

Figure S1. Co-expression relationship between PAK4, HSPH1 and MATH score. (A) Co-expression relationship in the expression of PAK4 with MATH. (B) Co-expression relationship in the expression of HSPH1 with MATH. PAK4, serine/threonine p21-activated kinase 4; MATH, mutant-allele tumor heterogeneity; HSPH1, heat shock protein 105 kDa.

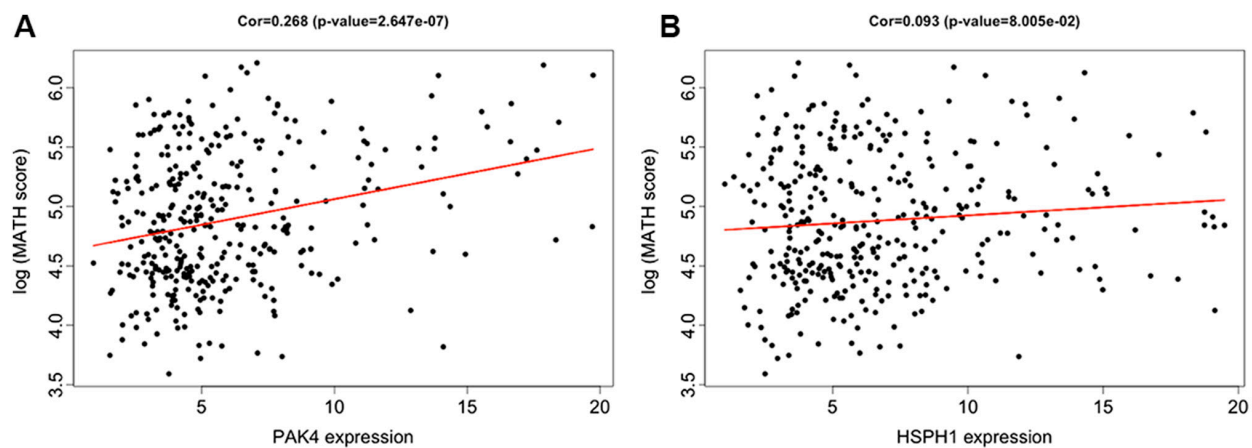


Table SI. Gene sets enriched in phenotype low MATH score group. KEGG, Kyoto Encyclopedia of Genes and Genomes; NES, normalized enrichment score; FDR, false discovery rate.

KEGG	SIZE	ES	NES	FDR q-val	FWER p-val
KEGG_FATTY_ACID_METABOLISM	42	0.83	4.23	0	0
KEGG_VALINE_LEUCINE_AND_ISOLEUCINE_DEGRADATION	44	0.84	4.06	0	0
KEGG_DRUG_METABOLISM_CYTOCHROME_P450	70	0.69	3.76	0	0
KEGG_TRYPTOPHAN_METABOLISM	39	0.72	3.63	0	0
KEGG_RETINOL_METABOLISM	63	0.68	3.58	0	0
KEGG_PROPANOATE_METABOLISM	32	0.79	3.52	0	0
KEGG_GLYCINE_SERINE_AND_THREONINE_METABOLISM	31	0.76	3.51	0	0
KEGG_BUTANOATE_METABOLISM	34	0.75	3.46	0	0
KEGG_PRIMARY_BILE_ACID_BIOSYNTHESIS	16	0.84	3.19	0	0
KEGG_METABOLISM_OF_XENOBIOTICS_BY_CYTOCHROME_P450	68	0.56	2.97	0	0
KEGG_LYSINE_DEGRADATION	39	0.6	2.97	0	0
KEGG_BETA_ALANINE_METABOLISM	22	0.69	2.87	0	0
KEGG_GLYCOLYSIS_GLUONEOGENESIS	61	0.5	2.83	0	0
KEGG_PYRUVATE_METABOLISM	39	0.6	2.82	0	0
KEGG_STEROID_HORMONE_BIOSYNTHESIS	55	0.51	2.72	0	0
KEGG_ASCORBATE_AND_ALDARATE_METABOLISM	25	0.65	2.63	0	0
KEGG_HISTIDINE_METABOLISM	27	0.55	2.51	0	0

Table SII. KEGG and GO enrichment analysis of immune genes. KEGG, Kyoto Encyclopedia of Genes and Genomes; GO, Gene Ontology; Count_gene, enrichment immune genes; Benjamini, Benjamini value.

Category	Term	Count_gene	P-Value	Benjamini
Go_TERM	cell polarity	ZO-1, TJAP1	9.4×10^{-26}	2.5×10^{-22}
Go_TERM	cell differentiation	ZO-1, ZONAB	4×10^{-19}	5.3×10^{-15}
Go_TERM	cell proliferation	ZO-1, ZONAB	1.1×10^{-16}	9.8×10^{-14}
KEGG_PATHWAY	MicroRNAs in cancer	PAK4, CAT1	2.1×10^{-24}	4.7×10^{-22}
KEGG_PATHWAY	thyroid hormone signaling	PAK4, PKHR, PFKP	8.5×10^{-21}	9.5×10^{-19}
KEGG_PATHWAY	renal cellcarcinoma	PAK4, SDHD, RAF1	1.3×10^{-16}	8.2×10^{-15}
KEGG_PATHWAY	tight junctions	JNK, MLC2, CD1	2.2×10^{-16}	1.2×10^{-14}
KEGG_PATHWAY	herpes simplex infection	IKKA, IKKB, IFA2	9.8×10^{-16}	4.4×10^{-14}
KEGG_PATHWAY	ErbB signaling	PAK4, JNK	7.2×10^{-15}	2.6×10^{-13}