maastricht, Netherlands,

<sup>3</sup>Radiology, Maastricht University Hospital, Maastricht, Netherlands

## Introduction

Two main factors for predicting the local recurrence following rectal cancer surgery are known as the circumferential resection margin (CRM) and the nodal status. MRI is currently regarded as an accurate imaging modality in the preoperative evaluation of the CRM. This allows us to preoperatively select patients with a close or involved CRM who are at high risk for local recurrence (1-5). However, preoperative detection of the other prognostic factor, the nodal status, is still a problem. MR is limited in differentiating metastatic from benign reactive lymph nodes (LN) and micrometastases in small nodes are easily missed. The MR prediction so far has not been satisfactory, because the detection of LN metastasis was usually based on the nonspecific dimensional criteria, even though it was known that there was size overlap between benign and malignant LN. If LN metastases could be more accurately predicted preoperatively, then an optimal treatment planning could be established for each individual patient. Thus, we had suggested new MR criteria for predicting nodal status in the preoperative evaluation of the rectal cancer (6). The aim of this study was to assess the accuracy and consistency of high-resolution MRI for predicting mesorectal lymph node (LN) metastases in patients with rectal cancer using new MR criteria.

## Materials and Methods

A total of 29 patients with rectal cancer who underwent total mesorectal excision were enrolled in this study. Two experienced MR radiologists independently reviewed the preoperative high-resolution MRI blinded to the histological results. They recorded the characteristics of each detectable LN, either mesorectal or extramesorectal, on each 5-point scale by using new criteria; the border (smooth, lobulated, spiculated or indistinct), degree heterogeneity and when heterogenous, the degree of a mottled heterogenous appearance, and a dirty perirectal fat signal. Finally, they predicted mesorectal and extramesorectal LN status. The histopathologic findings on a patient bases were taken as the standard of reference of mesorectal LN status.

## Results and Discussion

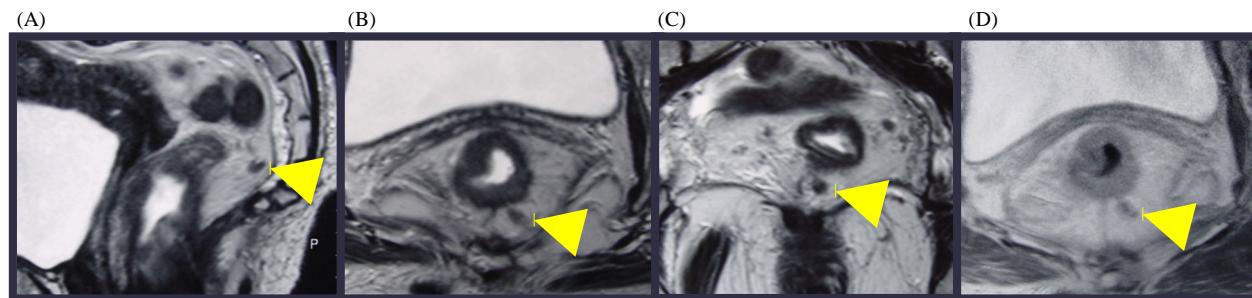
Fifteen patients (52%) were mesorectal node-positive; pN1 (n=8) and pN2 (n=7). The overall accuracy rates for mesorectal LN staging on MR were 91.4% (89.7% in observer 1 and 93.1%, observer 2) (Fig. 1). The presence of an indistinct or spiculated border of the nodes showed a sensitivity of 87% and a specificity of 82% (table 1). The presence of any heterogeneous pattern had 100% sensitivity but only 54% specificity for prediction of nodal positive patients. However the absence of a mottled heterogeneous pattern had a sensitivity of 71% but a specificity of 100% for the prediction of node negativity. There were 7 patients (5 in reader 1 and 6 in reader 2) showing dirty perirectal fat signal; 4 out of these 7 were nodal positive patients. For 2 out of remaining 3 node negative patients, postradiation or peritumoral edema in the mesorectal fat led to false-positive readings in both observers. Interobserver agreement among 2 experienced MR readers was excellent ( $k=0.93$ ) for the prediction of mesorectal LN. Although in the TME there was no histological correlation for extramesorectal nodal status, the interobserver agreement among the 2 readers was also excellent ( $k=0.92$ ) for the prediction of extramesorectal LN.

## Conclusions

Using new criteria of indistinct or spiculated margin and mottled heterogeneity, high-resolution MRI could provide reliable nodal staging in rectal cancer with accuracy of up to 90% and a very high interobserver agreement when the reading is performed by experienced MR radiologists.

## Reference

1. Beets-Tan RG, Beets GL, Vliegen RF, et al. Lancet 2001;357:497-504.
2. Blomqvist L, Rubio C, Holm T, Machado M, Hindmarsh T. Br J Radiol 1999;72:18-23.
3. Bissett IP, Fernando CC, Hough DM, et al. Dis Colon Rectum 2001;44(2):259-65.
4. Brown G, Radcliffe AG, Newcombe RG, Dallimore NS, Bourne MW, Williams GT. Br J Surg 2003;90:355-64.
5. Brown G, Richards CJ, Newcombe RG, et al. Radiology 1999;211(1):215-22.
6. Beets-Tan RG, Beets GL. Int J Colorectal Dis. 2003;18:385-91.
7. Kim JH, Beets GL, Kim MJ, Kessels AGH, Beets-Tan RG. EJR 2004 (in press).



**Fig. 1.** A 70-year-old man with T3 rectal cancer. T2 weighted sagittal (A), axial (B) and coronal (C) images show only 7mm-sized perirectal LN, however showing irregularly spiculated border and mottled signal intensity (arrows). On gadolinium-enhanced T1-weighted axial image (D), that LN show heterogeneous enhancement with indistinct margin. Both review predicted positive perirectal LN status, and that was correct.

	Reader 1	Reader 2	Overall
<b>Sensitivity</b>	100 %	100 %	<b>100 %</b>
<b>Specificity</b>	78.6 %	85.7 %	<b>82.2 %</b>
<b>PPV</b>	83.3 %	88.2 %	<b>85.8 %</b>
<b>NPV</b>	100 %	100 %	<b>100 %</b>

**Table 1.** Sensitivity, specificity, positive predictive value, and negative predictive value of rectal MRI in predicting nodal status using new criteria.