

Figure S1. BMPs that have no association with OS of breast cancer patients in TCGA. (A) The associations of BMP expression with OS. (B) Gene expression comparison between tumor and adjacent normal tissues in matched pairs of TCGA breast cancer. BMP, bone morphogenetic protein; OS, overall survival; TCGA, The Cancer Genome Atlas.

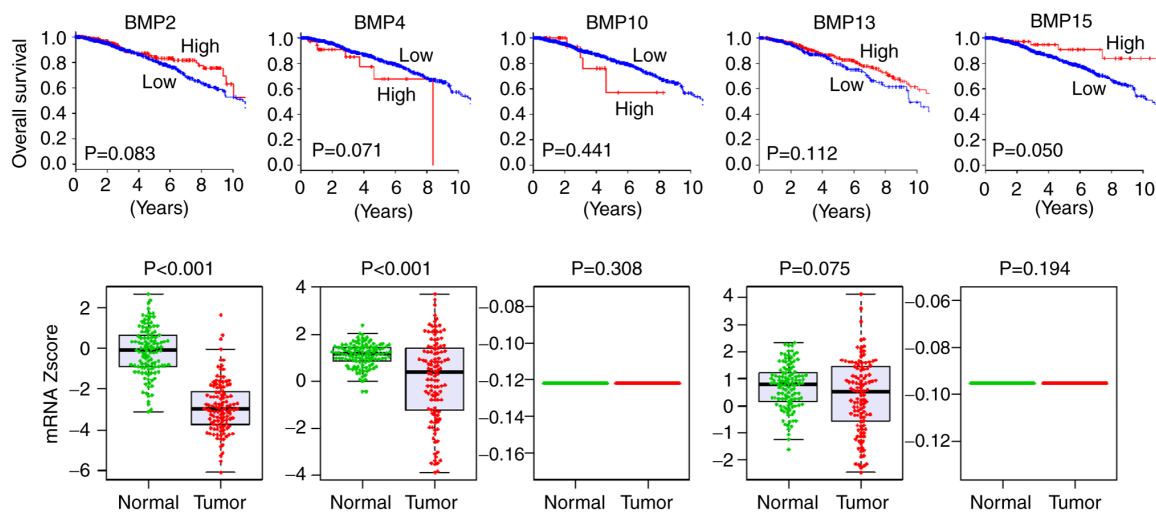


Figure S2. Infiltrating immune cell comparison between the BMP7 high and low ER⁺ tumors. BMP, bone morphogenetic protein; ER⁺, ER-positive.

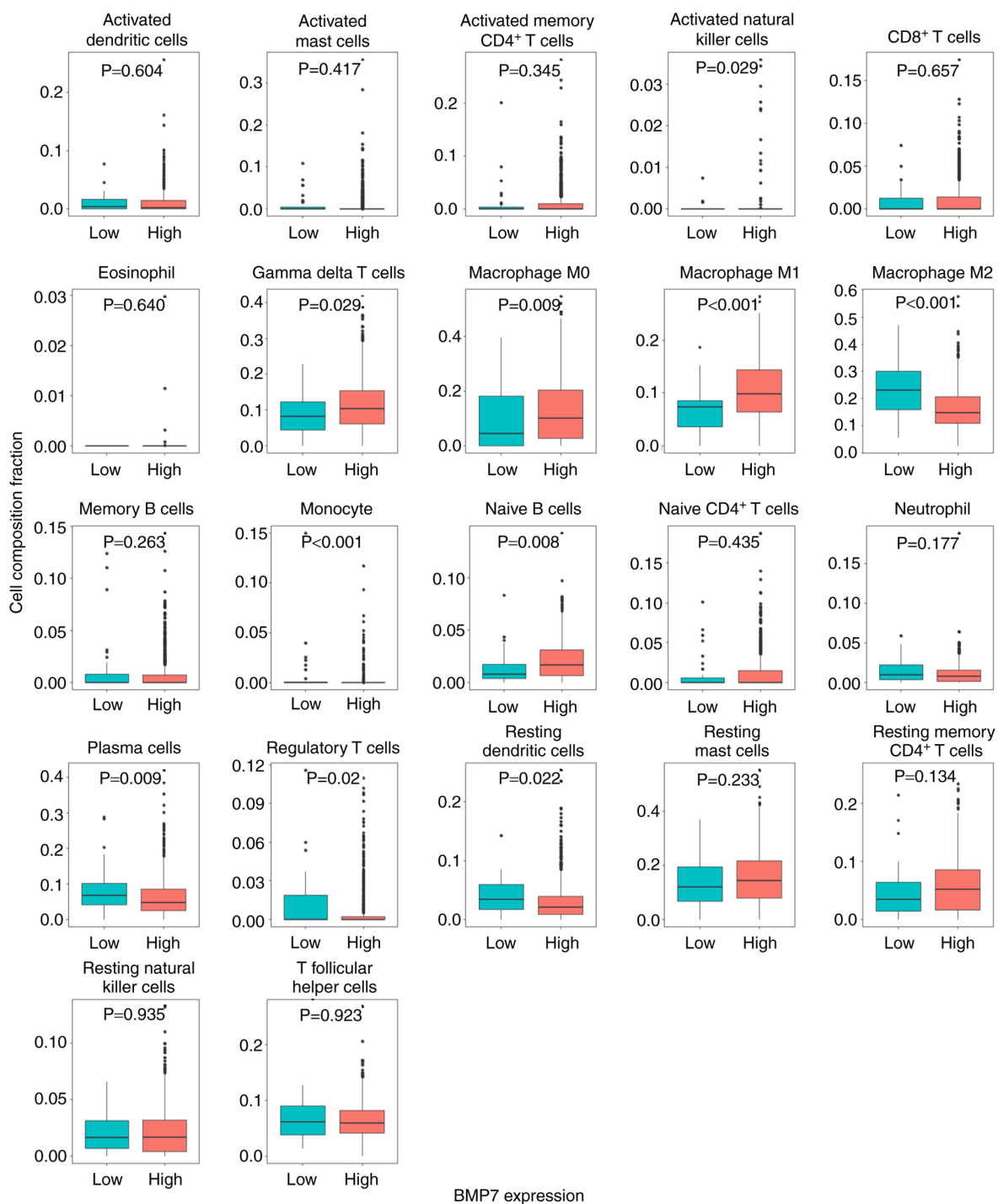


Figure S3. Infiltrating immune cell comparison between the BMP6 high and low ER⁺ tumors. BMP, bone morphogenetic protein; ER⁺, ER-positive.

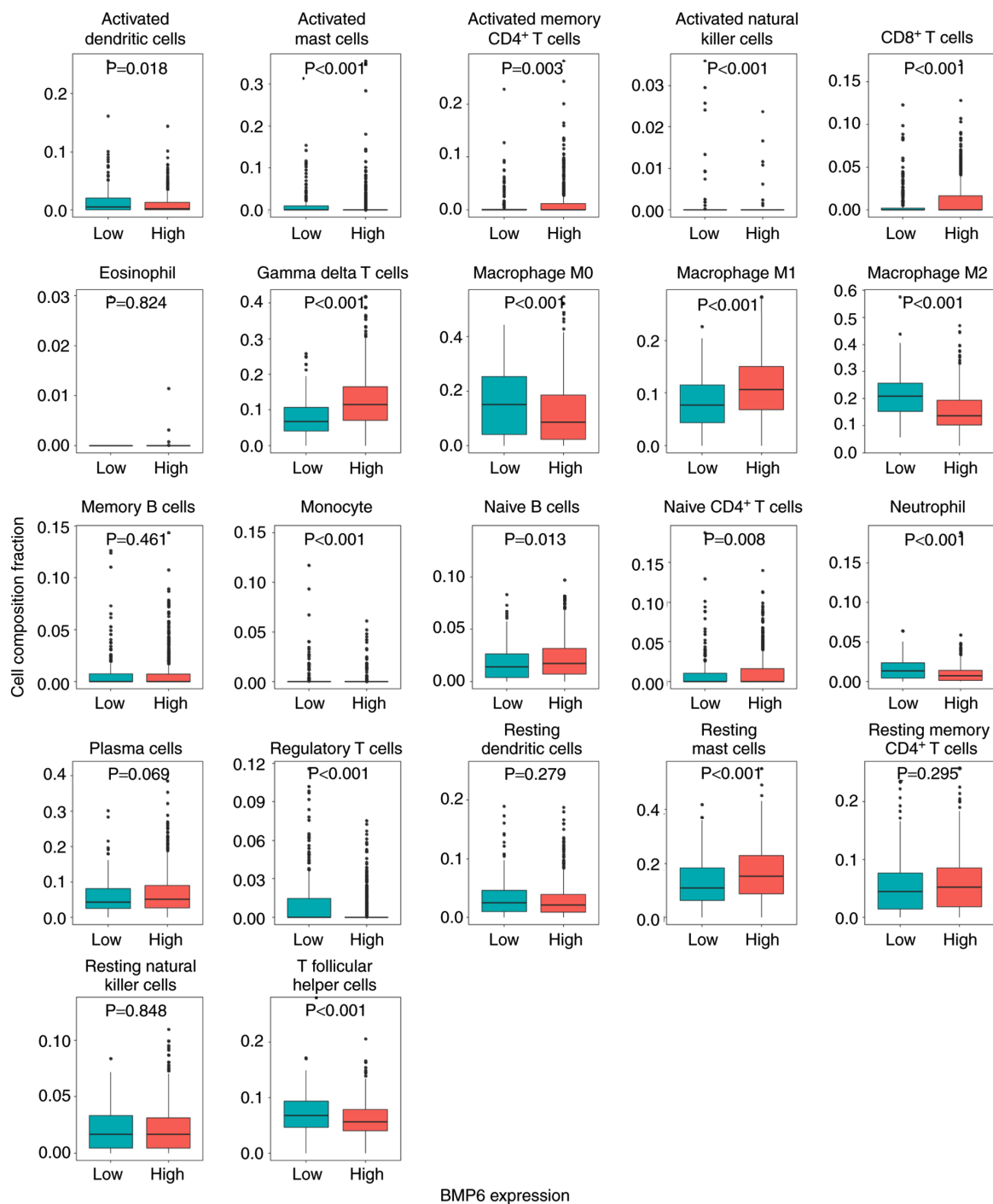


Table SI. Hallmark gene sets enriched in the BMP7 high ER⁺ tumors.

NAME	SIZE	ES	NES	P-value
HALLMARK_EPITHELIAL_MESENCHYMAL_TRANSITION	195	0.81539	2.376158	<0.001
HALLMARK_APICAL_JUNCTION	198	0.647673	2.311165	<0.001
HALLMARK_TGF_BETA_SIGNALING	54	0.671326	2.210063	<0.001
HALLMARK_INFLAMMATORY_RESPONSE	197	0.680065	2.060358	<0.001
HALLMARK_IL2_STAT5_SIGNALING	197	0.57649	2.054061	<0.001
HALLMARK_TNFA_SIGNALING_VIA_NFKB	197	0.678327	2.039314	<0.001
HALLMARK_APOPTOSIS	158	0.525642	2.031495	<0.001
HALLMARK_UV_RESPONSE_DN	142	0.579119	1.990315	<0.001
HALLMARK_KRAS_SIGNALING_UP	191	0.617549	1.915935	<0.001
HALLMARK_ANGIOGENESIS	36	0.693166	1.866302	<0.001
HALLMARK_HYPOXIA	196	0.546198	1.865337	<0.001
HALLMARK_COAGULATION	135	0.624235	1.844726	<0.001
HALLMARK_IL6_JAK_STAT3_SIGNALING	83	0.633065	1.841464	<0.001
HALLMARK_P53_PATHWAY	199	0.469798	1.791799	<0.001
HALLMARK_APICAL_SURFACE	44	0.576014	1.705311	0.001
HALLMARK_COMPLEMENT	194	0.568917	1.862521	0.001
HALLMARK_ALLOGRAFT_REJECTION	191	0.668578	1.918512	0.003
HALLMARK_INTERFERON_GAMMA_RESPONSE	192	0.659769	1.897822	0.005
HALLMARK_NOTCH_SIGNALING	32	0.543718	1.740645	0.007
HALLMARK_PI3K_AKT_MTOR_SIGNALING	105	0.396568	1.587435	0.015
HALLMARK_MYOGENESIS	199	0.506531	1.505736	0.018

ER⁺, estrogen receptor-positive; ES, enrichment score; NES, normalized enrichment score.

Table SII. Hallmark gene sets enriched in the BMP7 high ER⁻ tumors.

NAME	SIZE	ES	NES	P-value
HALLMARK_WNT_BETA_CATENIN_SIGNALING	42	0.434099	1.571727	0.024
HALLMARK_NOTCH_SIGNALING	32	0.398375	1.449805	0.039

ER⁻, estrogen receptor-negative; ES, enrichment score; NES, normalized enrichment score.

Table SIII. Hallmark gene sets enriched in the BMP7 low ER⁻ tumors.

NAME	SIZE	ES	NES	P-value
HALLMARK_ANDROGEN_RESPONSE	98	-0.53563	-2.02248	0.002
HALLMARK_BILE_ACID_METABOLISM	112	-0.40396	-1.61658	0.021
HALLMARK_PROTEIN_SECRETION	95	-0.48222	-1.72896	0.028
HALLMARK_CHOLESTEROL_HOMEOSTASIS	73	-0.44082	-1.63514	0.030

ER⁻, estrogen receptor-negative; ES, enrichment score; NES, normalized enrichment score.

Table SIV. Hallmark gene sets enriched in the BMP6 high ER⁺ tumors.

NAME	SIZE	ES	NES	P-value
HALLMARK_IL2_STAT5_SIGNALING	197	0.63789	2.485591	<0.001
HALLMARK_KRAS_SIGNALING_UP	191	0.664757	2.424568	<0.001
HALLMARK_INFLAMMATORY_RESPONSE	197	0.688708	2.306533	<0.001
HALLMARK_COMPLEMENT	194	0.620603	2.289384	<0.001
HALLMARK_TNFA_SIGNALING_VIA_NFKB	197	0.693867	2.283025	<0.001
HALLMARK_APICAL_JUNCTION	198	0.575342	2.278082	<0.001
HALLMARK_APOPTOSIS	158	0.531623	2.269902	<0.001
HALLMARK_COAGULATION	135	0.636102	2.236989	<0.001
HALLMARK_ALLOGRAFT_REJECTION	191	0.72233	2.181941	<0.001
HALLMARK_IL6_JAK_STAT3_SIGNALING	83	0.691988	2.176086	<0.001
HALLMARK_P53_PATHWAY	199	0.512236	2.162432	<0.001
HALLMARK_EPITHELIAL_MESENCHYMAL_TRANSITION	195	0.713427	2.158405	<0.001
HALLMARK_HYPOXIA	196	0.51047	2.006642	<0.001
HALLMARK_ANGIOGENESIS	36	0.661551	1.999856	<0.001
HALLMARK_NOTCH_SIGNALING	32	0.587456	1.967395	<0.001
HALLMARK_UV_RESPONSE_DN	142	0.514739	1.88418	<0.001
HALLMARK_MYOGENESIS	199	0.579657	1.879561	<0.001
HALLMARK_KRAS_SIGNALING_DN	192	0.459638	1.755702	<0.001
HALLMARK_XENOBIOTIC_METABOLISM	199	0.441781	1.773818	0.001
HALLMARK_TGF_BETA_SIGNALING	54	0.539635	1.826941	0.004
HALLMARK_APICAL_SURFACE	44	0.491586	1.755079	0.004
HALLMARK_WNT_BETA_CATENIN_SIGNALING	42	0.509669	1.750261	0.009
HALLMARK_ADIPOGENESIS	195	0.43348	1.760053	0.010
HALLMARK_INTERFERON_GAMMA_RESPONSE	192	0.650129	1.951214	0.011
HALLMARK_CHOLESTEROL_HOMEOSTASIS	73	0.46569	1.683062	0.015

ER⁺, estrogen receptor-positive; ES, enrichment score; NES, normalized enrichment score.

Table SV. Hallmark gene sets enriched in the BMP6 low ER⁺ tumors.

NAME	SIZE	ES	NES	P-value
HALLMARK_E2F_TARGETS	197	-0.67545	-1.91366	0.008
HALLMARK_G2M_CHECKPOINT	196	-0.60042	-1.80707	0.019
HALLMARK_UNFOLDED_PROTEIN_RESPONSE	109	-0.43187	-1.67543	0.024
HALLMARK_MYC_TARGETS_V1	199	-0.56131	-1.72977	0.031

ER⁺, estrogen receptor-positive; ES, enrichment score; NES, normalized enrichment score.

Table SVI. Hallmark gene sets enriched in the BMP6 high ER⁻ tumors.

NAME	SIZE	ES	NES	P-value
HALLMARK_MYC_TARGETS_V2	58	0.616632	1.713357	0.041

ER⁻, estrogen receptor-negative; ES, enrichment score; NES, normalized enrichment score.

Table SVII. Hallmark gene sets enriched in the BMP6 low ER⁻ tumors.

NAME	SIZE	ES	NES	P-value
HALLMARK_PI3K_AKT_MTOR_SIGNALING	105	-0.44702	-1.75764	<0.001
HALLMARK_BILE_ACID_METABOLISM	112	-0.48538	-1.5936	0.007
HALLMARK_XENOBIOTIC_METABOLISM	199	-0.46769	-1.54509	0.011
HALLMARK_PEROXISOME	102	-0.42292	-1.52831	0.027
HALLMARK_COAGULATION	135	-0.47871	-1.45814	0.041
HALLMARK_COMPLEMENT	194	-0.46668	-1.59476	0.041
HALLMARK_APOPTOSIS	158	-0.39287	-1.46413	0.047

ER⁻, estrogen receptor-negative; ES, enrichment score; NES, normalized enrichment score.