Network radiotherapy treatment protocol for Rectum

SECTION 1: Treatment options

Chemotherapy

5FU 350 mg/m2 over 60 minutes with Folinic acid 20mg/m2 Day 1-5 and 29-33 (Bossett regime).
or
Concurrent Capecitabine 900mg/m2 day weekdays only (radiotherapy days) for 25 days.

Radiotherapy

Intent and indications	Regime, technique and RCR
C20 – 25(I)5 SCRT T2-T3 without threatened CRM. Pre-operative or debulking. Palliative dose for the frail and elderly	• 25 Gy in 5 fractions over 5-7 days • VMAT • Prescribed to ICRU median dose (D50%) of PTV • RCR2 - where possible treatment should not be prolonged for more than two days
C20 – 45(I)25 LCRT For downstaging chemo/radiotherapy, or radical radiotherapy for locally advanced, involved or threatened CRM.	• 45 Gy in 25 fractions daily over 5 weeks • VMAT • Prescribed to ICRU median dose (D50%) of PTV • RCR2 - where possible treatment should not be prolonged for more than two days
C20 – 55(I)25 LCRT For patients not expected to proceed to surgery or who need a major response to allow surgery to proceed (ie very bulky disease), 55gy in 25# can be considered to the primary disease (Phase 2 evidence, when given with capecitabine 825mg/m2 BD, or without chemotherapy).	• 55 Gy in 25 fractions daily over 5 weeks • VMAT • Prescribed to ICRU median dose (D50%) of PTV • RCR2 - where possible treatment should not be prolonged for more than two days
C20 – 45(I)25+50 LCRT SIB SIB to gross disease for larger or fixed tumours – 50Gy in 25# Elective nodal regions – 45Gy in 25#	• 45Gy + 50Gy in 25 fractions over 5 weeks • VMAT • Prescribed to ICRU Median dose (D50%) of PTV • RCR2 - where possible treatment should not be prolonged for more than two days
C20 – 45(I)25+52 LCRT SIB SIB postoperative with residual macroscopic disease or disease outside the resection margin.	• 45Gy +52Gy in 25 fractions over 5 weeks • VMAT • Prescribed to ICRU Median dose (D50%) of PTV • RCR2 - where possible treatment should not be prolonged for more than two days

SECTION 2: Side effects

Acute

- Diarrhea – treated by Loperamide 2mg, prn.
- Nausea.
- Occasionally genito-urinary symptoms – (bacterial or fungal infection should be excluded).
- Skin irritation.

Late

- Small bowel obstruction.
- Genito-urinary problems.
- Impaired continence.
- Delayed wound healing. (APR)
- Sexual dysfunction (vaginal narrowing, dyspareunia) impotence, sterility, early menopause.
- Risk of secondary cancer.

SECTION 3: Target Definition		
Regime	*Definition*	
C20 – 25(I)5 SCRT	GTVp	Macroscopic primary tumour, areas of adjacent extramural vascular invasion or post op macroscopic disease identified on imaging. If the tumour can be confidently identified, the GTVp can include macroscopic disease only, without the whole lumen. In this situation, lumen, rectal gas or faecal contents should not be included in the volume.
	GTVn	Involved lymph nodes defined by MDT using all available imaging.
	ICTV	(CTV that includes a margin for motion according to AAPM and ICRU)
	ICTVp	GTVp + 10mm in all directions except anteriorly where 15mm can be considered for tumours that may be more mobile anteriorly. 15mm margin should be used for more superior tumours where there is more anterior mobility. ICTVp should be edited off bone in all directions other than posteriorly and also edited off muscle unless there are obturator nodes.
	ICTVn	GTVn + 5mm in all directions. ICTVp should be edited off bone in asll directions other than posteriorly and also edited off muscle unless there are obturator nodes.
	ICTV_Elec	All elective nodal groups combined. Includes a 1cm margin anterior to the mesorectum. 15mm anterior margin should be used for more superior tumours where there is more anterior mobility. If neo-adjuvant chemotherapy has been used, all compartments that contained nodal disease at outset must be included with a 2cm superior margin to the most superior node at outset.
	ICTV-Final	ICTVp + ICTVn + ICTV_Elec
	PTV	ICTV_Final + 5mm in all directions
C20 – LCRT +/- SIB*	GTVp	Macroscopic primary tumour, areas of adjacent extramural vascular invasion or post op macroscopic disease identified on imaging. If the tumour can be identified, the GTVp can include macroscopic disease only, without the whole lumen. In this situation, lumen, rectal gas or faecal contents should not be included in the volume.
	GTVn	Involved lymph nodes defined by MDT using all available imaging
	**GTVp_Boost*	areas to boost, may be identical to GTVp
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	ICTV	(CTV that includes a margin for motion according to AAPM and ICRU)
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	ICTV-Final	ICTVp + ICTVn + ICTV_Elec
	**ICTVp_Boost*	GTVp_Boost + 10mm in all directions except anteriorly where 15mm can be considered for tumours that may be more mobile anteriorly. 15mm

		anterior margin should be used for more superior tumours there is more anterior mobility.
	**ICTVn_Boost*	GTVn_Boost + 5mm in all directions.
	ICTVsb	Area around surgical bed at risk for microscopic disease (for post operative radiotherapy only)
	**ICTV_High*	ICTVp_Boost + ICTVn_Boost
	**PTV_High*	ICTV_High + 5mm in all directions
	PTV_Low	ICTV_Final + 5mm in all directions

SECTION 4: Organs At Risk constraints				
Regime	***Organs to define and constraints*** (optimal) mandatory	***** indicates non-mandatory constraint **genitalia only - indicates less optimal but not		
C20 – 25(I)5 SCRT	**Bowel_Small**	• D200cc		<20Gy
		• D150cc		<22Gy
		• D20cc		<25Gy
	Bladder	• D45%		<21Gy
C20 – LCRT +/- SIB*	**Bowel_Small**	• D180cc	<35Gy*	
		• D100cc	<40Gy*	
		• D65cc	<45Gy*	
		• D0.5cc		<52.5Gy
	Femur_Head_R/L	• D50%	<30Gy*	<45Gy
		• D35%	<40Gy*	<50Gy
		• D5%	<50Gy*	<52.5Gy
	Bladder	• D50%	<35Gy*	<45Gy
		• D35%	<40Gy*	<50Gy
		• D5%	<50Gy*	<52.5Gy
	Genitalia	• D50%	<20Gy*	<35Gy**
		• D35%	<30Gy*	<40Gy**
		• D5%	<40Gy*	<52.5Gy**

SECTION 5: Process	
Positioning	• Supine with immobilisation for popliteal fossa and feet.
Preparation	• **Comfortably Full Bladder.** Instructions for correct bladder prep as stated in local protols. • **Empty Rectum (Not Mandatory requirement).** Aim for Rectal diameter ≤4cm. For larger symptomatic tumours, clinical judgement of rectal size is required. • Patient with defunctioning stoma, stoma bag should be positioned outside of the treatment area where possible.
Localisation	• Planning CT scan in accordance with local protocols. • Intravenous contrast can be used to aid delineation of pelvic vessels, and GTV.

	• Radio-opaque marker can be considered as a reference point for low rectal cancers. • IMAR reconstruction for patient with artificial hips.
Information required for planning	• Patient with artificial hips - IMAR scan to be used for planning. • Patient with defunctioning stoma, avoid beam entry through area. • Refer to local protocols for rectal planning guidelines.
Image fusion	• Planning MRI (if requested). • Diagnostic MRI.
Treatment verification	• SCRT - XVI daily. • LCRT +/- SIB – XVI daily. • Refer to local protocols for X-ray Volume Imaging and guidelines for the application of XVI.
Treatment delivery	• VMAT delivery 6MV.
Patient information	• Refer to local protocols for supplementary instructions for pelvis treatments.
Clinical review	• Reviewed once weekly – Review can be carried out by the consultant clinical oncologist, SpR or treatment review radiographer.

SECTION 6: Responsibilities	
Task:	***Staff group:***
Registration and fusion of CT/MR datasets.	Dosimetrist
Definition of Target Volumes.	CCO
Delineation of OARs, as per RCR guidelines.	Dosimetrist
Review and approval of registration, fusion quality and OARs.	CCO
Supervision of Specialty Registrars (SpR), Dosimetrists and Clinical Specialist Radiographers.	CCO
Review and approval of dosimetric plan data.	CCO
Peer review:	
Second CCO can peer review target volume suitability.	CCO