

## SUPPLEMENTARY TABLES

**Supplementary Table 1. Primer sequences.**

$\beta$ -actin:  
 Forward primer: CTGGCCGGGACCTGACT  
 Reverse primer: TCCTTAATGTCACGCACGATTT  
 PDPK1  
 Forward primer: GGAACAGCGCAGTACGTTTCT  
 Reverse primer: CTCGTTTCCAGCTCGGAATGG  
 WSB2  
 Forward primer: TTGCTACGGGACTCAACGATG  
 Reverse primer: GTGACGCGGAGACCAAATCA  
 PIR  
 Forward primer: GAGCAGTCGGAAGGGGTTG  
 Reverse primer: TTA ACTCGGGTCTGCCAATGC  
 MTHFD2  
 Forward primer: AGGACGAATGTGTTTGGATCAG  
 Reverse primer: GGAATGCCAGTTCGCTTGATTA

**Supplementary Table 2. Clinical characteristics of enrolled patients.**

	recoded ID	Age	Type	Grade	Maximum tumor diameter	Number of lymph node metastases	Immunohistochemistry			
					(Measured according to pathology)	(Measured according to pathology)	ER	PR	Her2	Ki-67
patient 1	565774	62	Invasive ductal carcinoma	II	2.0cm	0	100%+	100%+	0	10%
patient 2	565297	59	Invasive ductal carcinoma	II	1.9cm	0	90%+	80%+	0	20%
patient 3	563841	60	Invasive ductal carcinoma	II	1.9cm	0	60%+	90%+	1+	5%

**Supplementary Table 3. Model genes and their coefficients.**

gene symbol	gene name	coef
MTHFD2	ENSG00000065911.13	0.10523284074475
PIR	ENSG00000087842.11	0.479944592959224
PDPK1	ENSG00000140992.19	0.8754054718031
WSB2	ENSG00000176871.9	0.423554406918477