Supplementary Materials

1. Supplementary Tables

(1) Supplementary Table S1. Basic information of GEO datasets

GEO	Type	Platform	Tissue	Samples			Country
				HC	SLE	Total	
GSE50772	Array	GPL570	PBMC	20	61	81	USA
GSE61635	Array	GPL570	whole blood	30	99	129	USA
GSE72509	RNA-seq	GPL16791	whole blood	18	99	117	USA
GSE81622	Array	GPL10558	PBMC	25	30	55	USA

(2) Supplementary Table S2. SNPs

chr .exposure	pos .exposure	beta .exposure	se .exposure	pval .exposure	samplesize .exposure	id .exposure	SNP	effect_allele .exposure	other_allele .exposure	eaf .exposure	exposure	mr_keep .exposure	pval_origin .exposure	data_source .exposure	R^2	F
1	18610402	-0.198716	0.0480609	4.23331e-05	1323	ebi-a-GCST90010240	rs223191	C	A	0.238	|| id:ebi-a-GCST90010240	True	reported	igd	0.0127569286040295	17.0696591084648
1	237131148	0.503608	0.119511	3.1291e-05	1323	ebi-a-GCST90010240	rs6428982	T	C	0.029	|| id:ebi-a-GCST90010240	True	reported	igd	0.0132440072130605	17.7301517866033
1	196774718	-0.175053	0.0402729	1.74389e-05	1323	ebi-a-GCST90010240	rs365299	T	C	0.255	|| id:ebi-a-GCST90010240	True	reported	igd	0.0140797598287891	18.8649770802966
1	108044081	-0.220913	0.0504561	1.51824e-05	1323	ebi-a-GCST90010240	rs11185124	A	C	0.2	|| id:ebi-a-GCST90010240	True	reported	igd	0.0142826160327328	19.1407152659758
1	36650692	-0.160508	0.0359093	1.00339e-05	1323	ebi-a-GCST90010240	rs114480320	A	T	0.328	|| id:ebi-a-GCST90010240	True	reported	igd	0.0148768224852152	19.9490611443607
2	43104586	-0.263048	0.0533326	1.13164e-06	1323	ebi-a-GCST90010240	rs112016221	T	G	0.169	|| id:ebi-a-GCST90010240	True	reported	igd	0.0180555846575571	24.2899974377012
2	65917987	0.820959	0.197145	3.6857e-05	1323	ebi-a-GCST90010240	rs873028	T	C	0.011	|| id:ebi-a-GCST90010240	True	reported	igd	0.0129376719699523	17.3146762742086
2	160375434	0.531664	0.124573	2.36881e-05	1323	ebi-a-GCST90010240	rs10178388	A	G	0.025	|| id:ebi-a-GCST90010240	True	reported	igd	0.0135808919600493	18.1873588345965
2	164579523	-0.191384	0.0456086	3.26002e-05	1323	ebi-a-GCST90010240	rs7606895	C	T	0.278	|| id:ebi-a-GCST90010240	True	reported	igd	0.0131345701217064	17.5816951384283
2	180146469	-0.2589	0.0600773	2.07248e-05	1323	ebi-a-GCST90010240	rs34358481	A	C	0.13	|| id:ebi-a-GCST90010240	True	reported	igd	0.0138429775858049	18.5432674261966
2	45409872	-0.27191	0.0649764	3.4412e-05	1323	ebi-a-GCST90010240	rs17033130	A	G	0.102	|| id:ebi-a-GCST90010240	True	reported	igd	0.0130637637818261	17.4856604940558
2	66255387	1.72735	0.379595	7.08044e-06	1323	ebi-a-GCST90010240	rs115134733	A	G	0.003	|| id:ebi-a-GCST90010240	True	reported	igd	0.0154104422858801	20.6758177558881

chr .exposure	pos .exposure	beta .exposure	se .exposure	pval .exposure	samplesize .exposure	id .exposure	SNP	effect_allele .exposure	other_allele .exposure	eaf .exposure	exposure	mr_keep .exposure	pval_origin .exposure	data_source .exposure	R^2	F
3	24369366	-0.251771	0.0591955	2.53881e-05	1323	ebi-a-GCST90010240	rs17014539	G	A	0.134	|| id:ebi-a-GCST90010240	True	reported	igd	0.0134888883645775	18.062464091324
3	131342120	-0.258029	0.0625163	4.43803e-05	1323	ebi-a-GCST90010240	rs7643824	T	G	0.112	|| id:ebi-a-GCST90010240	True	reported	igd	0.0127125963433563	17.0095756386395
3	19936589	0.24251	0.05578	1.77615e-05	1323	ebi-a-GCST90010240	rs2931380	A	C	0.16	|| id:ebi-a-GCST90010240	True	reported	igd	0.0140858013831991	18.8731875991961
3	173952876	0.193546	0.0424867	6.87702e-06	1323	ebi-a-GCST90010240	rs1345534	A	G	0.361	|| id:ebi-a-GCST90010240	True	reported	igd	0.0154434113260072	20.7207453551566
4	139734379	1.51319	0.334532	7.72254e-06	1323	ebi-a-GCST90010240	rs141839722	T	G	0.003	|| id:ebi-a-GCST90010240	True	reported	igd	0.015229539093894	20.4293507387729
4	165140204	-0.176165	0.041667	2.87965e-05	1323	ebi-a-GCST90010240	rs6821978	T	C	0.625	|| id:ebi-a-GCST90010240	True	reported	igd	0.0133311121161702	17.848337290974
4	184880036	-0.762863	0.154297	1.06336e-06	1323	ebi-a-GCST90010240	rs17363675	T	C	0.017	|| id:ebi-a-GCST90010240	True	reported	igd	0.0181412541406065	24.4073771515531
4	4174495	-0.493337	0.112003	1.3299e-05	1323	ebi-a-GCST90010240	rs142186348	T	C	0.033	|| id:ebi-a-GCST90010240	True	reported	igd	0.0144525919843959	19.3718474181048
4	70763844	-0.602798	0.141715	2.63299e-05	1323	ebi-a-GCST90010240	rs11943648	T	G	0.021	|| id:ebi-a-GCST90010240	True	reported	igd	0.0134912766798167	18.0657059311715
4	121175593	0.178648	0.0429024	3.71809e-05	1323	ebi-a-GCST90010240	rs4250293	G	T	0.372	|| id:ebi-a-GCST90010240	True	reported	igd	0.0129365469660873	17.3131509323689
5	166984125	-0.265085	0.0614797	2.10116e-05	1323	ebi-a-GCST90010240	rs6886928	A	G	0.13	|| id:ebi-a-GCST90010240	True	reported	igd	0.0138575557765326	18.563069958128
5	21460904	0.865214	0.19546	1.27289e-05	1323	ebi-a-GCST90010240	rs187879548	T	G	0.011	|| id:ebi-a-GCST90010240	True	reported	igd	0.014594407420697	19.5647481077079
5	14304025	0.687235	0.159691	2.04795e-05	1323	ebi-a-GCST90010240	rs114645804	T	C	0.014	|| id:ebi-a-GCST90010240	True	reported	igd	0.0138055078238763	18.4923724275715
5	11347020	0.392658	0.0710655	6.42081e-08	1323	ebi-a-GCST90010240	rs6881516	G	A	0.083	|| id:ebi-a-GCST90010240	True	reported	igd	0.0225550468118808	30.4827568461139
5	163854973	-0.374292	0.087584	2.34985e-05	1323	ebi-a-GCST90010240	rs183875568	G	A	0.054	|| id:ebi-a-GCST90010240	True	reported	igd	0.0136162526636768	18.2353671350427
5	68320844	0.352946	0.0788824	1.02468e-05	1323	ebi-a-GCST90010240	rs114096895	G	T	0.073	|| id:ebi-a-GCST90010240	True	reported	igd	0.0149064398949168	19.9893775562644
5	53136710	-1.20108	0.27422	1.49551e-05	1323	ebi-a-GCST90010240	rs150148097	G	C	0.005	|| id:ebi-a-GCST90010240	True	reported	igd	0.0142933315581576	19.1552838109263
5	165870095	-0.895316	0.187235	2.84341e-06	1323	ebi-a-GCST90010240	rs72821475	T	G	0.012	|| id:ebi-a-GCST90010240	True	reported	igd	0.0169893591087781	22.8308244581652
5	9638133	1.26836	0.305535	3.90859e-05	1323	ebi-a-GCST90010240	rs74371106	C	T	0.004	|| id:ebi-a-GCST90010240	True	reported	igd	0.0128582777902582	17.2070378333397
5	38422991	-0.237472	0.0558528	2.60154e-05	1323	ebi-a-GCST90010240	rs3935014	A	G	0.154	|| id:ebi-a-GCST90010240	True	reported	igd	0.0134797268004719	18.0500285571139
6	157119873	-0.459491	0.11132	4.37603e-05	1323	ebi-a-GCST90010240	rs9383813	G	C	0.033	|| id:ebi-a-GCST90010240	True	reported	igd	0.0127142471416425	17.0118128672311
6	67971721	-0.689357	0.164794	4.07043e-05	1323	ebi-a-GCST90010240	rs186293015	T	C	0.015	|| id:ebi-a-GCST90010240	True	reported	igd	0.0130538673304518	17.4722390338405
6	2592894	0.242219	0.0589519	4.65232e-05	1323	ebi-a-GCST90010240	rs73716778	T	A	0.13	|| id:ebi-a-GCST90010240	True	reported	igd	0.0125995282944833	16.8563590498024
6	106600243	0.263715	0.0562026	3.67528e-06	1323	ebi-a-GCST90010240	rs9480646	A	G	0.153	|| id:ebi-a-GCST90010240	True	reported	igd	0.0163692619859039	21.9836512297658
6	46895270	0.528696	0.127676	4.44877e-05	1323	ebi-a-GCST90010240	rs150110122	C	G	0.024	|| id:ebi-a-GCST90010240	True	reported	igd	0.0127950210871006	17.1212901242378
6	31713823	0.556075	0.113023	1.19454e-06	1323	ebi-a-GCST90010240	rs12177823	A	G	0.028	|| id:ebi-a-GCST90010240	True	reported	igd	0.0179679649056328	24.1699667547608

chr .exposure	pos .exposure	beta .exposure	se .exposure	pval .exposure	samplesize .exposure	id .exposure	SNP	effect_allele .exposure	other_allele .exposure	eaf .exposure	exposure	mr_keep .exposure	pval_origin .exposure	data_source .exposure	R^2	F
6	70136445	-0.680283	0.149876	7.23852e-06	1323	ebi-a-GCST90010240	rs7762967	T	C	0.019	|| id:ebi-a-GCST90010240	True	reported	igd	0.0153336067269333	20.571124011807
6	37934825	-0.986524	0.197162	8.49533e-07	1323	ebi-a-GCST90010240	rs150755111	A	G	0.011	|| id:ebi-a-GCST90010240	True	reported	igd	0.0185723695610519	24.9983793294841
6	43429666	-0.990032	0.187041	1.85323e-07	1323	ebi-a-GCST90010240	rs148608708	C	G	0.012	|| id:ebi-a-GCST90010240	True	reported	igd	0.0207378606850636	27.9748525600445
7	143863872	0.397321	0.0963834	4.40859e-05	1323	ebi-a-GCST90010240	rs117133027	C	T	0.043	|| id:ebi-a-GCST90010240	True	reported	igd	0.0126816545178059	16.967643409725
7	49570175	-0.178895	0.0430502	4.27189e-05	1323	ebi-a-GCST90010240	rs34559849	C	G	0.328	|| id:ebi-a-GCST90010240	True	reported	igd	0.0128841080355228	17.2420552170971
7	13291280	-0.708906	0.167507	2.76204e-05	1323	ebi-a-GCST90010240	rs71538826	T	C	0.016	|| id:ebi-a-GCST90010240	True	reported	igd	0.0133570804710486	17.8835756614756
7	22466398	-0.590489	0.143577	4.57741e-05	1323	ebi-a-GCST90010240	rs117887153	C	T	0.021	|| id:ebi-a-GCST90010240	True	reported	igd	0.0126234148250626	16.8887243573365
7	14204690	0.190804	0.0429821	1.19138e-05	1323	ebi-a-GCST90010240	rs12699572	A	G	0.351	|| id:ebi-a-GCST90010240	True	reported	igd	0.0146763730435098	19.6762649956557
7	34073022	0.566033	0.128261	1.26692e-05	1323	ebi-a-GCST90010240	rs79806142	G	A	0.026	|| id:ebi-a-GCST90010240	True	reported	igd	0.0145073406617289	19.4463112764453
8	136037060	-0.431676	0.0850929	5.70309e-07	1323	ebi-a-GCST90010240	rs78720213	C	A	0.059	|| id:ebi-a-GCST90010240	True	reported	igd	0.0190810572684153	25.696390959058
8	118284996	0.178631	0.0410105	1.61678e-05	1323	ebi-a-GCST90010240	rs1499438	T	A	0.521	|| id:ebi-a-GCST90010240	True	reported	igd	0.0141377379905161	18.9437739988186
9	5639516	0.289089	0.069574	3.84096e-05	1323	ebi-a-GCST90010240	rs79788701	G	A	0.097	|| id:ebi-a-GCST90010240	True	reported	igd	0.0128818571226091	17.2390036408035
10	97469387	-0.22538	0.0494405	6.80644e-06	1323	ebi-a-GCST90010240	rs28445650	A	G	0.224	|| id:ebi-a-GCST90010240	True	reported	igd	0.0154645243300912	20.7495180670358
10	9076156	-0.484165	0.0994245	1.52827e-06	1323	ebi-a-GCST90010240	rs117418264	C	T	0.041	|| id:ebi-a-GCST90010240	True	reported	igd	0.0176085932742759	23.6778859791194
10	53248340	-0.609583	0.134106	7.09055e-06	1323	ebi-a-GCST90010240	rs80209163	A	C	0.023	|| id:ebi-a-GCST90010240	True	reported	igd	0.0153772717116021	20.6306185581738
11	11317059	0.353164	0.0850539	3.97384e-05	1323	ebi-a-GCST90010240	rs7109994	C	A	0.942	|| id:ebi-a-GCST90010240	True	reported	igd	0.0128641609533996	17.2150133216252
11	4917142	0.328406	0.0761113	1.93321e-05	1323	ebi-a-GCST90010240	rs12225511	A	G	0.073	|| id:ebi-a-GCST90010240	True	reported	igd	0.0138769855772496	18.5894636667389
12	89365305	-0.262394	0.0616582	2.49833e-05	1323	ebi-a-GCST90010240	rs10858809	G	A	0.124	|| id:ebi-a-GCST90010240	True	reported	igd	0.0135039745727798	18.0829419996058
12	130096502	1.14005	0.246401	4.78267e-06	1323	ebi-a-GCST90010240	rs77114422	T	C	0.007	|| id:ebi-a-GCST90010240	True	reported	igd	0.0159232600680903	21.3749860111548
12	46239129	-0.498231	0.117915	2.92099e-05	1323	ebi-a-GCST90010240	rs150091353	C	T	0.03	|| id:ebi-a-GCST90010240	True	reported	igd	0.0133150269868198	17.8265111263168
13	62098003	-0.254178	0.0596154	2.4251e-05	1323	ebi-a-GCST90010240	rs11841647	T	C	0.135	|| id:ebi-a-GCST90010240	True	reported	igd	0.0135541533387665	18.1510588610568
13	33938363	-0.512347	0.117392	1.56146e-05	1323	ebi-a-GCST90010240	rs182427332	A	G	0.03	|| id:ebi-a-GCST90010240	True	reported	igd	0.0141932977632479	19.0192928316566
13	40663271	0.526646	0.125366	3.24011e-05	1323	ebi-a-GCST90010240	rs117263512	C	T	0.024	|| id:ebi-a-GCST90010240	True	reported	igd	0.0131632614256849	17.6206130797798
14	46803894	-0.648283	0.157078	4.54036e-05	1323	ebi-a-GCST90010240	rs114750813	A	G	0.017	|| id:ebi-a-GCST90010240	True	reported	igd	0.0127110946597379	17.0075405027739
14	77450706	2.34923	0.523616	9.34609e-06	1323	ebi-a-GCST90010240	rs117297158	A	G	0.002	|| id:ebi-a-GCST90010240	True	reported	igd	0.0149867508354412	20.0987122461643
14	40681548	0.340804	0.0785387	1.75934e-05	1323	ebi-a-GCST90010240	rs12147294	C	T	0.066	|| id:ebi-a-GCST90010240	True	reported	igd	0.0140328075785062	18.8011720407042

chr .exposure	pos .exposure	beta .exposure	se .exposure	pval .exposure	samplesize .exposure	id .exposure	SNP	effect_allele .exposure	other_allele .exposure	eaf .exposure	exposure	mr_keep .exposure	pval_origin .exposure	data_source .exposure	R^2	F
15	77381959	-0.280339	0.063501	1.29885e-05	1323	ebi-a-GCST90010240	rs7402884	G	A	0.89	|| id:ebi-a-GCST90010240	True	reported	igd	0.0145176037131324	19.4602710076876
15	82339578	-0.460252	0.109959	3.36636e-05	1323	ebi-a-GCST90010240	rs140983710	A	G	0.034	|| id:ebi-a-GCST90010240	True	reported	igd	0.013069427498463	17.4933416863452
16	17501080	0.233762	0.0553252	2.89554e-05	1323	ebi-a-GCST90010240	rs12446686	G	T	0.161	|| id:ebi-a-GCST90010240	True	reported	igd	0.0133143754714704	17.8256270899017
17	43132719	0.180062	0.0405213	1.18424e-05	1323	ebi-a-GCST90010240	rs12602966	C	A	0.407	|| id:ebi-a-GCST90010240	True	reported	igd	0.0147056273922241	19.7160709785777
17	5687658	0.455323	0.107108	2.56844e-05	1323	ebi-a-GCST90010240	rs73346992	T	C	0.038	|| id:ebi-a-GCST90010240	True	reported	igd	0.0134754540889564	18.0442290313945
18	13309360	-1.27612	0.302311	3.03284e-05	1323	ebi-a-GCST90010240	rs1377813	A	G	0.004	|| id:ebi-a-GCST90010240	True	reported	igd	0.0132893911448849	17.7917269205835
18	59122150	0.405104	0.0920885	1.37499e-05	1323	ebi-a-GCST90010240	rs76364944	C	T	0.05	|| id:ebi-a-GCST90010240	True	reported	igd	0.0144163694181151	19.3225855324794
19	50555544	0.234335	0.0570645	4.69818e-05	1323	ebi-a-GCST90010240	rs4802650	T	C	0.137	|| id:ebi-a-GCST90010240	True	reported	igd	0.0125858281534401	16.8377966052506
19	34744263	-0.716741	0.151443	2.92907e-06	1323	ebi-a-GCST90010240	rs77592306	G	A	0.018	|| id:ebi-a-GCST90010240	True	reported	igd	0.0166484969160961	22.365008196145
20	17525361	-1.89948	0.403006	3.39602e-06	1323	ebi-a-GCST90010240	rs147292136	T	C	0.002	|| id:ebi-a-GCST90010240	True	reported	igd	0.0165140928901393	22.1814227841672
20	16981324	-1.5789	0.374661	3.21959e-05	1323	ebi-a-GCST90010240	rs532347711	G	A	0.003	|| id:ebi-a-GCST90010240	True	reported	igd	0.0132458968985423	17.7327155245436
21	27376344	-0.512873	0.122319	3.31627e-05	1323	ebi-a-GCST90010240	rs71317448	A	G	0.029	|| id:ebi-a-GCST90010240	True	reported	igd	0.0131141130491271	17.5539477937222
22	48795422	0.395382	0.0880627	1.41746e-05	1323	ebi-a-GCST90010240	rs147856022	T	C	0.054	|| id:ebi-a-GCST90010240	True	reported	igd	0.0150079942901794	20.1276359020193
22	23407512	-0.739072	0.175681	3.11157e-05	1323	ebi-a-GCST90010240	rs76003838	A	G	0.014	|| id:ebi-a-GCST90010240	True	reported	igd	0.0132005780999327	17.6712341768853

(3) Supplementary Table S3. MR results

id.exposure	id.outcome	outcome	exposure	method	nsnp	b	se	pval	lo_ci	up_ci	or	or_lci95	or_uci95
ebi-a-GCST90010240	ebi-a-GCST006908	Ischemic stroke || id:ebi-a-GCST006908	|| id:ebi-a-GCST90010240	MR Egger	72	0.017127	0.011221	0.131417	-0.00487	0.03912	1.017275	0.995146	1.039895
ebi-a-GCST90010240	ebi-a-GCST006908	Ischemic stroke || id:ebi-a-GCST006908	|| id:ebi-a-GCST90010240	Weighted median	72	0.019186	0.010021	0.055545	-0.00046	0.038827	1.019371	0.999545	1.03959
ebi-a-GCST90010240	ebi-a-GCST006908	Ischemic stroke || id:ebi-a-GCST006908	|| id:ebi-a-GCST90010240	Inverse variance weighted	72	0.013286	0.006595	0.043959	0.000359	0.026213	1.013375	1.000359	1.026559
ebi-a-GCST90010240	ebi-a-GCST006908	Ischemic stroke || id:ebi-a-GCST006908	|| id:ebi-a-GCST90010240	Simple mode	72	0.017885	0.020351	0.382455	-0.022	0.057773	1.018046	0.978238	1.059474
ebi-a-GCST90010240	ebi-a-GCST006908	Ischemic stroke || id:ebi-a-GCST006908	|| id:ebi-a-GCST90010240	Weighted mode	72	0.023335	0.013747	0.093998	-0.00361	0.050279	1.023609	0.996397	1.051564

(4) Supplementary Table S4. Pleiotropy

id.exposure	id.outcome	outcome	exposure	egger_intercept	se	pval
ebi-a-GCST90010240	ebi-a-GCST006908	Ischemic stroke || id:ebi-a-GCST006908	|| id:ebi-a-GCST90010240	-0.00173	0.004085	0.672538

(5) Supplementary Table S5. heterogeneity

id.exposure	id.outcome	outcome	exposure	method	Q	Q_df	Q_pval
ebi-a-GCST90010240	ebi-a-GCST006908	Ischemic stroke || id:ebi-a-GCST006908	|| id:ebi-a-GCST90010240	MR Egger	72.82633	70	0.385173
ebi-a-GCST90010240	ebi-a-GCST006908	Ischemic stroke || id:ebi-a-GCST006908	|| id:ebi-a-GCST90010240	IVW	73.01377	71	0.411662