

Supplementary Tables

Supplementary Table 1. Primer sequences.

Name	Sequence or target sequence
Borealin-F	5'-GAAGGGCAGTAGTCGGGTG-3'
Borealin-R	5'-TCACGGTCGAAGTCTTTCAGA-3'
GAPDH-F	5'-ACGGATTGGTCGTATTGGGC-3'
GAPDH-R	5'-CTCGCTCCTGGAAGATGGTGAT-3'

Supplementary Table 2. Antibodies used in this study.

Antibody	WB	IHC	IF	Specificity	
Borealin (#12465-1-AP)	1:1000	1:200	1:200	Rabbit polyclonal	Proteintech
E-cadherin (#3195)	1:2000			Rabbit monoclonal	Cell Signaling Technology
Vimentin (#5741)	1:1000			Rabbit monoclonal	Cell Signaling Technology
Claudin-1 (#13255)	1:1000			Rabbit monoclonal	Cell Signaling Technology
GAPDH (#10494-1-AP)	1:3000			Rabbit Polyclonal	Proteintech
β -catenin (ab16051)	1:1000		1:200	Rabbit Polyclonal	Abcam
Cyclin D1 (ab226977)	1/500			Rabbit Polyclonal	Abcam
C-myc (ab39688)	1/500			Rabbit Polyclonal	Abcam
Lamin B1 (#13435)	1:1000			Rabbit monoclonal	Cell Signaling Technology
Ki67 (#9449)		1:200		Mouse monoclonal	Cell Signaling Technology
BAX (ab32503)		1: 250		Rabbit monoclonal	Abcam

Supplementary Table 3. The top 81 differential expressed genes (DEGs).

DEGs				
CAP2	NXF3	RACGAP1	TBXA2R	CENPI
STAB2	SLITRK6	CCNA2	GPM6A	FAM83D
EHD3	NPY1R	UBE2T	DLGAP5	CDHR2
CLEC1B	COLEC10	PRC1	CDCA8	FCN3
ECM1	GPR182	BUB1	MARCO	TTC36
VIPR1	CCBE1	ITGA6	NCAPG	HHIP
BMPER	CFP	CETP	CDKN3	ADAMTS13
OIT3	FCN2	IGFALS	ECT2	ASPM
CLEC4G	LRAT	ANKRD55	BUB1B	TOP2A
CRHBP	LIFR	EZH2	STIL	CCNB2
DACH1	PLAC8	ANLN	NUSAP1	DNASE1L3
CXCL14	PLVAP	TMEM26	HJURP	CENPF
GDF2	DBH	CXCL12	BMP5	KIF20A
CLEC4M	ANGPTL6	ITGA9	AURKA	
PTH1R	FAM180A	BCO2	PVALB	
PTTG1	NTF3	SLC26A6	GNA14	
MELK	ST6GAL2	KIF4A	MKI67	

Supplementary Table 4. The Cox's proportional hazards regression model analysis of 81 DEGs.

Gene	Hazard.Ratio	X95CI	P.Value
STIL	1.09	0.78-1.53	0.619122319
GNA14	0.43	0.27-0.67	0.00017488
GDF2	0.8	0.57-1.13	0.211780271
PRC1	0.94	0.6-1.47	0.795660362
CRHBP	0.77	0.61-0.97	0.025664214
EZH2	1.83	1.45-2.31	2.84E-07
AURKA	1.32	1.12-1.57	0.000956536
PTTG1	1.41	1.22-1.62	3.17E-06
VIPR1	0.52	0.32-0.85	0.009529733
ANKRD55	1.19	0.55-2.54	0.65833981
CXCL12	1.64	1.2-2.24	0.002087358
DNASE1L3	0.71	0.6-0.83	1.93E-05
FAM83D	1.43	1.2-1.71	7.60E-05
CFP	0.84	0.62-1.15	0.278378256
MARCO	1.66	1.22-2.26	0.001238036
CDCA8	1.65	1.39-1.96	1.61E-08
PVALB	0.94	0.57-1.57	0.818571563
CLEC4G	0.87	0.7-1.08	0.207426352
CCBE1	1.56	1.2-2.02	0.000788941
CETP	0.94	0.64-1.4	0.770965925
OIT3	0.92	0.77-1.09	0.329424765
HHIP	0.91	0.55-1.52	0.725855637
TOP2A	1.3	1.14-1.48	0.000102613
CCNA2	1.33	1.16-1.53	3.46E-05
ASPM	1.45	1.19-1.76	0.000197086
TTC36	1.21	0.99-1.48	0.062063093
CDHR2	1.06	0.95-1.17	0.305942157
LIFR	0.95	0.71-1.26	0.718016024
COLEC10	0.74	0.58-0.94	0.015416483
IGFALS	0.9	0.81-1	0.041006615
NUSAP1	1.24	1.06-1.45	0.006358684
TMEM26	2.8	0.86-9.07	0.086341778
ECT2	1.5	1.25-1.81	1.29E-05
CLEC4M	0.82	0.52-1.31	0.409582915
SLC26A6	1.43	1.14-1.78	0.001682798
LRAT	1.28	0.72-2.28	0.395336578
BUB1B	1.4	0.79-2.47	0.248844691
SLITRK6	0.08	0-2.79	0.162711342
UBE2T	1.42	1.19-1.69	7.04E-05
MELK	1.56	1.29-1.88	3.05E-06

CLEC1B	1.12	0.96-1.32	0.159962293
GPR182	0.86	0.77-0.95	0.00372672
KIF4A	1.47	1.24-1.73	5.14E-06
ADAMTS13	0.9	0.63-1.28	0.550869278
PTH1R	0.76	0.57-1.01	0.060801106
PLVAP	0.83	0.69-1	0.054603845
ANLN	1.62	1.35-1.94	2.20E-07
ANGPTL6	0.92	0.7-1.2	0.544201729
GPM6A	0.77	0.4-1.47	0.42880437
NCAPG	1.69	1.38-2.06	3.13E-07
HJURP	1.66	1.37-2.02	2.94E-07
FCN3	0.84	0.73-0.98	0.028999433
FCN2	0.9	0.77-1.05	0.180557189
BUB1	1.72	1.38-2.16	2.16E-06
EHD3	0.92	0.68-1.25	0.59516537
ST6GAL2	275.32	4.85-15619.3	0.006398506
CAP2	1.04	0.89-1.23	0.616482672
MKI67	1.48	1.24-1.76	1.62E-05
NTF3	0.68	0.34-1.34	0.267220424
DLGAP5	1.69	1.39-2.06	1.57E-07
CENPF	1.46	1.21-1.75	5.48E-05
NXF3	0.52	0.1-2.74	0.441230102
NPY1R	2.13	1.4-3.26	0.000456768
DACH1	1.85	0.68-5.02	0.226921099
STAB2	1.55	1.18-2.05	0.001925381
DBH	0.82	0.66-1.03	0.082234373
RACGAP1	1.59	1.3-1.95	5.87E-06
CDKN3	1.3	1.11-1.53	0.000944652
ECM1	1.02	0.84-1.24	0.82134985
CENPI	2.15	1.56-2.97	3.48E-06
PLAC8	1.25	0.95-1.64	0.108264323
ITGA9	0.98	0.76-1.26	0.856756498
BMPER	0.86	0.4-1.85	0.699332688
CCNB2	1.36	1.15-1.61	0.00038898
FAM180A	1.19	0.92-1.52	0.179878081
CXCL14	0.92	0.79-1.07	0.287852559
ITGA6	1.11	0.92-1.35	0.276097968
TBXA2R	1.1	0.75-1.61	0.634832714
BMP5	0.85	0.46-1.57	0.598462996
BCO2	0.84	0.65-1.09	0.183262447
KIF20A	1.68	1.39-2.01	3.65E-08

Supplementary Table 5. The Kaplan-Meier method analysis of 81 DEGs

Gene	P.Value
KIF20A	0.001000851
BCO2	0.142758054
BMP5	0.378524165
TBXA2R	0.843408482
ITGA6	0.481041631
CXCL14	0.943506221
FAM180A	0.203615563
CCNB2	0.045808749
BMPER	0.216409925
ITGA9	0.398094054
PLAC8	0.15473574
CENPI	0.005918544
ECM1	0.956967149
CDKN3	0.076630313
RACGAP1	0.000494733
DBH	0.076334902
STAB2	0.069381646
DACH1	0.039695185
NPY1R	0.001332647
NXF3	0.589690491
CENPF	0.003881948
DLGAP5	0.001656399
NTF3	0.019403636
MKI67	0.013236604
CAP2	0.147903319
ST6GAL2	0.002158322
EHD3	0.422981521
BUB1	0.000904282
FCN2	0.078829744
FCN3	0.040031719
HJURP	0.000488403
NCAPG	0.004214009
GPM6A	0.028113462
ANGPTL6	0.18242289
ANLN	0.000350759
PLVAP	0.042821731
PTH1R	0.200503028
ADAMTS13	0.96716659
KIF4A	0.003116398
GPR182	0.000421636
CLEC1B	0.287847666

MELK	0.001761222
UBE2T	0.010520233
SLITRK6	0.949538986
BUB1B	0.542654564
LRAT	0.671632382
SLC26A6	0.006890423
CLEC4M	0.662350138
ECT2	0.001417385
TMEM26	0.526218208
NUSAP1	0.006785759
IGFALS	0.005372179
COLEC10	0.026066014
LIFR	0.367378588
CDHR2	0.336035217
TTC36	0.149729845
ASPM	0.001069078
CCNA2	0.006271972
TOP2A	0.0006734
HHIP	0.833811367
OIT3	0.304048502
CETP	0.902171495
CCBE1	0.001859691
CLEC4G	0.618110611
PVALB	0.03878043
CDCA8	8.52E-06
MARCO	0.000314751
CFP	0.272386086
FAM83D	0.010560294
DNASE1L3	2.21E-06
CXCL12	0.094085993
ANKRD55	0.926296464
VIPR1	0.013306865
PTTG1	0.0009186
AURKA	0.002936903
EZH2	2.37E-05
CRHBP	0.014184877
PRC1	0.957989624
GDF2	0.792838595
GNA14	0.001679474
STIL	0.457358526
