

# Retinoblastoma

## Pediatric Surveillance & Follow-up Guidelines

ATTACH PATIENT ID

	Months from end of therapy	Date	Location	H&P	CBC	Chem	EUA / Ophtho Retinal Exam *	MRI head	LP and B/L BM **	Urine tests	Audiol	LH, FSH, Test or Est	Endo	Neuropsych assessment	Distress screening tool	Other		
Early Follow-up Clinic	0			End of treatment evaluations (per protocol)												Summary for LTFU clinic		
	3			+	+													
	6			+	+												Attenuated vaccine re-immunizations	
	9			+	+													
	12			+	+	+				+	+		+				Live vaccine re-immunizations	
	15			+	+													
	18			+	+													
	21			+	+													
24			+	+							+		+					
LTFU Clinic	30			+	+													
	36			+	+													
	42			+	+													
	48			+	+								+					
	54			+	+													
	60			+														Refer to Late Effects clinic
Notes					Lytes, Ca, Mg, PO4, Cr, urea, LFTs	Suggested frequency: EUA Q1-3mo until approx age 3y, then clinic retinal exams Q6mo			U/A, urine prot:Cr & alb:Cr ratio.	If carbo- or cisplatin or CNS RT. Annual age <5y; Q2y if ages 6-12 and Q5y when >13y	Baseline age 12 y if CED ≥4, CNS RT or clinical concerns. Rpt Q1y	If CNS RT only. TSH, T4, non-fasting glucose & lipids, IGF-1.	If clinical concerns, first assessment prior to school entry & repeat at school transitions	Start age 13y				

\* Patients with unilateral RB treated with enucleation who are RB1 germline mutation negative do not require further surveillance  
 \*\* Suggested for patients with TNM stage T4 (severe local disease) or pT2 (minimal optic nerve or choroidal invasion), pT3 (significant optic nerve or choroidal involvement) or pT4 (invasion of optic nerve or extraocular extension)  
 ^CED: Cyclophosphamide Equivalence Dose (see over)

**Further Surveillance**  
 Counselling re: second malignancy      Lifelong for patients with RB1 germline mutation

### Cardiac Surveillance Guidelines (BC)

Anthracycline Dose*	Radiation Dose**	Recommended Frequency of Echo***
<100 mg/m <sup>2</sup>	< 15 Gy	No screening
<100 mg/m <sup>2</sup>	15 Gy to < 30 Gy	Every 5 years
≥ 100 mg/m <sup>2</sup> to <250 mg/m <sup>2</sup>	<15 gy	Every 5 years
≥ 100 mg/m <sup>2</sup> to <250 mg/m <sup>2</sup>	>15 Gy	Every 2 years
Any	> 30 Gy	Every 2 years
≥250 mg/m <sup>2</sup>	Any	Every 2 years

\*Based on total doses of doxorubicin or the equivalent doses of other anthracyclines

\*\*Based on radiation dose with potential impact to heart (radiation to chest, abdomen, spine [thoracic, whole], total body [TBI]) COG LTFU Guidelines version 6.0 (Oct 2023)

\*\*\*Consider increased frequency if known high risk genetic variant for anthracycline toxicity

### Anthracycline Equivalent Dose

Agent	Correction factor
Doxorubicin	1.0
Daunorubicin	0.5
Epirubicin	0.67
Mitoxantrone	10.0
Idarubicin	5.0

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### Risk of Prolonged Oligospermia or Azoospermia

Agent	Possible Risk	High Risk
Cyclophosphamide	> 4g/m <sup>2</sup>	> 7.5 g/m <sup>2</sup>
Busulphan		> 600 mg/m <sup>2</sup>
Melphalan		> 140 mg/m <sup>2</sup>
Ifosfamide	> 42 g/m <sup>2</sup>	> 60 g/m <sup>2</sup>
Procarbazine	> 3 g/m <sup>2</sup>	> 4 g/m <sup>2</sup>
Chlorambucil		> 1.4 g/m <sup>2</sup>
BCNU	> 300 mg/m <sup>2</sup>	> 1 g/m <sup>2</sup>
CCNU		> 500 mg/m <sup>2</sup>
Cisplatin	> 300 mg/m <sup>2</sup>	> 600 mg/m <sup>2</sup>
Testicular RT dose	> 200 cGy	> 1200 cGy

\*Lower doses are still possible risk

1. Green J Clin Oncol 2010;28:332-9
2. Meistrich Pediatr Blood Cancer 2009;53:261-6
3. Wyns Human Reprod Update 2010;16(3):312-328

### Risk of Premature Ovarian Insufficiency or Infertility

Agent	Possible Risk	High Risk	Ref
CED	> 4 g/m <sup>2</sup>	> 8 g/m <sup>2</sup>	1
Procarbazine	> 2 g/m <sup>2</sup>	> 4 g/m <sup>2</sup>	2
Cisplatin	> 300 mg/m <sup>2</sup>		3
Dactinomycin	>12.2 mg/m <sup>2</sup>		4
Ovarian RT dose*	> 100 cGy	> 1000 cGy	5

\*Age dependent (see nomogram<sup>5</sup>)

^Bevacizumab can cause ovarian failure; possibly acute and transient only<sup>6</sup>

1. Green Pediatr Blood Cancer 2014;61(1):53-67
2. Van der Kaaij J Clin Oncol 2012;30(3):291-299
3. Solheim Gyne Oncol 2015;136(2):224-229
4. Van Den Berg Hum Reprod 2018; 33(8):1474-1488
5. Wallace Int J Radiat Oncol;62(3):738-744
6. Imai Molec Clin Oncol 2017;6:807-810

### Cyclophosphamide Equivalent Dose (CED)

Agent	Correction factor
Cyclophosphamide	1.0
Ifosfamide	0.244
Procarbazine	0.857
Chlorambucil	14.286
BCNU	15
CCNU	16
Melphalan	40
Thiotepa	50
Nitrogen Mustard	100
Busulphan	8.823

Green Pediatr Blood Ca 2014;61:53-67