

Table S1 Baseline characteristics of patients with lung metastases underwent PTR before and after PSM

Variables	Before PSM			After PSM		
	NS (n=4,339)	PTR (n=221)	P value	NS (n=537)	PTR (n=142)	P value
Age (years)			<0.001			0.262
≤55	558 (12.9)	43 (19.5)		86 (16.0)	31 (21.8)	
56-75	2,385 (55.0)	135 (61.1)		328 (61.1)	80 (56.3)	
≥76	1,396 (32.2)	43 (19.5)		123 (22.9)	31 (21.8)	
Race			0.717			0.367
White	3,206 (73.9)	165 (74.7)		408 (76.0)	105 (73.9)	
Black	647 (14.9)	29 (13.1)		88 (16.4)	21 (14.8)	
Other	486 (11.2)	27 (12.2)		41 (7.6)	16 (11.3)	
sex (male)	2,021 (46.6)	95 (43.0)	0.330	221 (41.2)	58 (40.8)	1.000
Location			<0.001			0.063
Main bronchus	154 (3.5)	1 (0.5)		7 (1.3)	1 (0.7)	
Upper lobe	2,186 (50.4)	100 (45.2)		219 (40.8)	52 (36.6)	
Middle lobe	188 (4.3)	16 (7.2)		27 (5.0)	12 (8.5)	
Lower lobe	1,101 (25.4)	64 (29.0)		163 (30.4)	46 (32.4)	
Overlapping lesions	60 (1.4)	9 (4.1)		4 (0.7)	5 (3.5)	
NOS	650 (15.0)	31 (14.0)		117 (21.8)	26 (18.3)	
T stage			<0.001			0.458
T1	857 (19.8)	75 (33.9)		153 (28.5)	46 (32.4)	
T2	1,211 (27.9)	59 (26.7)		160 (29.8)	35 (24.6)	
T3	923 (21.3)	49 (22.2)		102 (19.0)	32 (22.5)	
T4	1,348 (31.1)	38 (17.2)		122 (22.7)	29 (20.4)	
N stage			<0.001			0.952
N0	1,124 (25.9)	105 (47.5)		252 (46.9)	63 (44.4)	
N1	269 (6.2)	20 (9.0)		34 (6.3)	9 (6.3)	
N2	1,843 (42.5)	78 (35.3)		195 (36.3)	55 (38.7)	
N3	1,103 (25.4)	18 (8.1)		56 (10.4)	15 (10.6)	
LND (Yes)	56 (1.3)	84 (38.0)	<0.001	8 (1.5)	6 (4.2)	0.088
Chemotherapy (Yes)	2,454 (56.6)	126 (57.0)	0.949	322 (60.0)	87 (61.3)	0.852

NS, no surgery; PTR, primary tumor resection only; LND, lymph node dissection.

Table S2 Baseline characteristics of patients with bone metastases underwent PTR before and after PSM

Variables	Before PSM			After PSM		
	NS (n=5,636)	PTR (n=67)	P value	NS (n=144)	PTR (n=39)	P value
Age (years)			0.053			0.824
≤55	883 (15.7)	13 (19.4)		34 (23.6)	9 (23.1)	
56-75	3,362 (59.7)	46 (68.7)		86 (59.7)	25 (64.1)	
≥76	1,391 (24.7)	8 (11.9)		24 (16.7)	5 (12.8)	
Race			0.496			0.874
White	4,421 (78.4)	53 (79.1)		116 (80.6)	30 (76.9)	
Black	674 (12.0)	10 (14.9)		18 (12.5)	6 (15.4)	
Other	541 (9.6)	4 (6.0)		10 (6.9)	3 (7.7)	
Sex (male)	3,122 (55.4)	38 (56.7)	0.926	85 (59.0)	23 (59.0)	1.000
Location			0.169			0.542
Main bronchus	188 (3.3)	3 (4.5)		6 (4.2)	3 (7.7)	
Upper lobe	3,175 (56.3)	31 (46.3)		71 (49.3)	16 (41.0)	
Middle lobe	257 (4.6)	6 (9.0)		5 (3.5)	2 (5.1)	
Lower lobe	1,530 (27.1)	21 (31.3)		54 (37.5)	13 (33.3)	
Overlapping lesions	53 (0.9)	2 (3.0)		1 (0.7)	1 (2.6)	
NOS	433 (7.7)	4 (6.0)		7 (4.9)	4 (10.3)	
T stage			0.362			0.990
T1	1,452 (25.8)	20 (29.9)		46 (31.9)	13 (33.3)	
T2	1,720 (30.5)	18 (26.9)		27 (18.8)	7 (17.9)	
T3	1,083 (19.2)	17 (25.4)		31 (21.5)	9 (23.1)	
T4	1,381 (24.5)	12 (17.9)		40 (27.8)	10 (25.6)	
N stage			0.054			0.887
N0	1,457 (25.9)	27 (40.3)		53 (36.8)	14 (35.9)	
N1	562 (10.0)	7 (10.4)		17 (11.8)	3 (7.7)	
N2	2,622 (46.5)	24 (35.8)		48 (33.3)	14 (35.9)	
N3	995 (17.7)	9 (13.4)		26 (18.1)	8 (20.5)	
LND (Yes)	46 (0.8)	32 (47.8)	<0.001	4 (2.8)	4 (10.3)	0.113
Chemotherapy (Yes)	3,397 (60.3)	47 (70.1)	0.129	95 (66.0)	26 (66.7)	1.000

NS, no surgery; PTR, primary tumor resection only; LND, lymph node dissection.

Table S3 Baseline characteristics of patients with brain metastases underwent PTR before and after PSM

Variables	Before PSM			After PSM		
	NS (n=3,323)	PTR (n=33)	P value	NS (n=64)	PTR (n=19)	P value
Age (years)			0.693			0.861
≤55	714 (21.5)	8 (24.2)		12 (18.8)	3 (15.8)	
56-75	2,021 (60.8)	21 (63.6)		43 (67.2)	14 (73.7)	
≥76	588 (17.7)	4 (12.1)		9 (14.1)	2 (10.5)	
Race			0.351			0.240
White	2,502 (75.3)	24 (72.7)		45 (70.3)	14 (73.7)	
Black	457 (13.8)	3 (9.1)		12 (18.8)	1 (5.3)	
Other	364 (11.0)	6 (18.2)		7 (10.9)	4 (21.1)	
sex (male)	1,642 (49.4)	14 (42.4)	0.533	29 (45.3)	8 (42.1)	1.000
Location			0.884			0.886
Main bronchus	104 (3.1)	0 (0.0)		1 (1.6)	0 (0.0)	
Upper lobe	1,983 (59.7)	20 (60.6)		41 (64.1)	13 (68.4)	
Middle lobe	153 (4.6)	1 (3.0)		-	-	
Lower lobe	848 (25.5)	9 (27.3)		16 (25.0)	5 (26.3)	
Overlapping lesions	17 (0.5)	0 (0.0)		-	-	
NOS	218 (6.6)	3 (9.1)		6 (9.4)	1 (5.3)	
T stage			0.177			0.845
T1	684 (20.6)	11 (33.3)		24 (37.5)	8 (42.1)	
T2	1,015 (30.5)	11 (33.3)		17 (26.6)	6 (31.6)	
T3	649 (19.5)	6 (18.2)		11 (17.2)	3 (15.8)	
T4	975 (29.3)	5 (15.2)		12 (18.8)	2 (10.5)	
N stage			0.047			0.719
N0	922 (27.7)	15 (45.5)		44 (68.8)	11 (57.9)	
N1	320 (9.6)	5 (15.2)		1 (1.6)	1 (5.3)	
N2	1,551 (46.7)	11 (33.3)		16 (25.0)	6 (31.6)	
N3	530 (15.9)	2 (6.1)		3 (4.7)	1 (5.3)	
LND (Yes)	11 (0.3)	18 (54.5)	<0.001	4 (6.2)	4 (21.1)	0.140
Chemotherapy (Yes)	1,792 (53.9)	13 (39.4)	0.136	8 (12.5)	5 (26.3)	0.273

NS, no surgery; PTR, primary tumor resection only; LND, lymph node dissection.

Table S4 Baseline characteristics of patients with multiple organ metastases underwent PTR before and after PSM

Variables	Before PSM			After PSM		
	NS (n=9,806)	PTR (n=69)	P value	NS (n=194)	PTR (n=52)	P value
Age (years)			0.161			0.912
≤55	1,789 (18.2)	16 (23.2)		47 (24.2)	13 (25.0)	
56-75	6,024 (61.4)	45 (65.2)		135 (69.6)	35 (67.3)	
≥76	1,993 (20.3)	8 (11.6)		12 (6.2)	4 (7.7)	
Race			0.941			0.925
White	7,374 (75.2)	51 (73.9)		145 (74.7)	39 (75.0)	
Black	1,150 (11.7)	8 (11.6)		16 (8.2)	5 (9.6)	
Other	1,282 (13.1)	10 (14.5)		33 (17.0)	8 (15.4)	
sex (male)	5,063 (51.6)	33 (47.8)	0.610	113 (58.2)	28 (53.8)	0.680
Location			0.005			0.768
Main bronchus	398 (4.1)	1 (1.4)		-	-	
Upper lobe	5,245 (53.5)	34 (49.3)		93 (47.9)	25 (48.1)	
Middle lobe	405 (4.1)	2 (2.9)		2 (1.0)	1 (1.9)	
Lower lobe	2,611 (26.6)	15 (21.7)		41 (21.1)	12 (23.1)	
Overlapping lesions	88 (0.9)	3 (4.3)		3 (1.5)	2 (3.8)	
NOS	1,059 (10.8)	14 (20.3)		55 (28.4)	12 (23.1)	
T stage			0.001			0.792
T1	1,900 (19.4)	26 (37.7)		64 (33.0)	18 (34.6)	
T2	2,734 (27.9)	11 (15.9)		35 (18.0)	10 (19.2)	
T3	2,068 (21.1)	12 (17.4)		54 (27.8)	11 (21.2)	
T4	3,104 (31.7)	20 (29.0)		41 (21.1)	13 (25.0)	
N stage			0.003			0.209
N0	1,712 (17.5)	22 (31.9)		70 (36.1)	17 (32.7)	
N1	728 (7.4)	7 (10.1)		8 (4.1)	6 (11.5)	
N2	4,827 (49.2)	21 (30.4)		55 (28.4)	12 (23.1)	
N3	2,539 (25.9)	19 (27.5)		61 (31.4)	17 (32.7)	
LND (Yes)	47 (0.5)	22 (31.9)	<0.001	6 (3.1)	5 (9.6)	0.100
Chemotherapy (Yes)	5,601 (57.1)	43 (62.3)	0.455	131 (67.5)	35 (67.3)	1.000

NS, no surgery; PTR, primary tumor resection only; LND, lymph node dissection.

Table S5 Baseline characteristics of patients with lung metastases underwent MTR before and after PSM

Variables	Before PSM			After PSM		
	NS (n=4,339)	MTR (n=29)	P value	NS (n=108)	MTR (n=27)	P value
Age (years)			0.043			0.749
≤55	558 (12.9)	5 (17.2)		22 (20.4)	4 (14.8)	
56-75	2,385 (55.0)	21 (72.4)		72 (66.7)	20 (74.1)	
≥76	1,396 (32.2)	3 (10.3)		14 (13.0)	3 (11.1)	
Race			0.381			0.589
White	3,206 (73.9)	19 (65.5)		78 (72.2)	17 (63.0)	
Black	647 (14.9)	7 (24.1)		19 (17.6)	7 (25.9)	
Other	486 (11.2)	3 (10.3)		11 (10.2)	3 (11.1)	
sex (male)	2,021 (46.6)	14 (48.3)	1.000	57 (52.8)	14 (51.9)	1
Location			0.689			0.085
Main bronchus	154 (3.5)	1 (3.4)		0 (0.0)	1 (3.7)	
Upper lobe	2,186 (50.4)	16 (55.2)		70 (64.8)	15 (55.6)	
Middle lobe	188 (4.3)	2 (6.9)		1 (0.9)	2 (7.4)	
Lower lobe	1,101 (25.4)	4 (13.8)		20 (18.5)	4 (14.8)	
Overlapping lesions	60 (1.4)	1 (3.4)		1 (0.9)	1 (3.7)	
NOS	650 (15.0)	5 (17.2)		16 (14.8)	4 (14.8)	
T stage			0.451			0.955
T1	857 (19.8)	4 (13.8)		20 (18.5)	4 (14.8)	
T2	1,211 (27.9)	7 (24.1)		23 (21.3)	6 (22.2)	
T3	923 (21.3)	5 (17.2)		22 (20.4)	5 (18.5)	
T4	1,348 (31.1)	13 (44.8)		43 (39.8)	12 (44.4)	
N stage			0.907			0.832
N0	1,124 (25.9)	7 (24.1)		31 (28.7)	7 (25.9)	
N1	269 (6.2)	2 (6.9)		8 (7.4)	2 (7.4)	
N2	1,843 (42.5)	11 (37.9)		46 (42.6)	10 (37.0)	
N3	1,103 (25.4)	9 (31.0)		23 (21.3)	8 (29.6)	
LND (Yes)	56 (1.3)	3 (10.3)	0.001	4 (3.7)	1 (3.7)	1.000
Chemotherapy (Yes)	2,454 (56.6)	20 (69.0)	0.248	80 (74.1)	19 (70.4)	0.884

NS, no surgery; MTR, metastatic tumor resection only; LND, lymph node dissection.

Table S6 Baseline characteristics of patients with bone metastases underwent MTR before and after PSM

Variables	Before PSM			After PSM		
	NS (n=5,636)	MTR (n=95)	P value	NS (n=380)	MTR (n=95)	P value
Age (years)			0.720			0.899
≤55	883 (15.7)	12 (12.6)		55 (14.5)	12 (12.6)	
56-75	3,362 (59.7)	59 (62.1)		231 (60.8)	59 (62.1)	
≥76	1,391 (24.7)	24 (25.3)		94 (24.7)	24 (25.3)	
Race			0.557			0.833
White	4,421 (78.4)	77 (81.1)		303 (79.7)	77 (81.1)	
Black	674 (12.0)	12 (12.6)		46 (12.1)	12 (12.6)	
Other	541 (9.6)	6 (6.3)		31 (8.2)	6 (6.3)	
sex (male)	3,122 (55.4)	58 (61.1)	0.319	216 (56.8)	58 (61.1)	0.531
Location			0.440			0.733
Main bronchus	188 (3.3)	4 (4.2)		12 (3.2)	4 (4.2)	
Upper lobe	3,175 (56.3)	59 (62.1)		247 (65.0)	59 (62.1)	
Middle lobe	257 (4.6)	3 (3.2)		20 (5.3)	3 (3.2)	
Lower lobe	1,530 (27.1)	19 (20.0)		73 (19.2)	19 (20.0)	
Overlapping lesions	53 (0.9)	0 (0.0)		-	-	
NOS	433 (7.7)	10 (10.5)		28 (7.4)	10 (10.5)	
T stage			0.039			0.881
T1	1,452 (25.8)	35 (36.8)		146 (38.4)	35 (36.8)	
T2	1,720 (30.5)	20 (21.1)		90 (23.7)	20 (21.1)	
T3	1,083 (19.2)	21 (22.1)		73 (19.2)	21 (22.1)	
T4	1,381 (24.5)	19 (20.0)		71 (18.7)	19 (20.0)	
N stage			0.048			0.448
N0	1,457 (25.9)	35 (36.8)		145 (38.2)	35 (36.8)	
N1	562 (10.0)	11 (11.6)		26 (6.8)	11 (11.6)	
N2	2,622 (46.5)	39 (41.1)		159 (41.8)	39 (41.1)	
N3	995 (17.7)	10 (10.5)		50 (13.2)	10 (10.5)	
LND (Yes)	46 (0.8)	1 (1.1)	1.000	1 (0.3)	1 (1.1)	0.859
Chemotherapy (Yes)	3,397 (60.3)	37 (38.9)	<0.001	143 (37.6)	37 (38.9)	0.906

NS, no surgery; MTR, metastatic tumor resection only; LND, lymph node dissection.

Table S7 Baseline characteristics of patients with brain metastases underwent MTR before and after PSM

Variables	Before PSM			After PSM		
	NS (n=3,323)	MTR (n=167)	P value	NS (n=665)	MTR (n=167)	P value
Age (years)			0.366			0.652
≤55	714 (21.5)	29 (17.4)		100 (15.0)	29 (17.4)	
56-75	2,021 (60.8)	110 (65.9)		438 (65.9)	110 (65.9)	
≥76	588 (17.7)	28 (16.8)		127 (19.1)	28 (16.8)	
Race			0.043			0.299
White	2,502 (75.3)	122 (73.1)		507 (76.2)	122 (73.1)	
Black	457 (13.8)	33 (19.8)		100 (15.0)	33 (19.8)	
Other	364 (11.0)	12 (7.2)		58 (8.7)	12 (7.2)	
sex (male)	1,642 (49.4)	90 (53.9)	0.294	368 (55.3)	90 (53.9)	0.803
Location			0.653			0.059
Main bronchus	104 (3.1)	5 (3.0)		6 (0.9)	5 (3.0)	
Upper lobe	1,983 (59.7)	94 (56.3)		421 (63.3)	94 (56.3)	
Middle lobe	153 (4.6)	9 (5.4)		28 (4.2)	9 (5.4)	
Lower lobe	848 (25.5)	42 (25.1)		162 (24.4)	42 (25.1)	
Overlapping lesions	17 (0.5)	2 (1.2)		1 (0.2)	2 (1.2)	
NOS	218 (6.6)	15 (9.0)		47 (7.1)	15 (9.0)	
T stage			0.003			0.566
T1	684 (20.6)	53 (31.7)		202 (30.4)	53 (31.7)	
T2	1,015 (30.5)	50 (29.9)		191 (28.7)	50 (29.9)	
T3	649 (19.5)	22 (13.2)		118 (17.7)	22 (13.2)	
T4	975 (29.3)	42 (25.1)		154 (23.2)	42 (25.1)	
N stage			0.001			0.817
N0	922 (27.7)	70 (41.9)		305 (45.9)	70 (41.9)	
N1	320 (9.6)	14 (8.4)		48 (7.2)	14 (8.4)	
N2	1,551 (46.7)	65 (38.9)		246 (37.0)	65 (38.9)	
N3	530 (15.9)	18 (10.8)		66 (9.9)	18 (10.8)	
LND (Yes)	11 (0.3)	1 (0.6)	1.000	2 (0.3)	1 (0.6)	1.000
Chemotherapy (Yes)	1,792 (53.9)	34 (20.4)	<0.001	135 (20.3)	34 (20.4)	1.000

NS, no surgery; MTR, metastatic tumor resection only; LND, lymph node dissection.

Table S8 Baseline characteristics of patients with multiple organ metastases underwent MTR before and after PSM

Variables	Before PSM			After PSM		
	NS (n=9,806)	MTR (n=151)	P value	NS (n=592)	MTR (n=148)	P value
Age (years)			0.040			0.876
≤55	1,789 (18.2)	21 (13.9)		73 (12.3)	19 (12.8)	
56-75	6,024 (61.4)	108 (71.5)		425 (71.8)	108 (73.0)	
≥76	1,993 (20.3)	22 (14.6)		94 (15.9)	21 (14.2)	
Race			0.480			0.557
White	7,374 (75.2)	116 (76.8)		478 (80.7)	114 (77.0)	
Black	1,150 (11.7)	20 (13.2)		63 (10.6)	20 (13.5)	
Other	1,282 (13.1)	15 (9.9)		51 (8.6)	14 (9.5)	
sex (male)	5,063 (51.6)	73 (48.3)	0.471	291 (49.2)	72 (48.6)	0.985
Location			0.967			0.843
Main bronchus	398 (4.1)	8 (5.3)		21 (3.5)	8 (5.4)	
Upper lobe	5,245 (53.5)	77 (51.0)		303 (51.2)	75 (50.7)	
Middle lobe	405 (4.1)	6 (4.0)		18 (3.0)	6 (4.1)	
Lower lobe	2,611 (26.6)	42 (27.8)		182 (30.7)	41 (27.7)	
Overlapping lesions	88 (0.9)	1 (0.7)		6 (1.0)	1 (0.7)	
NOS	1,059 (10.8)	17 (11.3)		62 (10.5)	17 (11.5)	
T stage			0.015			0.477
T1	1,900 (19.4)	40 (26.5)		172 (29.1)	37 (25.0)	
T2	2,734 (27.9)	51 (33.8)		174 (29.4)	51 (34.5)	
T3	2,068 (21.1)	24 (15.9)		114 (19.3)	24 (16.2)	
T4	3,104 (31.7)	36 (23.8)		132 (22.3)	36 (24.3)	
N stage			0.402			0.930
N0	1,712 (17.5)	32 (21.2)		128 (21.6)	32 (21.6)	
N1	728 (7.4)	12 (7.9)		45 (7.6)	12 (8.1)	
N2	4,827 (49.2)	76 (50.3)		311 (52.5)	74 (50.0)	
N3	2,539 (25.9)	31 (20.5)		108 (18.2)	30 (20.3)	
LND (Yes)	47 (0.5)	3 (2.0)	0.043	5 (0.8)	0 (0.0)	0.575
Chemotherapy (Yes)	5,601 (57.1)	49 (32.5)	<0.001	205 (34.6)	48 (32.4)	0.684

NS, no surgery; MTR, metastatic tumor resection only; LND, lymph node dissection.