

Supplemental Methods: Methodology for linkage between CCSS and OPTN databases

Through a data-sharing agreement with OPTN, SOT and wait-list outcomes were obtained for all eligible CCSS participants through 12/31/2013. OPTN began consistently collecting transplant data in October, 1987. For the 13,318 eligible CCSS participants, the following information was sent to OPTN: First Name, Middle Name, Last Name (+ former last name, if relevant), Sex, Date of Birth, Social Security number (if available), Ages of any known heart, kidney, liver or lung transplants, Medical Record notes, date of last CCSS survey (last contact) and primary cancer diagnosis. OPTN based matching on first and last names, sex, date of birth and, if available, social security number and classified identified cases into 3 levels of certainty: (1) Denotes highly certain match; (2) Denotes potential, but unlikely match unless CCSS has extra data that matches on additional data provided by OPTN (height, weight, zip code, type of malignancy, etc); (3) Denotes a match of any of the blocking criteria, but a highly unlikely match. This analysis used only level 1 matches and additionally reviewed agreement between other available clinical data from both sources. Manual searches were carried out for any patients who self-reported a transplant that wasn't identified via the above methodology, but a match was not found. These events were excluded from this analysis, though a sensitivity analysis was carried out to evaluate the impact on results if they were included. The final number of SOTs occurring after cohort entry to the CCSS utilized in this manuscript and their method of identification are shown in the supplemental methods table below, within 3 key time intervals defined by pre-October, 1987 when OPTN began collecting transplant data and the last date of contact for the CCSS participant.

Supplemental Methods		Source of Transplant Ascertainment		
		CCSS Only	Both CCSS and OPTN	OPTN Only
Time interval	Total Transplants			
Prior to October, 1987	3	2	1	0
October, 1987 – End of CCSS Follow-up	67	0	54	13
After end of CCSS follow-up	33	0	0	33
Total Time	103	2	55	46

Supplemental table: Univariable hazard ratio estimates

Kidney *				
Treatment factor	Level of exposure	Univariable Hazard Ratio	95% Confidence Interval	p-value
Ifosfamide	No	1.0	referent	
	Yes	30.7	(9.6, 98.7)	<0.0001
IV or IM Methotrexate	No	1.0	referent	
	Yes	0.6	(0.3, 1.2)	0.15
Kidney radiation exposure (Gy)	None	1.0	referent	
	>0 to 10	0.4	(0.2, 0.7)	0.0021
	>10 to 20	4.4	(2.3, 8.6)	<0.0001
	>20	4.0	(0.9, 16.8)	0.061
	TBI	4.4	(1.5, 12.6)	0.0061
Nephrectomy	No	1.0	referent	
	Yes	7.1	(4.3, 11.8)	<0.0001
Age at primary cancer diagnosis (years)	0-4	2.4	(1.1, 5.4)	0.031
	5-9	1.8	(0.7, 4.3)	0.21
	10-14	0.9	(0.3, 2.5)	0.78
	15-20	1.0	referent	
Heart **				
Treatment factor	Level of exposure	Univariable Hazard Ratio	95% Confidence Interval	p-value
Cyclophosphamide (mg/m ²)	None	1.0	referent	
	>0 to 10000	0.8	(0.4, 1.7)	0.60
	>10000 to 20000	2.8	(1.4, 5.6)	0.0028
	>20000	3.3	(1.3, 8.7)	0.014
Anthracyclines (mg/m ²)	None	1.0	referent	
	>0 to 150	3.4	(0.9, 12.5)	0.69
	>150 to 300	2.6	(0.8, 8.5)	0.11
	>300 to 450	10.0	(4.4, 22.6)	<0.0001
	>450	31.2	(14.3, 68.2)	<0.0001
Heart radiation exposure (Gy)	None	1.0	referent	
	>0 to 10	1.9	(0.9, 4.1)	0.075
	> 10 to 20	1.3	(0.4, 4.7)	0.70
	> 20 to 30	2.6	(0.8, 8.4)	0.10
	> 30	4.1	(1.7, 9.6)	0.0013
Liver †				
Treatment factor	Level of exposure	Univariable Hazard Ratio	95% Confidence Interval	p-value
Dactinomycin	No	1.0	referent	
	Yes	3.6	(1.5, 8.8)	0.0040
Cyclophosphamide	No	1.0	referent	
	Yes	4.3	(1.6, 12.1)	0.0049

IV or IM Methotrexate	No	1.0	referent	0.0009
	Yes	4.4	(1.8, 10.7)	
Antimetabolites (6-MP or 6-TG)	No	1.0	referent	0.76
	Yes	1.2	(0.5, 2.8)	
Abdominal radiation exposure (Gy)	None	1.0	referent	0.084
	>0 to 20 (non TBI)	0.3	(0.1, 1.2)	
	> 20 (non TBI)	1.1	(0.4, 3.5)	
	TBI	3.6	(0.4, 28.9)	
Sex	Male	1.0	referent	0.048
	Female	0.4	(0.2, 1.0)	

Lung ‡

Treatment factor	Level of exposure	Univariable Hazard Ratio	95% Confidence Interval	p-value
Carmustine	No	1.0	referent	0.0010
	Yes	9.3	(2.5, 35.1)	
IV or IM Methotrexate	No	1.0	referent	0.38
	Yes	1.8	(0.5, 7.1)	
Lung radiation exposure (Gy)	None	1.0	referent	0.036
	>0 to 10	1.3	(0.2, 7.2)	
	> 10	5.8	(1.1, 30.0)	
Age at primary cancer diagnosis	0-4 yrs old	0.8	(0.2, 3.4)	0.82
	5-9 yrs old	0.3	(0.0, 2.5)	0.24
	10-14 yrs old	0.9	(0.2, 4.3)	0.86
	15-20 yrs old	1.0	referent	
Sex	Male	1.0	referent	0.13
	Female	2.5	(0.8, 8.1)	

* Other factors evaluated in univariable analysis for kidney: cyclophosphamide, cisplatin and sex

** Other factors evaluated in univariable analysis for heart: cisplatin, ifosfamide, sex and age at primary cancer diagnosis

† Other factors evaluated in univariable analysis for liver: age at primary cancer diagnosis

‡ Other factors evaluated in univariable analysis for lung: cyclophosphamide, cisplatin, bleomycin