

Table S1. The results of eQTL and GWAS for the 114 identified pairs between the 70 unique poly-miRTSs and 28 genes

SNP.ID	Chr	Position	Allele1	Allele2	OR.A1	GWAS P value	eQTL target gene	eQTL effect value	eQTL type	eQTL cell type
rs907091	chr17	37921742	T	C	0.92	3.9E-08	IKZF3	62.12	cis	LCLs
rs907091	chr17	37921742	T	C	0.92	3.9E-08	ORMDL3	61.15	cis	LCLs
rs907091	chr17	37921742	T	C	0.92	3.9E-08	GSDML	35.93	cis	LCLs
rs907091	chr17	37921742	T	C	0.92	3.9E-08	KRT222P	4.02	cis	LCLs
rs907091	chr17	37921742	T	C	0.92	3.9E-08	MED24	3.58	cis	LCLs
rs9277542	chr6	33055247	T	C	1.41	1.3E-85	HLA-DPB1	149.45	cis	Monocytes
rs9277550	chr6	33055487	T	C	1.44	4.6E-90	HLA-DPB1	141.66	cis	Monocytes
rs3077	chr6	33033022	A	G	1.52	3.1E-77	HLA-DPB1	100.01	cis	Monocytes
rs7195	chr6	32412539	A	G	0.53	1E-250	HLA-DRA	91.53	cis	Monocytes
rs7194	chr6	32412480	A	G	1.9	1E-250	HLA-DRA	91.26	cis	Monocytes
rs9277551	chr6	33055494	T	G	0.7	6.7E-90	HLA-DPB1	64.02	cis	LCLs
rs9277538	chr6	33055047	A	G	1.4	4.6E-78	HLA-DPB1	63.77	cis	LCLs
rs9277547	chr6	33055367	A	C	0.71	1.3E-85	HLA-DPB1	63.74	cis	LCLs
rs9277546	chr6	33055346	T	G	1.41	1.3E-85	HLA-DPB1	63.73	cis	LCLs
rs9277537	chr6	33055009	A	C	0.71	1.3E-85	HLA-DPB1	63.67	cis	LCLs
rs9277542	chr6	33055247	T	C	1.41	1.3E-85	HLA-DPB1	63.65	cis	LCLs
rs9277549	chr6	33055419	A	G	1.41	1.3E-85	HLA-DPB1	63.65	cis	LCLs
rs9277533	chr6	33054721	T	C	0.71	1.2E-85	HLA-DPB1	63.65	cis	LCLs
rs9277536	chr6	33054890	T	C	0.71	1.3E-85	HLA-DPB1	63.64	cis	LCLs
rs3128964	chr6	33055818	A	G	1.41	1.6E-85	HLA-DPB1	63.64	cis	LCLs
rs3128963	chr6	33055780	T	C	0.71	1.6E-85	HLA-DPB1	150.64	cis	Monocytes
rs9277554	chr6	33055538	T	C	0.71	1.7E-85	HLA-DPB1	63.63	cis	LCLs
rs3128963	chr6	33055780	T	C	0.71	1.6E-85	HLA-DPB1	63.63	cis	LCLs
rs3091282	chr6	33057198	G	C	1.41	1.4E-85	HLA-DPB1	63.63	cis	LCLs
rs9277541	chr6	33055158	A	G	1.41	1.3E-85	HLA-DPB1	63.61	cis	LCLs
rs3130188	chr6	33057176	T	C	1.41	1.4E-85	HLA-DPB1	63.61	cis	LCLs
rs3117228	chr6	33056435	T	G	0.71	1.6E-85	HLA-DPB1	63.60	cis	LCLs
rs9277566	chr6	33056916	T	G	0.71	1.5E-85	HLA-DPB1	63.57	cis	LCLs
rs9277534	chr6	33054807	A	G	1.41	1.2E-85	HLA-DPB1	63.43	cis	LCLs
rs9277550	chr6	33055487	T	C	1.44	4.6E-90	HLA-DPB1	63.38	cis	LCLs
rs9277553	chr6	33055516	T	C	1.41	1.7E-85	HLA-DPB1	59.44	cis	LCLs
rs7195	chr6	32412539	A	G	0.53	1E-250	HLA-DRB6	57.06	cis	Monocytes
rs7194	chr6	32412480	A	G	1.9	1E-250	HLA-DRB6	56.90	cis	Monocytes
rs7194	chr6	32412480	A	G	1.9	1E-250	HLA-DRB5	56.30	cis	Monocytes
rs9277540	chr6	33055123	A	G	1.41	1.3E-85	HLA-DPB1	56.08	cis	LCLs
rs7195	chr6	32412539	A	G	0.53	1E-250	HLA-DRB5	56.08	cis	Monocytes
rs3097650	chr6	33057440	T	C	0.72	3.6E-78	HLA-DPB1	55.27	cis	LCLs
rs931	chr6	33054550	A	G	0.71	1.2E-85	HLA-DPB1	52.20	cis	LCLs
rs3177928	chr6	32412435	A	G	1.25	3E-28	HLA-DRB1	49.41	cis	Monocytes
rs3130186	chr6	33056207	T	C	0.74	6.2E-57	HLA-DPB1	45.71	cis	Monocytes
rs3117229	chr6	33056069	A	G	0.74	6.2E-57	HLA-DPB1	45.65	cis	Monocytes
rs9277539	chr6	33055079	A	G	1.31	2E-49	HLA-DPB1	43.16	cis	LCLs
rs9277555	chr6	33055605	A	G	0.75	2.4E-55	HLA-DPB1	43.10	cis	LCLs
rs2071594	chr6	31512720	G	C	0.92	4.2E-08	LST1	43.06	cis	Monocytes
rs3091283	chr6	33057213	T	C	0.75	1.5E-55	HLA-DPB1	43.03	cis	LCLs
rs3198005	chr6	32813214	A	G	0.79	7.8E-10	HLA-DRB5	42.43	cis	Monocytes
rs9296076	chr6	33056840	T	C	1.57	1.5E-50	HLA-DPB1	41.82	cis	LCLs
rs9366749	chr6	29765271	A	G	1.22	3.6E-34	HLA-A29-1	40.86	cis	LCLs

rs3091284	chr6	33057244	T	G	1.31	1.7E-49	HLA-DPB1	40.45	cis	LCLs
rs9380142	chr6	29798794	A	G	0.83	6.8E-32	HLA-A29-1	40.27	cis	LCLs
rs7195	chr6	32412539	A	G	0.53	1E-250	HLA-DRA	39.31	cis	LCLs
rs7194	chr6	32412480	A	G	1.9	1E-250	HLA-DRA	39.30	cis	LCLs
rs1573298	chr6	30116160	G	C	0.79	8E-46	HLA-H	38.46	cis	Monocytes
rs3177928	chr6	32412435	A	G	1.25	3E-28	HLA-DRB6	36.92	cis	Monocytes
rs3211475	chr6	33033058	T	C	1.52	3.2E-77	HLA-DPB1	36.41	cis	LCLs
rs17220934	chr6	33032358	A	T	1.52	2.8E-77	HLA-DPB1	36.41	cis	LCLs
rs17214555	chr6	33032430	A	C	1.52	2.8E-77	HLA-DPB1	36.33	cis	LCLs
rs3077	chr6	33033022	A	G	1.52	3.1E-77	HLA-DPB1	36.32	cis	LCLs
rs17220927	chr6	33032347	T	G	1.51	4.6E-76	HLA-DPB1	36.32	cis	LCLs
rs1042926	chr6	33032822	A	G	0.66	2.8E-77	HLA-DPB1	36.23	cis	LCLs
rs1042688	chr6	33033055	A	T	1.52	3.1E-77	HLA-DPB1	36.17	cis	LCLs
rs1042920	chr6	33032831	A	G	0.66	2.8E-77	HLA-DPB1	36.09	cis	LCLs
rs9501259	chr6	33055551	A	G	0.64	1.6E-50	HLA-DPB1	34.75	cis	LCLs
rs522162	chr6	31919917	T	C	1.79	1.4E-74	RDBP	32.43	cis	LCLs
rs760070	chr6	31919956	T	C	1.79	1.4E-74	RDBP	32.43	cis	LCLs
rs7905	chr6	33032975	T	C	1.51	1.3E-65	HLA-DPB1	31.37	cis	LCLs
rs9296075	chr6	33056788	A	G	0.7	1.3E-21	HLA-DPB1	30.03	cis	LCLs
rs3198005	chr6	32813214	A	G	0.79	7.8E-10	HLA-DMA	28.25	cis	Monocytes
rs2267633	chr6	29570841	A	G	1.17	5.7E-10	HLA-A	24.59	cis	Monocytes
rs2267633	chr6	29570841	A	G	1.17	5.7E-10	HLA-H	24.48	cis	Monocytes
rs3177928	chr6	32412435	A	G	1.25	3E-28	HLA-DQB1	20.68	cis	Monocytes
rs1573298	chr6	30116160	G	C	0.79	8E-46	HLA-A	19.84	cis	Monocytes
rs3198005	chr6	32813214	A	G	0.79	7.8E-10	HLA-DRB1	19.06	cis	Monocytes
rs7194	chr6	32412480	A	G	1.9	1E-250	HLA-DQA1	18.24	cis	Monocytes
rs7195	chr6	32412539	A	G	0.53	1E-250	HLA-DQA1	18.12	cis	Monocytes
rs3128965	chr6	33055899	A	G	0.84	5.2E-16	HLA-DPB1	16.74	cis	Monocytes
rs3128966	chr6	33055946	A	G	0.84	5.2E-16	HLA-DPB1	16.66	cis	Monocytes
rs7194	chr6	32412480	A	G	1.9	1E-250	HLA-C	16.17	cis	Monocytes
rs7195	chr6	32412539	A	G	0.53	1E-250	HLA-C	16.10	cis	Monocytes
rs1573298	chr6	30116160	G	C	0.79	8E-46	HLA-G	15.74	cis	Monocytes
rs522162	chr6	31919917	T	C	1.79	1.4E-74	RDBP	14.48	cis	Monocytes
rs2071594	chr6	31512720	G	C	0.92	4.2E-08	HLA-DRB5	13.57	cis	Monocytes
rs2071594	chr6	31512720	G	C	0.92	4.2E-08	PSMB9	12.61	cis	Monocytes
rs2267633	chr6	29570841	A	G	1.17	5.7E-10	HCG4	12.44	cis	Monocytes
rs3177928	chr6	32412435	A	G	1.25	3E-28	HLA-DRA	12.43	cis	Monocytes
rs3177928	chr6	32412435	A	G	1.25	3E-28	TAP2	12.24	cis	Monocytes
rs522162	chr6	31919917	T	C	1.79	1.4E-74	SKIV2L	12.23	cis	Monocytes
rs1573298	chr6	30116160	G	C	0.79	8E-46	HCG4	11.68	cis	Monocytes
rs707974	chr6	31629499	A	G	0.58	4.5E-127	LST1	11.52	cis	Monocytes
rs2071594	chr6	31512720	G	C	0.92	4.2E-08	HLA-DRB1	11.38	cis	Monocytes
rs2744537	chr6	33162215	A	C	1.11	4.1E-10	HLA-DPB1	11.30	cis	Monocytes
rs3129302	chr6	32974343	T	C	0.57	2.3E-30	HLA-DPB1	11.29	cis	Monocytes
rs2267633	chr6	29570841	A	G	1.17	5.7E-10	HLA-G	11.28	cis	Monocytes
rs1041885	chr6	32412809	A	T	0.59	9.3E-121	HLA-DRB5	10.02	cis	LCLs
rs7194	chr6	32412480	A	G	1.9	1E-250	HLA-DRB5	9.23	cis	LCLs
rs9266825	chr6	31382882	A	C	0.89	2.5E-11	LOC282956	8.07	cis	LCLs
rs1063320	chr6	29798749	G	C	0.89	9.1E-14	HLA-A	7.37	cis	LCLs
rs974963	chr6	30314567	A	C	0.89	2E-08	LOC401245	7.21	cis	LCLs
rs7194	chr6	32412480	A	G	1.9	1E-250	HLA-DQA1	7.11	cis	LCLs
rs7194	chr6	32412480	A	G	1.9	1E-250	HLA-DRB1	6.59	cis	LCLs

rs241453	chr6	32796226	A	G	0.9	1E-08	TAP2	6.48	cis	Fibroblasts
rs7195	chr6	32412539	A	G	0.53	1E-250	HLA-DRB5	6.42	cis	LCLs
rs7195	chr6	32412539	A	G	0.53	1E-250	HLA-DRB1	6.35	cis	LCLs
rs1966	chr6	31107733	T	C	1.19	7.5E-22	CCHCR1	6.25	cis	LCLs
rs241453	chr6	32796226	A	G	0.9	1E-08	TAP2	6.14	cis	T-cells
rs1245371	chr6	30038352	A	G	1.1	1.8E-08	HLA-A	5.70	cis	LCLs
rs1059288	chr6	33267672	A	G	0.85	2.7E-25	TAPBP	5.58	cis	LCLs
rs241453	chr6	32796226	A	G	0.9	1E-08	TAP2	5.57	cis	LCLs
rs1061783	chr6	33282628	T	C	1.17	1.4E-23	TAPBP	4.88	cis	LCLs
rs7195	chr6	32412539	A	G	0.53	1E-250	HLA-DQB1	4.61	cis	LCLs
rs2240070	chr6	30071110	T	C	1.16	1.7E-20	HLA-A	4.57	cis	LCLs
rs7194	chr6	32412480	A	G	1.9	1E-250	HLA-DQB1	4.49	cis	LCLs
rs2517415	chr6	30956779	T	C	0.8	4.1E-22	HLA-C	4.26	cis	LCLs
rs1044870	chr6	31130821	T	C	1.14	5.7E-10	HLA-C	4.17	cis	LCLs

Notes: SNP, single nucleotide polymorphisms; Chr, Chromosome; eQTL effect value, -log10P value of eQTL; LCLs, lymphoblastoid cell lines.

Table S2. The top 15 significant enriched GO terms for the 28 identified genes

GO:ID	Term	Count	Genes	P value	Adjust P
GO:0071556	integral component of luminal side of endoplasmic reticulum membrane	11	HLA-DQB1, HLA-H, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DQA1, HLA-G, HLA-DRA, TAPBP	1.65E-24	7.43E-23
GO:0042613	MHC class II protein complex	9	HLA-DQB1, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	7.95E-20	1.79E-18
GO:0012507	ER to Golgi transport vesicle membrane	10	HLA-DQB1, HLA-H, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DQA1, HLA-G, HLA-DRA	5.44E-19	8.17E-18
GO:0042605	peptide antigen binding	9	HLA-DQB1, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DQA1, HLA-DRA, TAPBP	4.58E-19	2.11E-17
GO:0019882	antigen processing and presentation	10	HLA-DQB1, HLA-H, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DQA1, HLA-G, HLA-DRA	1.96E-18	2.19E-16
GO:0060333	interferon-gamma-mediated signaling pathway	10	HLA-DQB1, HLA-H, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DQA1, HLA-G, HLA-DRA	2.27E-17	1.27E-15
GO:0032395	MHC class II receptor activity	7	HLA-DQB1, HLA-DRB1, HLA-C, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	1.92E-15	4.34E-14
GO:0002504	antigen processing and presentation of peptide or polysaccharide antigen via MHC class II	7	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	1.07E-14	3.98E-13
GO:0006955	immune response	12	HLA-DQB1, HLA-H, LST1, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA, TAPBP	1.36E-13	3.82E-12
GO:0002474	antigen processing and presentation of peptide antigen via MHC class I	7	HLA-DQB1, HLA-H, TAP2, HLA-A, HLA-C, HLA-G, TAPBP	5.10E-13	1.14E-11
GO:0000139	Golgi membrane	12	HLA-DQB1, HLA-H, LST1, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DQA1, HLA-G, HLA-DRA, TAPBP	2.27E-12	2.56E-11
GO:0042612	MHC class I protein complex	5	HLA-DQB1, HLA-H, HLA-A, HLA-C, HLA-G	2.77E-10	2.49E-09

GO:0030658	transport vesicle membrane	6	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DQA1, HLA-DRA	3.41E-10	2.56E-09
GO:0030669	clathrin-coated endocytic vesicle membrane	6	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DQA1, HLA-DRA	5.09E-10	3.27E-09
GO:0019886	antigen processing and presentation of exogenous peptide antigen via MHC class II	7	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	5.87E-10	1.10E-08

Notes: GO: Gene Ontology; the count represents the number of genes involved in the GO term; the adjust P value: raw P value adjusted using Benjamini method.

Table S3. The significant enriched pathways for the 28 identified genes

Pathway ID	Term	Count	Genes	P value	Adjust P
hsa04612	Antigen processing and presentation	12	HLA-DQB1, HLA-DRB1, TAP2, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-G, HLA-DRA, TAPBP	4.75E-20	1.38E-18
hsa05332	Graft-versus-host disease	10	HLA-DQB1, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-G, HLA-DRA	7.71E-19	1.12E-17
hsa05330	Allograft rejection	10	HLA-DQB1, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-G, HLA-DRA	2.48E-18	2.40E-17
hsa04940	Type I diabetes mellitus	10	HLA-DQB1, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-G, HLA-DRA	8.85E-18	6.42E-17
hsa05320	Autoimmune thyroid disease	10	HLA-DQB1, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-G, HLA-DRA	7.25E-17	6.66E-16
hsa05416	Viral myocarditis	10	HLA-DQB1, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-G, HLA-DRA	1.77E-16	1.11E-15
hsa04145	Phagosome	11	HLA-DQB1, HLA-DRB1, TAP2, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-G, HLA-DRA	1.95E-14	8.09E-14
hsa05168	Herpes simplex infection	11	HLA-DQB1, HLA-DRB1, TAP2, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-G, HLA-DRA	1.21E-13	4.40E-13
hsa04514	Cell adhesion molecules (CAMs)	10	HLA-DQB1, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-G, HLA-DRA	9.30E-13	3.00E-12
hsa05310	Asthma	7	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	1.15E-11	3.35E-11
hsa05166	HTLV-I infection	10	HLA-DQB1, HLA-DRB1, HLA-A, HLA-DRB5, HLA-C, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-G, HLA-DRA	1.95E-10	5.14E-10
hsa04672	Intestinal immune network for IgA production	7	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	2.05E-10	4.96E-10
hsa05150	Staphylococcus aureus infection	7	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	4.90E-10	1.09E-09
hsa05321	Inflammatory bowel disease (IBD)	7	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	1.41E-09	2.92E-09
hsa05140	Leishmaniasis	7	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	2.67E-09	5.17E-09
hsa05323	Rheumatoid arthritis	7	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	9.94E-09	1.80E-08

hsa05145	Toxoplasmosis	7	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	5.86E-08	1.00E-07
hsa05322	Systemic lupus erythematosus	7	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	1.26E-07	2.03E-07
hsa05164	Influenza A	7	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	5.94E-07	9.07E-07
hsa05152	Tuberculosis	7	HLA-DQB1, HLA-DRB1, HLA-DRB5, HLA-DPB1, HLA-DMA, HLA-DQA1, HLA-DRA	6.57E-07	9.53E-07
hsa04640	Hematopoietic cell lineage	3	HLA-DRB1, HLA-DRB5, HLA-DRA	1.24E-02	1.70E-02

Notes: GO: Gene Ontology; the count represents the number of genes involved in the GO term; the adjust P value: raw P value adjusted using Benjamini method.