

Evaluation of MRI characterisation of histopathologically matched lymph nodes and other mesorectal nodal structures in rectal cancer.

ELECTRONIC SUPPLEMENTARY MATERIAL

Supp Table 1. MRI parameters used in the RECTOPET study.

Sequence	TE (ms)	TR (ms)	Field of view (mm)	Echo train length	Number of excitations	Slice thickness/gap (mm)	Matrix	Bandwidth (Hz/px)
Sag T2 FRFSE	102	3900	200 × 200	20	3	3.0/0.0	320x320	223
Ax T2 FRFSE	100	5719	270 × 270	16	1	4.0/0.4	384x256	325
Cor T2 FRFSE	102	4000	220 × 220	23	3	3.0/0.0	320x320	260
T2 perpendicular (ax)	100	4000	210 × 210	16	2	3.0/0.0	384x256	260
Ax DWI Focus	69.4	3500	240 × 120	–	1	4.0/0.0	160x180	3125
Ax T1 FSPGR	1.9	4.7	256 × 256	–	1	1	256x256	488

FRFSE: Fast relaxation fast spin echo,

FSPGR: Fast spoiled gradient echo,

TR: Repetition time,

TE: Echo time,

DWI: Diffusion-weighted magnetic resonance imaging

Supp Table 2. Description of all 609 matched and unmatched nodal structures found at baseline MRI and histopathological assessment according to short axis size and matching status for the 46 included patients – including the 151 excluded histopathological benign nodal structures in the neoadjuvant treatment group.

	Found at baseline MRI			Found at histopathology		
	Matched	Unmatched	p-value	Matched	Unmatched	p-value
Median short axis size in mm (IQR)	3.3 (2.4–4.7)	2.3 (1.7–3.2)	<0.001	2.7 (2.0–3.7)	1.7 (1.2–2.4)	<0.001
Nodal structures < 5 mm (%)	473 (78%)	531 (95%)		548 (90%)	1079 (99%)	
N-	502 (82%)			502 (82%)	998 (92%)	
N+	60 (9.9%)			60 (9.9%)	44 (4.0%)	
TD	39 (6.4%)			39 (6.4%)	34 (3.1%)	
EMVI	8 (1.3%)			8 (1.3%)	12 (1.1%)	
Total number	609	560		609	1088	

*N-= benign lymph nodes, N+= malignant lymph nodes, TD= tumour deposits, EMVI= extramural venous invasion
IQR= Interquartile range*

Supp Table 3. This includes the primary surgery group only, consisting of 27 patients and 369 node by node matched mesorectal lymph nodes. Univariable and multivariable odds ratios (ORs) with 95% confidence intervals (CIs) in predicting histopathological malignancy for different MR-morphological characteristics in mesorectal nodal structures. The individual variables used for the multivariable model are the constituent criteria in the ESGAR consensus criteria, i.e., irregular margin,

Radiological characteristics	N-	N+	Univariable model			Multivariable model		
	n (%)	n (%)	OR	95% CI	p value	OR	95% CI	p value
Irregular margin								
No	150 (98.0%)	3 (2.0%)	1.00			1.00		
Yes	201 (93.0%)	15 (7.0%)	5.46	1.22–24.45	0.026	1.12	0.18–6.85	0.906
Round shape								
No	318 (95.8%)	14 (4.2%)	1.00			1.00		
Yes	33 (89.2%)	4 (10.8%)	3.60	0.74–17.37	0.111	2.01	0.32–12.63	0.458
Comet tail appearance*								
No	341 (95.8%)	15 (4.2%)	1.00					
Yes	10 (76.9%)	3 (23.1%)	4.96	0.70–35.02	0.108			
Heterogeneous signal								
No	142 (99.3%)	1 (0.7%)	1.00			1.00		
Yes	209 (92.5%)	17 (7.5%)	10.9	1.24–95.85	0.031	5.13	0.46–57.78	0.186
Short axis size								
<5 mm	305 (97.1%)	9 (2.9%)	1.00			1.00		
≥5 mm	46 (83.6%)	9 (16.4%)	17.11	3.43–85.38	<0.0001	10.04	1.72–58.61	0.010

round shape, heterogeneous signal and size.

Supp Table 4. Radiological staging for determination of early/intermediate rectal cancer (defined as clinical stage T3b or less, no involvement of mesorectal fascia, and no presence of EMVI) for the included 46 patients.

Radiological staging	N (%)
mrT	
2	22 (47.8%)
3a	3 (6.5%)
3b	9 (19.6%)
3c	5 (10.9%)
3d	2 (4.3%)
4a	3 (6.5%)
4b	2 (4.3%)
mrMRF+	
No	37 (80.4%)
Yes	9 (19.6%)
mrEMVI+	
No	39 (84.8%)
Yes	7 (15.2%)
Early/intermediate rectal cancer	
No	16 (34.8%)
Yes	30 (65.2%)

MRF+: involvement of the mesorectal fascia

EMVI+: presence of extramural venous invasion

Supp Table 5. The sensitivity, specificity, positive and negative likelihood ratio with 95% confidence intervals for different criteria to predict malignancy in mesorectal nodal structures in early/intermediate rectal cancer (defined as clinical stage T3b or less, no involvement of mesorectal fascia, and no presence of EMVI).

	Sensitivity	Specificity	Positive likelihood ratio	Negative likelihood ratio
Single criterion				
Size ≥ 5mm	53%	87%	3.95 (1.33-8.35)	0.54 (0.22-0.92)
Irregular margin	85%	42%	1.48 (1.15–1.86)	0.35 (0.16–0.80)
Round shape	12%	92%	1.38 (0.00–2.94)	0.96 (0.84–1.09)
Heterogeneous signal	88%	41%	1.48 (1.21–1.77)	0.29 (0.08–0.68)
Combined criteria				
Size ≥ 5mm, Size <5 mm with heterogeneous signal	88%	41%	1.48 (1.21–1.77)	0.29 (0.08-0.68)
Size ≥ 5mm, Size <5 mm with irregular margin	85%	42%	1.47 (1.15–1.86)	0.35 (0.16–0.81)
Size ≥ 5mm, Size <5 mm with round shape	59%	81%	3.05 (1.26–5.58)	0.51 (0.13–0.92)
Size ≥ 5mm, Size <5 mm with round shape and irregular margin	53%	84%	3.24 (1.16–6.51)	0.56 (0.22–0.95)
Size ≥ 5mm, Size <5 mm with either round shape or irregular margin	91%	39%	1.50 (1.22–1.81)	0.23 (0.00–0.63)
Size ≥ 5mm, Size <5 mm with round shape and heterogeneous signal	56%	84%	3.42 (1.33–6.25)	0.53 (0.20–0.90)
Size ≥ 5mm, Size <5 mm with either round shape or heterogeneous signal	91%	38%	1.46 (1.18–1.71)	0.23 (0.00–0.71)
ESGAR consensus criteria	53%	85%	3.52 (1.28–7.22)	0.55 (0.22–0.94)
ESGAR consensus criteria minus round shape^a	79%	50%	1.60 (1.18–2.12)	0.41 (0.15–0.75)

ESGAR: European Society of Gastrointestinal and Abdominal Radiology

^a Defined as a short axis size of < 5 mm with heterogeneous signal and irregular margin, a short axis size of 5–8 mm with either heterogeneous signal or irregular margin, or a short axis size of > 9 mm.