

Supplementary Materials

Supplementary Table 1. non-HLA loci associated with SLE according to ethnicity

Ethnicity			SNP	Chromosome	Position	Gene	OR	EA
African-American	Asian	European						
0	0	0	rs13306575	1	183563302	<i>NCF2</i>	1.31	A
0	0	0	rs6702599	1	67359716	<i>IL12RB2</i>	0.84	C
0	0	0	rs76107698	1	161600039	<i>FCGR2C</i>	0.79	G
0	0	0	rs2205960	1	173222336	<i>TNFSF4</i>	1.37	T
0	0	0	rs4844538	1	206469377	<i>IKBKE</i>	1.11	A
0	0	0	rs7579944	2	30222160	<i>SNORA10B</i>	0.88	C
0	0	0	rs11679244	2	162225885	<i>FAP</i>	1.12	A
0	0	0	rs11889341	2	191079016	<i>STAT4</i>	1.41	T
0	0	0	rs144104218	3	119518879	<i>TIMMDC1</i>	0.83	AAAAC
0	0	0	rs13101828	4	971932	<i>DGKQ</i>	0.91	G
0	0	0	rs4643809	4	101834942	<i>BANK1</i>	0.85	C
0	0	0	rs2544920	5	100805670	<i>FAM174A</i>	1.12	A
0	0	0	rs10036748	5	151078585	<i>TNIP1</i>	1.19	T
0	0	0	rs2431697	5	160452971	<i>PTTG1</i>	1.24	T
0	0	0	rs6457796	6	34860776	<i>UHRF1BP1</i>	0.81	C
0	0	0	rs148314165	6	137908901	<i>TNFAIP3</i>	1.71	G
0	0	0	rs548234	6	106120159	<i>PRDM1</i>	0.82	C
0	0	0	rs4598207	7	50218883	<i>C7orf72</i>	1.33	A
0	0	0	rs117026326	7	74711703	<i>LOC101926943</i>	2.14	T

0	0	0	rs3757387	7	128936032	KCP	0.69	C
0	0	0	rs2272736	8	42319645	IKBKB	0.82	G
0	0	0	rs2736332	8	11482456	FAM167A	1.36	C
0	0	0	rs1405209	9	99823263	AL162394.1, AL359710.1, AS1, NR4A3, STX17	1.11	C
0	0	0	rs7097397	10	48817351	WDFY4	0.81	G
0	0	0	rs1131665	11	613208	CDHR5, IRF7, MIR210HG, PHRF1	1.19	T
0	0	0	rs2785198	11	35071482	PDHX	1.18	A
0	0	0	rs9736939	11	128435976	LINC02098	1.27	A
0	0	0	rs11059928	12	128811558	SLC15A4	0.82	T
0	0	0	rs77465633	12	111495741	ATXN2	1.34	A
0	0	0	rs34361002	16	11096177	CLEC16A	1.14	T
0	0	0	rs34572943	16	31261032	ITGAM, ITGAX	1.68	A
0	0	0	rs669763	16	57356566	PLLPL	1.12	C
0	0	0	rs28410471	16	68520852	SMPD3	1.13	A
0	0	0	rs11117432	16	85985665	IRF8	0.73	G
0	0	0	rs11673604	19	18430178	SSBP4	1.14	T
0	0	0	rs10419308	19	55228445	AC010327.5, AC010327.6, TMEM86B	0.84	A
0	0	0	rs55882956	19	10359243	TYK2	0.67	G
0	0	0	rs4821116	22	21619030	UBE2L3	1.24	T
0	0	0	rs1059702	X	154018741	IRAK1	1.36	A
0	0	0	rs28411034	1	37811325	MTF1	0.86	A
0	0	0	s12093154	1	1243545	C1QTNF12	0.84	A
0	0	0	rs2476601	1	113834946	AL137856.1, PHTF1, PTPN22, RSBN1	1.43	A
0	0	0	rs11264750	1	157527370	FCRL5	0.75	G
0	0	0	rs3795310	1	8371547	RERE	0.88	T
0	0	0	rs9651076	1	116500680	CD58	1.12	A
0	0	0	rs549669428	1	174925885	RABGAP1L	0.84	G
0	0	0	rs4143303	1	198701340	PTPRC	0.88	G

0	0	rs11126034	2	65353087	<i>SPRED2</i>	1.12	T
0	0	rs10207954	2	73989388	<i>TET3</i>	1.15	A
0	0	rs2381401	2	143263405	<i>ARHGAP15</i>	1.15	T
0	0	rs9630991	2	190567413	<i>AC108047.1</i>	0.85	A
0	0	rs3087243	2	203874196	<i>CTLA4, ICOS</i>	0.89	A
0	0	rs7565158	2	212729246	<i>ERBB4</i>	1.1	T
0	0	rs438613	3	28030595	<i>LINC01980</i>	0.92	C
0	0	rs6762714	3	188752450	<i>LPP</i>	1.16	T
0	0	rs231694	4	2699117	<i>FAM193A</i>	1.11	T
0	0	rs6871748	5	35885880	<i>AC112204.3, IL7R</i>	0.89	C
0	0	rs6874758	5	134093501	<i>VDAC1</i>	1.24	C
0	0	rs17603856	6	16630667	<i>ATXN1</i>	1.14	T
0	0	rs597325	6	90292775	<i>BACH2</i>	0.91	G
0	0	rs16902895	8	128413347	<i>LINC00824</i>	1.12	A
0	0	rs1887428	9	4984530	<i>JAK2</i>	0.92	G
0	0	rs10823829	10	71706952	<i>CDH23</i>	0.91	C
0	0	rs7902146	10	62041271	<i>ARID5B</i>	0.9	T
0	0	rs10995261	10	62651528	<i>ZNF365</i>	0.91	C
0	0	rs10896045	11	65788053	<i>OVOL1</i>	1.17	A
0	0	rs6539078	12	103522302	<i>LOC105369945</i>	0.89	C
0	0	rs3999421	12	120930715	<i>XLOC_009911</i>	0.91	T
0	0	rs76725306	13	49603317	<i>AL135901.1, RCBTB1</i>	1.16	A
0	0	rs1885889	13	99439046	<i>AL136961.1, TM9SF2</i>	0.87	G
0	0	rs12148050	14	102797451	<i>TRAF3</i>	0.91	G
0	0	rs11553760	15	74798906	<i>CSK</i>	1.11	T
0	0	rs7170151	15	38554477	<i>RASGRP1</i>	1.11	T
0	0	rs869310	15	77537964	<i>AC046168.1, AC046168.2</i>	0.88	G
0	0	rs61759532	17	7337072	<i>ACAP1</i>	1.24	T
0	0	rs33974425	19	49348489	<i>TEAD2</i>	1.12	CCAGCTGCA T

	0	0	rs4807205	19	2167879	<i>DOT1L</i>	1.12	G
	0	0	rs12461589	19	32581862	<i>PDCD5</i>	0.9	T
	0	0	rs6074813	20	1561106	<i>AL049634.2</i>	1.12	T
0		0	rs1432296	2	60,841,032	<i>LINC01185</i>	1.18	A
0		0	rs9852465	3	58,479,456	<i>AC098479.1, AC116036.2, PDHB, P XK</i>	1.1	G
0		0	rs2953898	8	56,068,244	<i>RPS20</i>	1.19	C
0		0	rs2955587	8	8,240,557	<i>ALG1L13P, FAM86B3P, PRAG1</i>	1.11	G
0		0	rs4739134	8	78,643,913	<i>AC068700.2</i>	1.12	T
0			rs4917385	10	103,243,964	<i>RPEL1, ST13P13</i>	0.72	T
0		0	rs911263	14	68,286,876	<i>RAD51B</i>	0.89	C
0		0	rs4252665	17	39,729,130	<i>ERBB2, IKZF3, MIEN1</i>	1.46	A
0		0	rs8072449	17	75,316,103	<i>AC011933.4, GRB2, SLC25A19</i>	1.19	A
0		0	rs4810485	20	46,119,308	<i>CD40</i>	1.43	A
0		0	rs137956	22	39,897,459	<i>ENTHD1, GRAP2</i>	1.14	C
	0		rs116785379	1	157138367	<i>ETV3</i>	1.21	C
	0		rs1547624	1	192574707	<i>AL390957.1</i>	1.17	T
	0		rs3806357	1	202010327	<i>ELF3-AS1</i>	1.11	A
	0		rs218174	2	135900775	<i>MCM6</i>	1.12	A
	0		rs7572733	2	198065082	<i>PLCL1</i>	1.14	T
	0		rs75362385	2	7432948	<i>LOC100506274</i>	0.89	G
	0		rs13385731	2	33476823	<i>RASGRP3</i>	1.29	T
	0		rs73954925	2	111119597	<i>ACOXL</i>	1.17	C
	0		rs1317082	3	169779797	<i>MYNN</i>	1.1	A
	0		rs7637844	3	72176765	<i>LINC00870</i>	0.88	C
	0		rs13116227	4	8556539	<i>AC105345.1, GPR78</i>	1.34	T
	0		rs113284964	4	40305570	<i>RHOH</i>	1.13	G
	0		rs2855772	4	54682309	<i>KIT</i>	1.4	C
	0		rs6533951	4	78723125	<i>LINC01094</i>	1.11	A
	0		rs6841907	4	83225843	<i>PLAC8</i>	0.91	C

0	rs116940334	4	87023100	<i>AFF1</i>	0.83	G
0	rs58107865	4	108140462	<i>LEF1</i>	0.8	C
0	rs10018951	4	183688220	<i>TRAPPC11</i>	1.31	T
0	rs2549002	5	132493886	<i>IRF1</i>	0.91	C
0	rs7725218	5	1282299	<i>TERT</i>	1.13	A
0	rs370449198	5	131784646	<i>FNIP1</i>	0.72	AC
0	rs2421184	5	159459931	<i>LINC01845</i>	1.11	A
0	rs9503037	6	243302	<i>LOC285766</i>	0.88	G
0	rs34868004	6	36747254	<i>CPNE5</i>	1.1	CA
0	rs9488914	6	116369686	<i>DSE</i>	0.86	C
0	rs9322454	6	154249517	<i>IPCEF1</i>	1.09	A
0	rs13238909	7	67611386	<i>ST3AGL4</i>	0.85	A
0	rs77009341	7	75559377	<i>HIP1</i>	2.01	C
0	rs2428	8	8783635	<i>MFHAS1</i>	1.13	T
0	rs142937720	8	70417931	<i>NCOA2</i>	0.89	AAGTGGCC
0	rs17374162	8	71982724	<i>MSC-AS1</i>	0.92	G
0	rs2445610	8	127184843	<i>CASC19, PCAT1</i>	0.89	G
0	rs7858766	9	21267088	<i>IFNA14</i>	1.14	T
0	rs77448389	10	5868783	<i>ANKRD16</i>	0.86	G
0	rs111447985	10	103918153	<i>STN1</i>	1.17	A
0	rs58164562	10	110904356	<i>BBIP1</i>	0.89	C
0	rs77885959	11	18340835	<i>GTF2H1</i>	1.69	T
0	rs77971648	11	72929435	<i>FCHSD2</i>	1.29	T
0	rs3750996	11	4091970	<i>STIM1</i>	1.17	A
0	rs4930642	11	69048902	<i>TPCN2</i>	1.15	A
0	rs377392985	11	118780114	<i>DDX6</i>	1.16	CAAAAAAAAA
0	rs2540119	12	4031710	<i>PARP11</i>	1.09	T
0	rs4251697	12	12721528	<i>CDKN1B</i>	0.64	G
0	rs4622329	12	101928157	<i>DRAM1</i>	1.12	A

0	rs200521476	12	132463596	<i>LOC101928416</i>	0.88	GCATCAC
0	rs57141708	13	41001255	<i>ELF1</i>	1.18	A
0	rs2819426	14	104945922	<i>AHNAK2</i>	0.82	G
0	rs35985016	15	100988807	<i>LRRK1</i>	0.84	G
0	rs11288784	16	50055296	<i>CNEP1R1</i>	0.9	G
0	rs79401250	16	23860136	<i>PRKCB</i>	1.17	T
0	rs534645300	16	30802134	<i>ZNF629</i>	0.81	AT
0	rs2731783	16	58219556	<i>CSNK2A2</i>	1.12	A
0	rs11376510	16	79711775	<i>MAF</i>	0.9	G
0	rs933717	16	87381644	<i>MAP1LC3B</i>	0.13	T
0	rs35966917	17	16936587	<i>TBC1D27</i>	0.91	G
0	rs2671655	17	49390658	<i>LOC102724596</i>	1.09	T
0	rs113417153	17	78377098	<i>LOC101928674</i>	0.89	C
0	rs1788097	18	69876452	<i>CD226</i>	1.1	T
0	rs118075465	18	79626912	<i>NFATC1</i>	1.14	A
0	rs7251	19	49659652	<i>IRF3</i>	0.88	C
0	rs4801882	19	51623800	<i>SIGLEC5</i>	0.88	G
0	rs2238577	19	948532	<i>ARID3A</i>	0.89	C
0	rs5826945	19	6697077	<i>C3</i>	0.84	T
0	rs2362475	19	16329024	<i>AC020917.3, KLF2</i>	0.85	A
0	rs4819670	22	18166589	<i>USP18</i>	1.15	T
0	rs9611155	22	39343182	<i>RPL3</i>	1.14	T
0	rs5914012	X	56882269	<i>NBDY</i>	1.1	T
0	rs6641111	X	12821671	<i>PRPS2</i>	1.19	C
0	rs13440883	X	53072295	<i>GPR173</i>	1.16	C
0	rs143181706	X	150504983	<i>MAMLD1</i>	1.5	T
0	rs10911628	1	184,680,369	<i>AL713852.1, EDEM3</i>	1.95	A
0	rs9782955	1	235,876,577	<i>LYST</i>	1.16	C

0	rs1780813	1	246,280,780	<i>SMYD3</i>	1.82	T
0	rs564976	3	160,011,272	<i>AS1, IL12A</i>	1.14	C
0	rs11724582	4	122,470,309	<i>IL2, IL21</i>	1.14	A
0	rs35789010	6	25,513,951	<i>CARMIL1</i>	1.46	A
0	rs36014129	6	25,884,291	<i>H2AC3P, H2BP5</i>	1.5	A
0	rs10946940	6	27,592,808	<i>471P, CD83P1, RNU6</i>	1.45	A
0	rs702814	7	28,133,113	<i>JAZF1</i>	1.14	A
0	rs150518861	7	74,152,347	<i>EIF4H, LIMK1</i>	1.66	A
0	rs7819602	8	10,869,332	<i>AC011008.2, XKR6</i>	1.15	C
0	rs3794060	11	71,476,633	<i>NADSYN1</i>	1.23	C
0	rs8023715	15	97,064,451	<i>LINC02253, RN7SKP181</i>	1.81	A
0	rs2286672	17	4,809,322	<i>PLD2</i>	1.25	T
0	rs114038709	17	45,379,362	<i>AC003070.2, ARHGAP27</i>	1.16	T
0	rs11697848	20	49,958,778	<i>147P, KRT18P4, RNU6</i>	2.12	T
0	rs887369	X	30,559,729	<i>CXorf21</i>	1.15	C

All SLE-associated variants were retrieved from association studies in multiple ethnic groups.

*OR has previously reported to be associated with SLE ([1] *Ann Rheum Dis.* 2021;80:632-640. [2] *Seminars in Immunopathology* 2022:44:29–46).

EA, effect allele; OR, odds ratio

Supplementary Table 2. List of SLE-risk SNPs that used for genetic risk score (GRS) calculation

Multi-racial*	European	European	European + Chinese	Korean
19 SNPs [3]	22 SNPs [4]	57 SNPs [5]	95 SNPs [6]	112 SNPs [7]
rs10516487	rs2187668	rs2476601	rs4649203	rs9651076
rs13277113	rs10488631	rs2327832	rs2476601	rs116785379
rs231775	rs9888739	rs1801274	rs1801274	rs76107698
rs1801274	rs7574865	rs849142	rs2205960	rs2205960
rs3131379	rs2476601	rs2205960	rs1418190	rs13306575
rs1270942	rs9462015	rs4917014	rs17849502	rs4143303
rs907715	rs3024505	rs17849502	rs10911628	rs3806357
rs729302	rs10036748	rs73366469	rs34889541	rs4844538
rs10954213	rs2205960	rs10911363	rs2297550	rs75362385
rs2070197	rs4963128	rs4728142	rs3024505	rs7579944
rs1143679	rs1801274	rs34889541a	rs9782955	rs13385731
rs4963128	rs2248932	rs2070197	rs7579944	rs11126034
rs1800450	rs5754217	rs3024505	rs17321999	rs10207954
rs17435	rs3129860	rs2980512a	rs13385731	rs73954925
rs11568821	rs2269368	rs7579944	rs6740462	rs218174
rs2476601	rs2431099	rs2736340	rs6705628	rs11679244
rs6445975	rs2327832	rs6740462	rs2111485	rs11889341
rs7574865	rs6568431	rs7829816	rs11889341	rs7572733
rs2205960	rs6445975	rs2111485	rs3768792	rs7565158
	rs1635852	rs1966115	rs6445972	rs438613
	rs633724	rs10930046	rs1132200	rs7637844
	rs10516487	rs877819	rs2222631	rs144104218
		rs11889341	rs564799	rs1317082
		rs4963128	rs10936599	rs13101828
		rs6445972	rs6762714	rs231694

rs2732552	rs4690229	rs113284964
rs6445975	rs340630	rs6533951
rs1308020a	rs10028805	rs6841907
rs1132200	rs907715	rs116940334
rs3794060a	rs7726159	rs4643809
rs564799	rs7726414	rs58107865
rs7941765a	rs7708392	rs7725218
rs10936599	rs2421184	rs2544920
rs10774625	rs2431697	rs370449198
rs1059312	rs17603856	rs2549002
rs10028805	rs36014129	rs6874758
rs9652601	rs597325	rs10036748
rs907715	rs6568431	rs2421184
rs34572943	rs6932056	rs2431697
rs7726414	rs2327832	rs9503037
rs223881	rs849142	rs6457796
rs7708392a	rs2366293	rs34868004
rs1170426a	rs4917014	rs597325
rs2431697	rs73135369	rs548234
rs2280381	rs73366469	rs9488914
rs17603856	rs1167796	rs148314165
rs2941509	rs4728142	rs9322454
rs11755393	rs2070197	rs4598207
rs930297	rs2736340	rs117026326
rs2762340	rs7829816	rs3757387
rs3093030	rs1966115	rs2736332
rs597325	rs1887428	rs2272736
rs2304256	rs877819	rs142937720
rs6568431	rs4948496	rs17374162

rs11697848	rs4917385	rs16902895
rs6932056	rs12802200	rs1887428
rs7444	rs2732552	rs7858766
	rs494003	rs77448389
	rs3794060	rs7097397
	rs4639966	rs7902146
	rs6590330	rs10995261
	rs7941765	rs10823829
	rs12822507	rs111447985
	rs34330	rs58164562
	rs10506216	rs3750996
	rs4622329	rs77885959
	rs10774625	rs2785198
	rs1059312	rs10896045
	rs8016947	rs4930642
	rs4902562	rs77971648
	rs12900339	rs377392985
	rs11073328	rs9736939
	rs2289583	rs2540119
	rs8023715	rs4251697
	rs9652601	rs4622329
	rs16972959	rs6539078
	rs7197475	rs77465633
	rs34572943	rs3999421
	rs223881	rs11059928
	rs1170426	rs200521476
	rs2934498	rs57141708
	rs2280381	rs2819426
	rs2286672	rs7170151

rs2941509	rs11553760
rs930297	rs35985016
rs1610555	rs34361002
rs3093030	rs79401250
rs2304256	rs534645300
rs2305772	rs11288784
rs4810485	rs669763
rs11697848	rs28410471
rs7444	rs11376510
rs61616683	rs11117432
rs2187668*	rs61759532
rs9267992*	rs35966917
	rs2671655
	rs113417153
	rs1788097
	rs118075465
	rs2238577
	rs5826945
	rs55882956
	rs11673604
	rs12461589
	rs33974425
	rs4801882
	rs4819670
	rs4821116
	rs9611155
	rs6641111
	rs5914012
	rs1059702

Multi-racial [43% European-American, 27% African-American, 12% Hispanics, 10% Gullah, 5% Native-American and 2% Asian]

REFERENCES

1. Yin X, Kim K, Suetsugu H, Bang SY, Wen L, Koido M, et al. Meta-analysis of 208370 East Asians identifies 113 susceptibility loci for systemic lupus erythematosus. *Ann Rheum Dis* 2021;80:632-40.
2. Ha E, Bae SC, Kim K. Recent advances in understanding the genetic basis of systemic lupus erythematosus. *Semin Immunopathol* 2022;44:29-46.
3. Webb R, Kelly JA, Somers EC, Hughes T, Kaufman KM, Sanchez E, et al. Early disease onset is predicted by a higher genetic risk for lupus and is associated with a more severe phenotype in lupus patients. *Ann Rheum Dis* 2011;70:151-6.
4. Taylor KE, Chung SA, Graham RR, Ortmann WA, Lee AT, Langefeld CD, et al. Risk alleles for systemic lupus erythematosus in a large case-control collection and associations with clinical subphenotypes. *PLoS Genet* 2011;7:e1001311.
5. Reid S, Alexsson A, Frodlund M, Morris D, Sandling JK, Bolin K, et al. High genetic risk score is associated with early disease onset, damage accrual and decreased survival in systemic lupus erythematosus. *Ann Rheum Dis* 2020;79:363-9.
6. Chen L, Wang YF, Liu L, Bielowka A, Ahmed R, Zhang H, et al. Genome-wide assessment of genetic risk for systemic lupus erythematosus and disease severity. *Hum Mol Genet* 2020;29:1745-56.
7. Kwon YC, Ha E, Kwon HH, Park DJ, Shin JM, Joo YB, et al. Higher genetic risk loads confer more diverse manifestations and higher risk of lupus nephritis in systemic lupus erythematosus. *Arthritis Rheumatol* 2023;75:1566-72.