

Supplementary File

Appendix 1. Gene symbols and gene names for top10 hub-genes in low-grade and high-grade NMIBC

Gene symbol	Gene name
<i>GAS6</i>	Growth arrest-specific protein 6
<i>TGFB3</i>	Transforming growth factor beta-3 proprotein
<i>TPM1</i>	Tropomyosin alpha-1 chain
<i>SDC1</i>	Syndecan-1
<i>COL5A1</i>	Collagen alpha-1(V) chain
<i>COL1A2</i>	Collagen alpha-2(I) chain
<i>SERPING1</i>	Plasma protease C1 inhibitor
<i>ACTA2</i>	Actin, aortic smooth muscle
<i>TPM2</i>	Tropomyosin beta chain
<i>A2M</i>	Alpha-2-macroglobulin
<i>CDK1</i>	Cyclin-dependent kinase 1
<i>CCNB1</i>	G2/mitotic-specific cyclin-B1
<i>CDC20</i>	Cell division cycle protein 20 homolog
<i>KIF11</i>	Kinesin-like protein KIF11
<i>TOP2A</i>	DNA topoisomerase 2-alpha
<i>AURKA</i>	Aurora kinase A
<i>CCNA2</i>	Cyclin-A2
<i>BUB1B</i>	Mitotic checkpoint serine/threonine-protein kinase BUB1 beta
<i>CCNB2</i>	G2/mitotic-specific cyclin-B2
<i>MAD2L1</i>	Mitotic spindle assembly checkpoint protein MAD2A

Appendix 2. Top 3 modules in low-grade and high-grade NMIBC

Cluster	Cluster score	↑UP/↓Down Regulation	Genes	Biological Process	Pathway
Low-grade NMIBC					
1	9.111	↓	ACTG2, MYL9, SORBS1, MYH11, F13A1, SERPING1, CALD1, LMOD1, CFD, PROS1, TGFB3, TPM1, ISLR, SPARC, ACTN1, A2M, TPM2, ACTA2, GAS6	Platelet degranulation	Complement and coagulation cascades
2	9	↓	COL21A1, COL15A1, COL16A1, COL18A1, COL13A1, COL1A2, COL5A1, COL6A1, COL6A2	collagen catabolic process	Protein digestion and absorption
3	5	↓	FBLN5, MFAP5, FBLN2, MFAP4, EFEMP1	Protein digestion and absorption	N.A
High-grade NMIBC					
1	59.746	↑	PRC1, CDCA5, CENPM, UBE2T, CDKN3, TIMELESS, ASF1B, DTL, MELK, CDCA3, CEP55, KIAA0101, RAD51AP1, EZH2, SPAG5, ANLN, DEPDC1, TROAP, UHRF1, and 45 more genes**	mitotic cell cycle	Cell cycle
2	10	↓	TPM1, ACTC1, MYH11, CNN1, CALD1, TAGLN, SMTN, TPM2, LMOD1, ACTA2	myofibril assembly	N.A
3	8.421	↓	TGFBI, COL21A1, SERPING1, IGFBP3, COL16A1, SPARCL1, COL1A2, COL5A1, TNC, CFD, TGFB3, ISLR, SPARC, LAMB2, DCN, A2M, P4HB, COL13A1, GAS6, COL6A2	platelet degranulation	Protein digestion and absorption

**ESPL1, CDC20, AURKA, CCNB2, CCNB1, CDK1, CCNA2, MCM2, GINS2, MCM5, MCM4, MAD2L1, BUB1B, KIF20A, BUB1, TACC3, FANCI, TRIP13, RFC4, KIF11, DLGAP5, CDC45, CKS2, CDCA8, NCAPG, PTTG1, CKS1B, TPX2, HJURP, CENPA, CDC25A, TTK, KIF2C, CENPF, TOP2A, TYMS, TK1, FOXM1, NUSAP1, HMMR, PBK, KIF15, KIF4A, FAM64A, POLQ