

# Hepatoblastoma (HB) and Hepatocellular Carcinoma (HCC) Pediatric Surveillance & Follow-up Guidelines

ATTACH PATIENT ID

	Months from end of therapy	Date	Location	H&P	CBC	Chem	AFP	Liver imaging	Chest imaging	Urine tests	GFR	Audiol	ECHO#	LH, FSH, Test or Est	Other	
Early Follow-Up Clinic	0			End of treatment evaluations (per protocol)											Summary for LTFU clinic	
	1			+	+	+	+									
	2			+	+	+	+									
	3			+	+	+	+	MRI	CT	+						
	4			+	+	+	+									
	5			+	+	+	+									
	6			+	+	+	+	MRI	CT							Attenuated vaccine re-immunizations
	9			+	+	+	+	MRI	CT							
	12			+	+	+	+	MRI	CT	+	+	+				Live vaccine re-immunizations
	15			+	+		+									
18			+	+		+	US	CXR								
21			+	+		+										
24			+	+	+	+	US	CXR				+				
LTFU Clinic	30			+	+		+	US	CXR							
	36			+	+	+	+	US	CXR							
	42			+			+	US	CXR							
	48			+	+	+	+	US	CXR							
	60			+												Refer to Late Effects clinic
	Notes					Lytes, Ca, Mg, PO4, Cr, urea, LFTs		<b>Only if negative AFP at diagnosis or HCC</b>	<b>Only if negative AFP at diagnosis or HCC</b>	U/A, urine Prot:Cr & Alb:Cr ratio		PRN if abN	<b>#Insert frequency</b> based on cardiac guidelines. ECG if clinical concerns	Baseline age 11 y if CED ≥4 or clinical concerns. Rpt Q1y		

^CED: Cyclophosphamide Equivalence Dose (see over)

**Further Surveillance**

Genetic predisposition syndrome	Continue screening abdominal US and AFP Q3mo until age 8 years
Semen Analysis	From age 18y in males if moderate or high risk
Anti-Mullerian Hormone	From age 12y in females if CED ≥ 6 g/m <sup>2</sup> or pelvic RT; or earlier if clinical concerns. Rpt Q2-3y if normal. Refer to Pediatric Gynecology if abnormal



### 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 Kaaji 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