

Supplementary Materials

Supplementary Table 1. Categorization of data types based on dataset origin.

Data type	Origin dataset and resolution if applicable
Sex	RPDB
Death date	RPDB
ICD-0-3 topography code	OCR
ICD-0-3 morphology code	OCR
Best stage at diagnosis (collaborative stage summary stage or the pathological/clinical stage from case resolution)	OCR
Diagnosis age	OCR
Date of primary cancer diagnosis	ALR
IMD flag	ALR, DAD, NACRS
IMD date	ALR, DAD, NACRS; if inconsistent IMD date, resolved by using the dates ALR > DAD and SDS > NACRS
Radiation tx date	ALR
Radiation tx body region code	ALR
Course of radiation treatment	ALR
Intent of radiation treatment	ALR
NHPIP code	ALR
Systemic therapy tx date	NDFP
Drug name	NDFP
Description (description of eligible disease and indication)	NDFP
ESAS – symptom management results	ESAS
Radiation treatment location data	ALR

*Registered Persons Database (RPDB), Ontario Cancer Registry (OCR), Cancer Activity Level Reporting (ALR), Discharge Abstract Database (DAD), National Ambulatory Care Reporting System (NACRS), New Drug Funding Program (NDFP), Symptom Management Database (ESAS), International Classification of Diseases (ICD), Intracranial Metastatic Disease (IMD), National Hospital Productivity Improvement Program (NHPIP).

Supplementary Table 2. NHPIP external beam treatment delivery codes. Bolded treatments are the defined relevant treatments.

500	Tx Superficial X-Ray
510	Tx Orthovoltage
538	Tx Linac TBI
540	Tx Linac Electrons
542	Tx Linac TSE
543	Tx Linac Non-Mod
544	Tx Linac Fld-in-Fld
548	Tx Linac SRT w Cones
592	Tx Linac IMRT
593	Tx Linac SBRT
594	Tx Linac VMAT
572	Tx Gammaknife
598	Tx CK Intra-Cranial
599	Tx CK Extra-Cranial
575	Tx Tomotherapy
576	Tx Tomotherapy TMI
595	Tx Tomotherapy SBRT
582	Tx PDT
590	Tx Radionuclide

Supplementary Table 3. Systemic treatment categorization.

Treatment category	Treatment
Chemotherapy	Paclitaxel, Pemetrexed, Docetaxel, Bendamustine, Azacitidine, Cavazitaxel, Epirubicin, Irinotecan, Oxaliplatin, Gemcitabine, Vinorelbine, Topotecan, Bab-Paclitaxel, Eribulin, Liposomal Doxorubicin, Raltitrexed, Pegaspargase, Pralatrexate, Fludarabine, Liposomal daunorubicin and Cytarabine, Arsenic Trioxide, Thiotepea
Antibody	Nivolumab, Ipilimumab, Pembrolizumab, Rituximab IV (Rituxan), Trastuzumab (Herceptin), Pertuzumab, Rituximab IV (Truxima), Rituximab SC, Bevacizumab (Mvasi), Atezolizumab, Bevacizumab (Avastin), Ramucirumab, Bevacizumab (Zirabev), Trastuzumab (Trazimera), Panitumab, Denosumab, Daratumumab SC, Obinutuzumab, Trastuzumab (Ogivri), Daratumumab IV, Rituximab IV (Riximyo), Rituximab IV (Ruxience), Durvalumab, Avelumab, Trastuzumab (Kanjinti), Cetuximab, Blinatumomab_overfill, Blinatumomab, Trastuzumab (Herzuma), Cemiplimab, Bevacizumab (Bamvevi), Istatuximab, Siltuximab, Dinutuximab
Antibody conjugate	Trastuzumab emtansine, Polatuzumab vedotin, Brentuximab vedotin, Gemtuzumab ozogamicin, Trastuzumab deruxtecan, enfortumav vedotin, Sacituzumav govitecan, Inotuzumab Ozogamicin
Immunomodulator	Interferon, Aldesleukin, Interferon lyophilized powder
Systemic radiation	Radium-223 dichloride, Strontium-89
Other	Pamidronate, Carfilzomib, Bortezomib, Zoledronic acid, Plerixafor, Midostaurin, Ventoclax, Temsirolimus, Romidepsin, Gilteritinib, Porfimer sodium, Erwinia asparaginase

Supplementary Table 4. Primary cancer morphology and topography codes.

Topography	
Gastro-intestinal	C260-269
Melanoma	C440-449, C510-519, C600-609, C632
Thyroid	C739
Lung	C340-349
Breast	C500-C509
Colon	C180-189
Morphology	
Renal cell	83123, 83163, 83173, 83183, 82603
Sarcoma	86800-87139, 8800-89219, 89900-89919, 90400-90449, 91200-91259, 91300-91369, 91410-92529, 93700-93739, 95400-95829

Supplemental Table 5. Patient characteristics

	Overall cohort	SRT	WBRT
n	4410	2922 (66%)	1488 (34%)
# getting systemic treatment	4410 (100%)	2922 (100%)	1488 (100%)
Chemotherapy	2499 (57%)	1608 (55%)	891 (60%)
Antibodies	2868 (65%)	1969 (67%)	899 (60%)
Ab Conjugate	185 (4%)	117 (4%)	68 (5%)
Immunomodulator	44 (1%)	27 (1.0%)	17 (1%)

Systemic RT	23 (0.5%)	9 (0.3%)	14 (0.9%)
Other systemic Tx	124 (3%)	59 (2%)	65 (4%)
Average age at diagnosis (NA's removed)	60.9	61.4	60.0
Best stage group at diagnosis	IV: 2126 (48%) III: 837 (19%) II: 459 (10%) I: 174 (4%) Other/NA/missing: 814 (18%)	IV: 1442 (49%) III: 535 (8%) II: 288 (10%) I: 104 (4%) Other/NA/missing: 553 (19%)	IV: 684 (46%) III: 302 (20%) II: 171 (11%) I: 70 (5%) Other/NA/missing: 261 (18%)
Sex ratio	M: 1860 (42%) F: 2550 (58%)	M: 1293 (44%) F: 1629 (56%)	M: 567(38%) F: 921 (62%)
Number of lesions	-	Min/Max: 1/35 1stQ/3rdQ: 1.0/2.0 Median/mean: 1.0/2.143	-
Primary tumour type	Breast: 874 (20%) Lung: 2261 (51%) Radioresistant: 468 (10%) Colon/GI: 118 (3%) Other: 689 (16%)	Breast: 447 (15%) Lung: 1598 (55%) Radioresistant: 340 (11%) Colon/GI: 84 (3%) Other: 453 (15%)	Breast: 427 (29%) Lung: 663 (44%) Radioresistant: 128 (9%) Colon/GI: 34 (2%) Other: 236 (16%)

Supplementary Table 6. Multivariate analysis of cox-proportional hazards for overall survival of SRT relative to WBRT across radioresistant categories.

	Breast		Lung		Radioresistant		Col/GI		Other	
	HR	p value	HR	p value	HR	p value	HR	p value	HR	p value
RT type (Radiosurgery)	0.47710	1.05e-19*	0.511335	5.09e-26*	0.3164210	1.43e-14*	1.111152	0.670	0.416871	1.86e-18*
Chemotherapy	1.052168	0.772	1.181625	0.0352	0.9900674	0.982	1.825249	0.563	1.428878	2.962e-3
Antibodies	0.622736	1.05e-6	0.926699	0.295	0.7369366	0.327	0.877950	0.584	1.063112	0.619
Ab Conjugate	0.959159	0.732	NA	NA	NA	NA	NA	NA	3.822940	0.191
Immunomodulator	NA	NA	NA	NA	1.1371483	0.575	NA	NA	NA	NA
Systemic RT	NA	NA	NA	NA	NA	NA	NA	NA	0.555056	0.0198
Other systemic TX	1.216147	0.0881	0.641811	0.660	NA	NA	NA	NA	0.894220	0.680
Diagnosis age (Primary)	1.011953	8.57e-4*	1.021537	2.28e-10	0.9995080	0.924	1.010004	0.286	1.007653	0.0796
Sex (M)	0.618783	0.504	1.227108	6.01e-4	1.2725312	0.0875	2.078280	0.00546	1.168027	0.0120
ESAS -Anxiety	0.980446	0.347	0.978530	0.134	0.9439739	0.111	1.012962	0.845	0.985798	0.597
ESAS -Depression	0.964214	0.123	1.018809	0.244	1.0387228	0.348	1.154517	0.0417	1.016045	0.585
ESAS -Drowsiness	0.975722	0.255	0.998346	0.906	1.0068031	0.863	0.954582	0.578	0.998480	0.948
ESAS - Lack of Appetite	1.013193	0.474	1.023592	0.0517	1.049063	0.156	1.030396	0.605	1.015265	0.451
ESAS - Nausea	0.967249	0.131	1.025927	0.117	1.0410741	0.260	0.926719	0.390	0.994287	0.822
ESAS - Pain	1.029819	0.0977	1.026954	0.0218	1.0491784	0.0964	1.002333	0.968	1.042637	0.00457
ESAS - Shortness of Breath	1.063499	9.52e-4	1.037564	1.09e-3	1.0639253	0.0620	1.210660	0.0114	1.053964	8.30e-3
ESAS -Tiredness	1.020657	0.351	0.970229	0.0389	0.9698145	0.411	0.904762	0.113	1.001673	0.946
ESAS - Wellbeing	1.032188	0.120	1.018611	0.170	0.9932698	0.832	1.067171	0.317	0.989016	0.621

ESAS - Constipation	1.181106	0.444	0.132726	0.413	1.2368474	0.423	NA	NA	0.110945	0.987
ESAS- Diarrhea	0.188344	0.267	0.854406	0.867	NA	NA	NA	NA	NA	NA
ESAS - Sleep	1.267027	0.306	1.299600	0.298	NA	NA	NA	NA	NA	NA
ESAS - Activities & Function	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Supplemental Table 7. Cox-proportional hazards for overall survival of patients with radioresistant vs radiosensitive primary tumour types.

Variates	Median OS (monts)	Univariable analysis HR	Adjusted P value (Bonferroni)	Multivariable analysis HR
Overall cohort				
Radiosensitive	6.18 (95% CI, 5.78-6.54)			
Radioresistant	5.62 (95% CI, 4.83-6.37)	0.90 (95% CI, 0.82-1.00), p = 0.0426	p = 0.256	1.10 (95% CI, 0.97-1.25), p = 0.141
SRT treatment				
Radiosensitive	9.50 (95% CI, 8.54-10.20)			
Radioresistant	8.12 (95% CI, 6.93-10.40)	0.89 (95% CI, 0.79-1.00), p = 0.0520	p = 0.312	1.09 (95% CI, 0.93-1.78), p = 0.298
WBRT treatment				
Radiosensitive	3.06 (95% CI, 2.79-3.35)			
Radioresistant	2.78 (95% CI, 2.14-3.52)	1.15 (95% CI, 0.97-1.37), p = 0.101	p = 0.606	1.19 (95% CI, 0.96-1.48), p = 0.119

Supplementary Table 8. Multivariate analysis of cox-proportional hazards for overall survival of patient primary radioresistant categories relative to breast (n = 447), within the SRT group.

Variates	HR	P value
Lung	1.039084	0.659
Radioresistant	1.036438	0.779
ColGI	1.789988	8.24e-5
Other	1.342508	3.18e-3
Chemotherapy	1.233963	5.06e-3*
Antibodies	0.834343	4.25e-3*
Ab Conjugate	0.915231	0.526
Immunomodulator	2.264930	2.55e-4*
Systemic RT	1.182743	0.663
Other systemic TX	1.401204	0.0229
Diagnosis age (Primary)	1.013390	1.88e-8*
Sex (M)	1.286078	6.50e-6*
ESAS -Anxiety	0.988992	0.392
ESAS -Depression	1.007672	0.593
ESAS -Drowsiness	0.988341	0.357
ESAS - Lack of Appetite	1.020319	0.0631
ESAS - Nausea	1.006579	0.643
ESAS - Pain	1.037256	7.17e-4
ESAS - Shortness of Breath	1.042632	8.91e-5
ESAS -Tiredness	0.989820	0.430
ESAS - Wellbeing	1.011200	0.349
ESAS - Constipation	1.112706	0.597
ESAS- Diarrhea	0.291197	0.175

ESAS - Sleep	1.195995	0.125
ESAS - Activities & Function	NA	NA

Supplementary Table 9. Multivariate analysis of cox-proportional hazards for overall survival of patient primary radioresistant categories relative to breast (n = 427), within the WBRT group.

Variates	HR	P value
Lung	0.8008	0.0184*
Radioresistant	1.363	0.0560
ColGI	0.8113	0.289
Other	1.199	0.0997
Chemotherapy	1.014	0.878
Antibodies	0.8880	0.135
Ab Conjugate	0.6097	2.97e-3*
Immunomodulator	0.8045	0.443
Systemic RT	0.4200	3.32e-3*
Other systemic TX	0.940	0.966
Diagnosis age (Primary)	1.011	7.43e-4*
Sex (M)	1.149	0.0836*
ESAS -Anxiety	0.9627	0.0233*
ESAS -Depression	1.011	0.570
ESAS -Drowsiness	1.012	0.446
ESAS - Lack of Appetite	1.028	0.0386*
ESAS - Nausea	0.9839	0.341
ESAS - Pain	1.025	0.0464*
ESAS - Shortness of Breath	1.047	3.88e-4
ESAS -Tiredness	0.9734	0.101
ESAS - Wellbeing	1.018	0.226
ESAS - Constipation	4.528e1	0.982
ESAS- Diarrhea	1.802e9	0.983
ESAS - Sleep	4.091e-4	0.983
ESAS - Activities & Function	NA	NA

Supplementary Table 10. Lesion counts within the SRT group across primary radioresistant categories.

Number of Lesions	Breast	Lung	Radioresistant	Colon/GI	Other
1	240	897	183	50	268
2	88	308	78	17	91
3	48	166	29	9	35
4	23	93	18	<6	16
5	11	40	10	<6	17
6	8	30	<6	<6	11
7	9	14	6	<6	<6
8	<6	19	<6	-	<6
9	<6	7	<6	-	<6
10	<6	12	<6	-	<6
11	<6	<6	<6	-	-
12	<6	<6	-	-	<6
13	-	<6	-	-	-

14	<6	-	-	-	<6
15	<6	<6	<6	-	-
16	-	<6	-	-	-
17	-	<6	-	-	-
19	<6	-	-	-	-
22	-	<6	-	-	-
23	<6	-	-	-	-
29	-	<6	-	-	-
30	-	<6	-	-	-
35	-	-	-	-	<6

Supplementary Table 11. Multivariate analysis of cox-proportional hazards for overall survival based on accounted lesions within the SRT group.

Variates	HR	P value
Lesions	1.020037	0.0392*
Lung	1.027865	0.751
Radioresistant	1.015399	0.905
ColGI	1.800799	6.96e-5*
Other	1.335535	3.75e-3*
Chemotherapy	1.230183	5.75e-3*
Antibodies	0.838825	5.54e-3*
Ab Conjugate	0.895509	0.431
Immunomodulator	2.306117	1.89e-4*
Systemic RT	1.202434	0.633
Other systemic TX	1.381942	0.0291*
Diagnosis age (Primary)	1.013709	9.38e-9*
Sex (M)	1.290042	5.08e-6*
ESAS -Anxiety	0.989425	0.411
ESAS -Depression	1.007966	0.579
ESAS -Drowsiness	0.988691	0.372
ESAS - Lack of Appetite	1.020299	0.0638
ESAS - Nausea	1.006343	0.655
ESAS - Pain	1.037707	6.32e-4*
ESAS - Shortness of Breath	1.041933	1.14e-4
ESAS -Tiredness	0.987865	0.349
ESAS - Wellbeing	1.011658	0.331
ESAS - Constipation	1.115149	0.588
ESAS- Diarrhea	0.291806	0.176
ESAS - Sleep	1.198906	0.120
ESAS - Activities & Function	NA	NA

Supplementary Table 12. Multivariate analysis of cox-proportional hazards for overall survival based on grouped values of accounted lesions (relative to 1-3 lesions) within the SRT group.

Variates	HR	P value
4-7 lesions	1.156462	0.0528
8-10 lesions	1.268176	0.118
11+ lesions	1.133838	0.585
Lung	1.020779	0.813
Radioresistant	1.009397	0.942
ColGI	1.800990	7.01e-5*
Other	1.331645	4.18e-3*
Chemotherapy	1.228451	6.10e-3*
Antibodies	0.838554	5.41e-3*
Ab Conjugate	0.896361	0.435
Immunomodulator	2.320471	1.70e-4*
Systemic RT	1.216870	0.611
Other systemic TX	1.373443	0.0324*

Diagnosis age (Primary)	1.013722	9.16e-9*
Sex (M)	1.288978	5.99e-6*
ESAS -Anxiety	0.990215	0.449
ESAS -Depression	1.005960	0.678
ESAS -Drowsiness	0.989060	0.388
ESAS - Lack of Appetite	1.019885	0.0695
ESAS - Nausea	1.003740	0.793
ESAS - Pain	1.037849	6.01e-4*
ESAS - Shortness of Breath	1.042801	8.84e-5*
ESAS -Tiredness	0.988440	0.373
ESAS - Wellbeing	1.012686	0.291
ESAS - Constipation	1.115969	0.585
ESAS- Diarrhea	0.295417	0.177
ESAS - Sleep	1.196053	0.124
ESAS - Activities & Function	NA	NA

Supplementary Table 13. Multivariate analysis of cox-proportional hazards for overall survival based on grouped values (3- vs 4+) of accounted lesions within the SRT group.

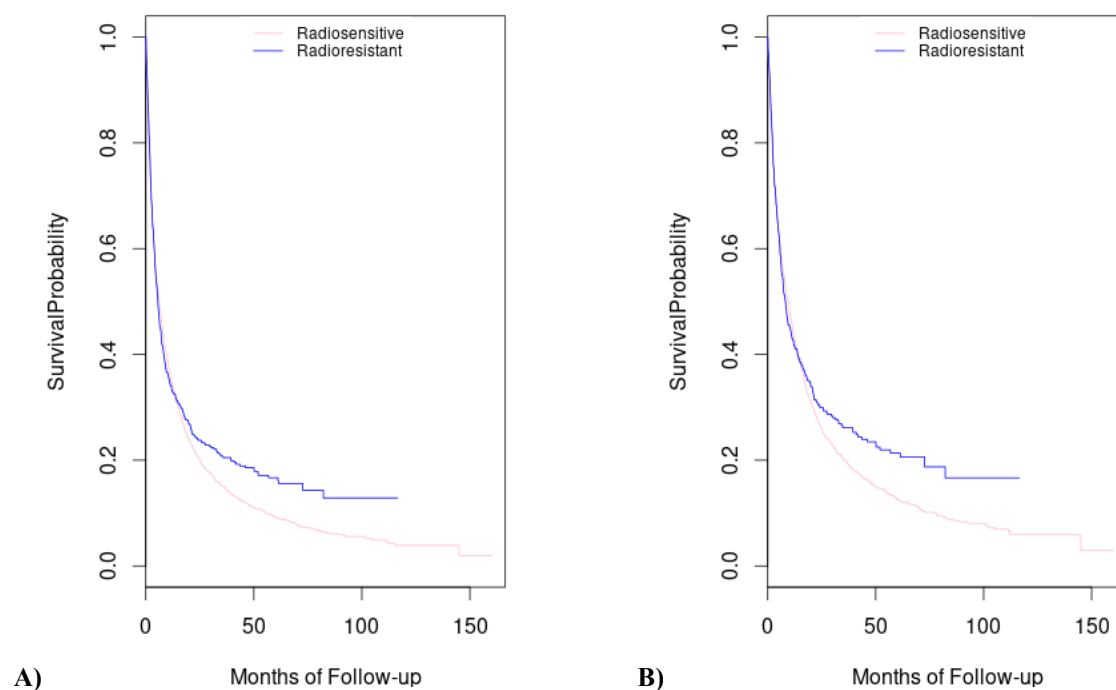
Variates	HR	P value
4+ Lesions	1.171774	0.0184*
Lung	1.024649	0.779
Radioresistant	1.015203	0.906
ColGI	1.805669	6.45e-5*
Other	1.336231	3.69e-3*
Chemotherapy	1.230085	5.75e-3*
Antibodies	0.838496	5.41e-3*
Ab Conjugate	0.896163	0.433
Immunomodulator	2.317202	1.74e-4*
Systemic RT	1.218895	0.608
Other systemic TX	1.378820	0.0302*
Diagnosis age (Primary)	1.013662	1.04e-8*
Sex (M)	1.284883	7.01e-6*
ESAS -Anxiety	0.990256	0.450
ESAS -Depression	1.006193	0.666
ESAS -Drowsiness	0.989114	0.390
ESAS - Lack of Appetite	1.019823	0.0703
ESAS - Nausea	1.003746	0.792
ESAS - Pain	1.037975	5.76e-4
ESAS - Shortness of Breath	1.042624	8.89e-5
ESAS -Tiredness	0.988155	0.360
ESAS - Wellbeing	1.012909	0.282
ESAS - Constipation	1.116153	0.584
ESAS- Diarrhea	0.295630	0.177
ESAS - Sleep	1.195870	0.124
ESAS - Activities & Function	NA	NA

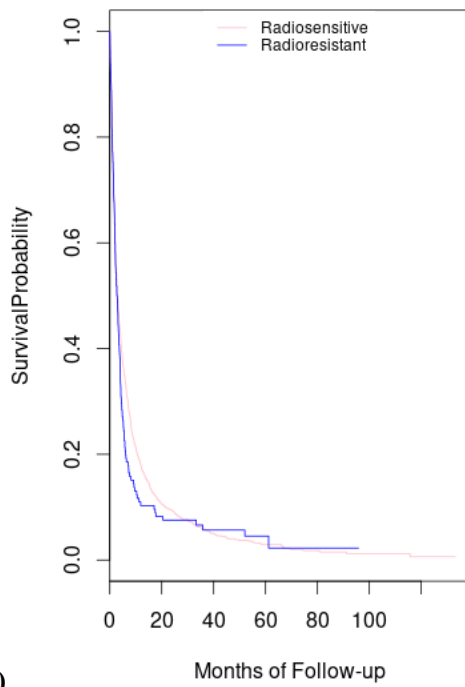
Supplementary Table 14. Multivariate analysis of cox-proportional hazards for overall survival based on grouped values (4- vs 5+) of accounted lesions within the SRT group.

Variates	HR	P value
5+ Lesions	1.138612	0.110
Lung	1.028591	0.746
Radioresistant	1.018351	0.887
ColGI	1.793592	7.79e-5*
Other	1.330417	4.30e-3*
Chemotherapy	1.229599	5.89e-3*
Antibodies	0.836061	4.70e-3*
Ab Conjugate	0.899475	0.450
Immunomodulator	2.299541	1.99e-4*
Systemic RT	1.200756	0.635

Other systemic TX	1.385952	0.0278*
Diagnosis age (Primary)	1.013655	1.10e-8*
Sex (M)	1.289511	5.23e-6*
ESAS -Anxiety	0.989823	0.430
ESAS -Depression	1.006677	0.642
ESAS -Drowsiness	0.988423	0.360
ESAS - Lack of Appetite	1.020079	0.0667
ESAS - Nausea	1.006265	0.659
ESAS - Pain	1.037431	6.87e-4*
ESAS - Shortness of Breath	1.042631	8.88e-5*
ESAS -Tiredness	0.988734	0.384
ESAS - Wellbeing	1.011839	0.233
ESAS - Constipation	1.114949	0.589
ESAS- Diarrhea	0.292805	0.176
ESAS - Sleep	1.196400	0.124
ESAS - Activities & Function	NA	NA

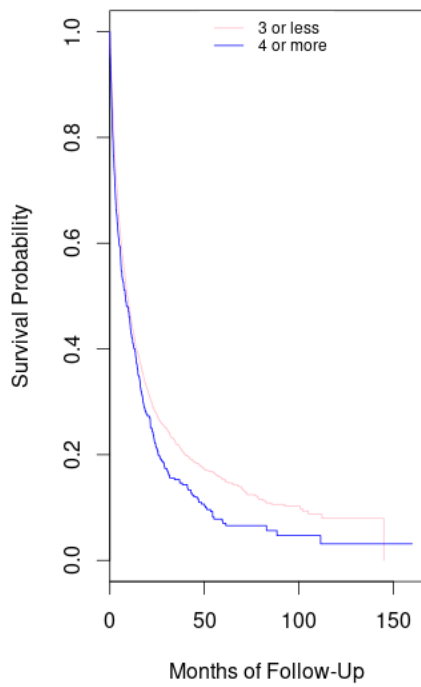
Supplemental Figure 1. Kaplan-Meier curves of the overall survival between the broad radioresistant (melanoma, renal cell, GI, colon, thyroid, and sarcomas) and radiosensitive (breast, lung, and other) with the A) overall cohort, B) SRT treatment cohort, C) WBRT treatment cohort.



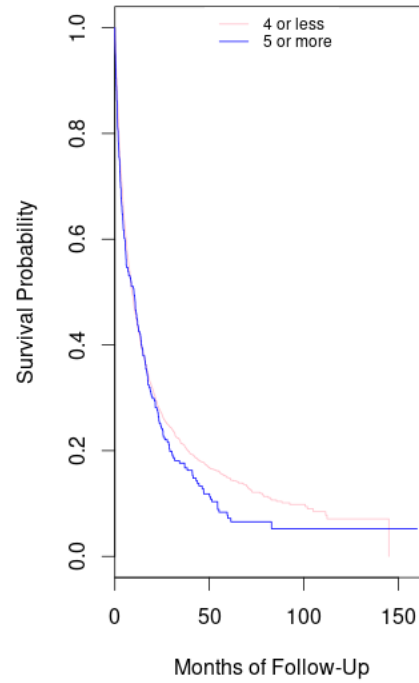


C)

Supplemental Figure 2. Kaplan-Meier curves of the overall survival between A) 3 or less vs 4 or more lesions, and B) 4 or less lesions vs 5 or more.



A)



B)

