

Figure S1. Hematoxylin and Eosin staining of the PSCs specimen from PSC-Case 1. The tumor tissue contained epithelial carcinoma components and sarcoma components. (A) Squamous cell carcinoma component (scale bar, 20 μm), (B) Spindle cell sarcoma component (scale bar, 50 μm), (C) Osteosarcoma component (scale bar: 50 μm), (D) Chondrosarcoma component (scale bar: 50 μm), and (E) Rhabdomyosarcoma component (scale bar: 20 μm). PSC, pulmonary sarcomatoid carcinomas.

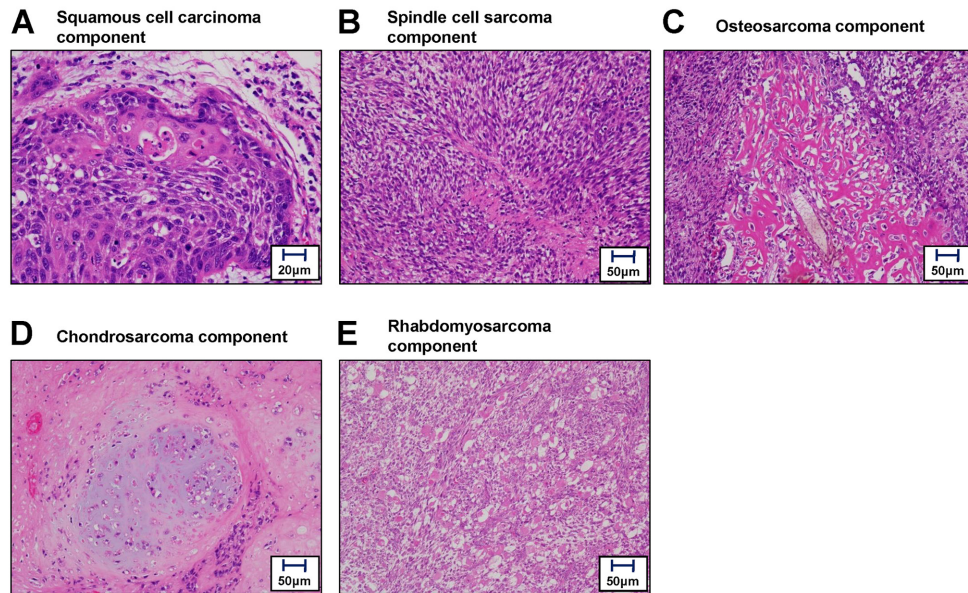


Figure S2. Gene mutation analysis in PSCs and epithelial carcinomas. (A) Mutation profile and (B) TMB of 6 PSCs and epithelial carcinomas (5 adenocarcinoma and 6 squamous cell carcinoma). Somatic mutations were detected by targeted deep sequencing (CCP; Thermo Fisher Scientific, Inc.). Pathogenicity was classified by FATHMM (scores ≥ 0.7 are classified as pathogenic variants) algorithm. TMB was calculated as the number of non-synonymous mutations/Mb. The data represent the mean $\pm$ SD. TMB, tumor mutation burden; PSC, pulmonary sarcomatoid carcinomas.

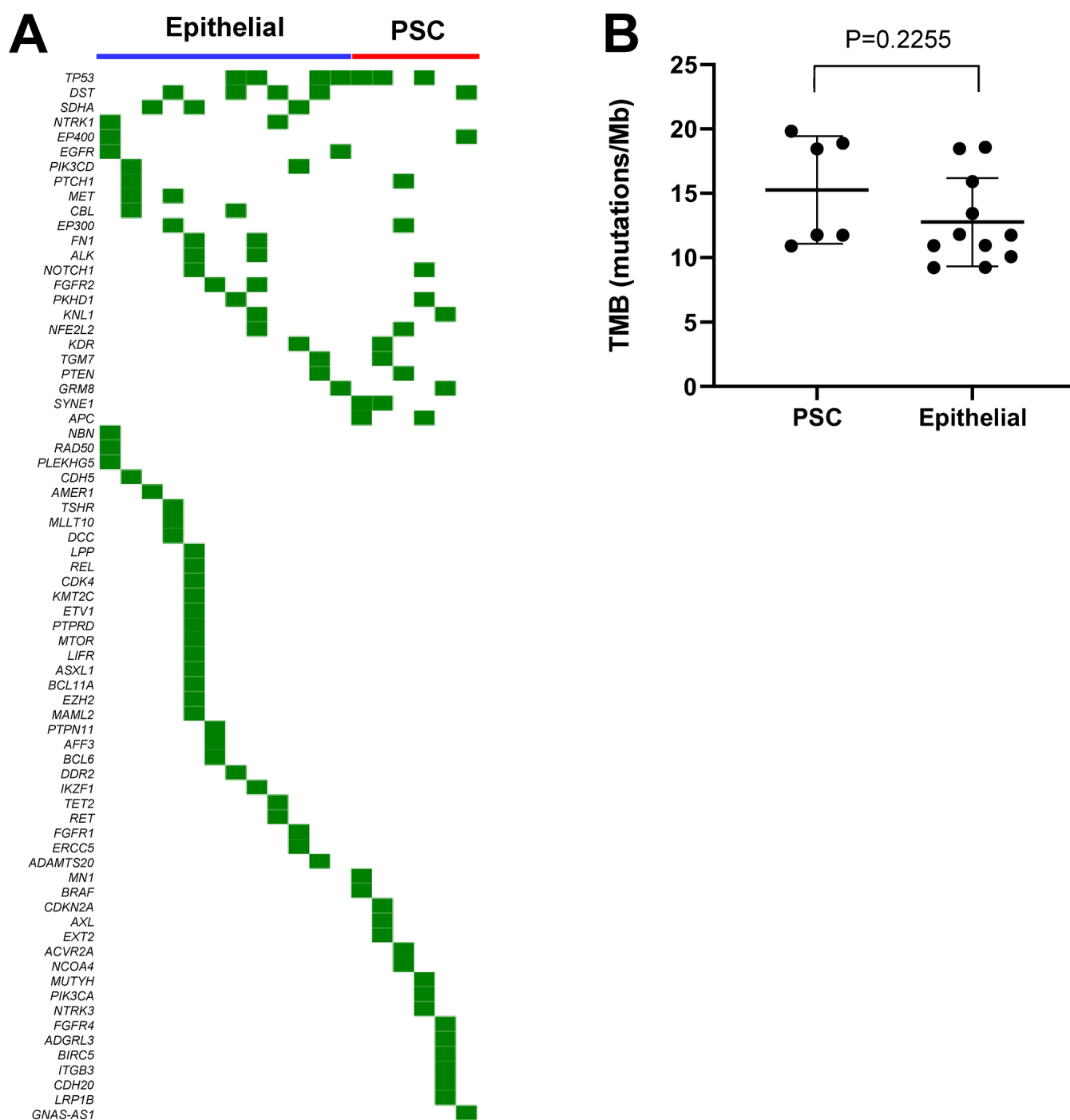


Figure S3. Selected regions of interests for GeoMx™ digital spatial profiling. ROI images and selected regions of interest (spots 1-12) with (A) squamous cell carcinoma, (B) adenocarcinoma and (C-E) PSC cases 1-6 as summarized in Table SII. ROI images were visualized with fluorescent staining using blue, green, red, and cyan for nuclei, pan-cytokeratin, CD3 and CD45, respectively. Numbers (1-12) indicates the numbers of spots. Scale bar, 200 μ m. ROI, region of interest; CD, cluster of differentiation; PSC, pulmonary sarcomatoid carcinomas.

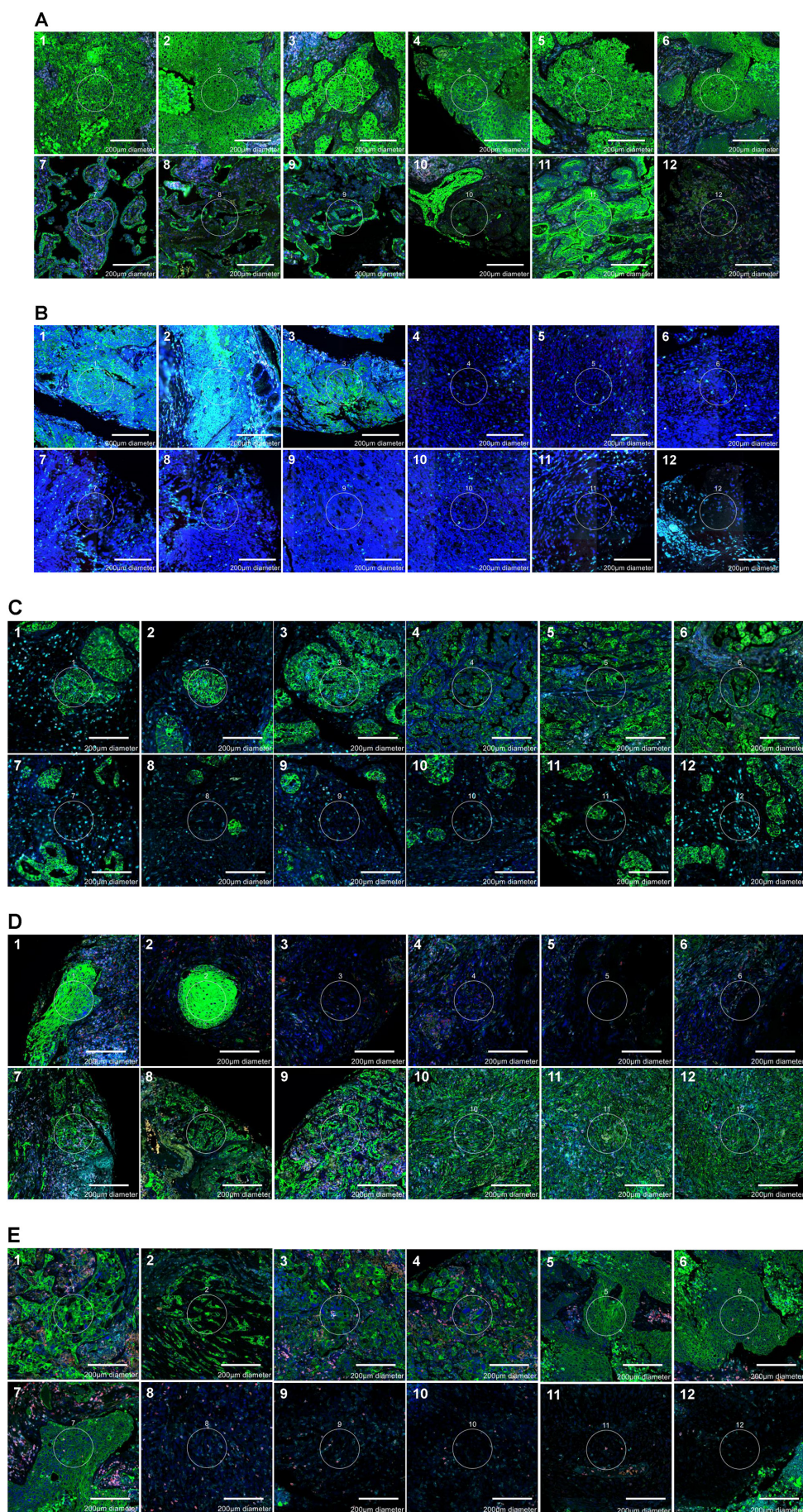


Table SI. A total of 56 antibodies of GeoMx™ digital spatial profiling.

Antibody name within GeoMx™ digital spatial profiling
4-1BB CD137
ARG1
B7-H3
Bcl-2
Beta-2-microglobulin
CD11c
CD127
CD14
CD163
CD20
CD25
CD27
CD3
CD34
CD4
CD40
CD44
CD45
CD45RO
CD56
CD66b
CD68
CD8
CD80
CTLA4
EPCAM
ER alpha
FAPalpha
Fibronectin
GAPDH
GZMB
Her2/ErbB2
Histone H3
HLA-DR
ICOS
IDO1
Ki-67
LAG3
MART1
Ms IgG1
Ms IgG2a
NY-ESO-1
OX40L
Pan-cytokeratin
PD-1
PD-L1
PD-L2
PTEN
Rb IgG
S100B
S6
SMA
STING
TGFB1
Tim-3
VISTA

Table SII. Selected region of interest with PSC and epithelial carcinoma for GeoMx™ digital spatial profiling.

A, Supplementary figure 3A

Spot of interest	Case	Component	Group
1	Epi-Case 1	Squamous cell carcinoma	Epithelial
2	Epi-Case 2	Squamous cell carcinoma	Epithelial
3	Epi-Case 3	Squamous cell carcinoma	Epithelial
4	Epi-Case 4	Squamous cell carcinoma	Epithelial
5	Epi-Case 5	Squamous cell carcinoma	Epithelial
6	Epi-Case 6	Squamous cell carcinoma	Epithelial
7	Epi-Case 7	Adenocarcinoma	Epithelial
8	Epi-Case 8	Adenocarcinoma	Epithelial
9	Epi-Case 9	Adenocarcinoma	Epithelial
10	Epi-Case 10	Adenocarcinoma	Epithelial
11	Epi-Case 11	Adenocarcinoma	Epithelial
12	Epi-Case 12	Adenocarcinoma	Epithelial

B, Supplementary figure 3B

Spot of interest	Case	Component	Group
1	PSC-Case 1	Squamous cell carcinoma	Epithelial
2	PSC-Case 1	Squamous cell carcinoma	Epithelial
3	PSC-Case 1	Squamous cell carcinoma	Epithelial
4	PSC-Case 1	Spindle cell carcinoma	Sarcomatoid
5	PSC-Case 1	Spindle cell carcinoma	Sarcomatoid
6	PSC-Case 1	Spindle cell carcinoma	Sarcomatoid
7	PSC-Case 1	Osteosarcoma	Sarcomatoid
8	PSC-Case 1	Osteosarcoma	Sarcomatoid
9	PSC-Case 1	Rhabdomyosarcoma	Sarcomatoid
10	PSC-Case 1	Rhabdomyosarcoma	Sarcomatoid
11	PSC-Case 1	Chondrosarcoma	Sarcomatoid
12	PSC-Case 1	Chondrosarcoma	Sarcomatoid

C, Supplementary figure 3C

Spot of interest	Case	Component	Group
1	PSC-Case 2	Adenocarcinoma	Epithelial
2	PSC-Case 2	Adenocarcinoma	Epithelial
3	PSC-Case 2	Adenocarcinoma	Epithelial
4	PSC-Case 2	Adenocarcinoma	Epithelial
5	PSC-Case 2	Adenocarcinoma	Epithelial
6	PSC-Case 2	Adenocarcinoma	Epithelial
7	PSC-Case 2	Spindle cell carcinoma	Sarcomatoid
8	PSC-Case 2	Spindle cell carcinoma	Sarcomatoid
9	PSC-Case 2	Spindle cell carcinoma	Sarcomatoid
10	PSC-Case 2	Spindle cell carcinoma	Sarcomatoid
11	PSC-Case 2	Spindle cell carcinoma	Sarcomatoid
12	PSC-Case 2	Rhabdomyosarcoma	Sarcomatoid

C, Supplementary figure 3D

Spot of interest	Case	Component	Group
1	PSC-Case 3	Squamous cell carcinoma	Epithelial
2	PSC-Case 3	Squamous cell carcinoma	Epithelial
3	PSC-Case 3	Spindle cell carcinoma	Sarcomatoid
4	PSC-Case 3	Spindle cell carcinoma	Sarcomatoid

Table SII. Continued.

C, Supplementary figure 3D

Spot of interest	Case	Component	Group
5	PSC-Case 3	Osteosarcoma	Sarcomatoid
6	PSC-Case 3	Osteosarcoma	Sarcomatoid
7	PSC-Case 5	Adenocarcinoma	Epithelial
8	PSC-Case 5	Adenocarcinoma	Epithelial
9	PSC-Case 5	Adenocarcinoma	Epithelial
10	PSC-Case 5	Spindle cell carcinoma	Sarcomatoid
11	PSC-Case 5	Spindle cell carcinoma	Sarcomatoid
12	PSC-Case 5	Spindle cell carcinoma	Sarcomatoid

C, Supplementary figure 3E

Spot of interest	Case	Component	Group
1	PSC-Case 6	Adenocarcinoma	Epithelial
2	PSC-Case 6	Adenocarcinoma	Epithelial
3	PSC-Case 6	Giant cell carcinoma	Sarcomatoid
4	PSC-Case 6	Giant cell carcinoma	Sarcomatoid
5	PSC-Case 4	Squamous cell carcinoma	Epithelial
6	PSC-Case 4	Squamous cell carcinoma	Epithelial
7	PSC-Case 4	Squamous cell carcinoma	Epithelial
8	PSC-Case 4	Spindle cell carcinoma	Sarcomatoid
9	PSC-Case 4	Spindle cell carcinoma	Sarcomatoid
10	PSC-Case 4	Spindle cell carcinoma	Sarcomatoid
11	PSC-Case 4	Chondrosarcoma	Sarcomatoid
12	PSC-Case 4	Chondrosarcoma	Sarcomatoid

PSC, pulmonary sarcomatoid carcinomas; Epi, epithelial carcinomas.