

Table 1. Published associations between associated phenotypes of Graves and MG in forward MR

SNP	OA	EA	pval	beta. exposure	se. exposure	eaf. exposure	beta	se	pval
rs10199135	A	G	3.13E-09	-0.188116	0.0317512	0.143784	-0.0208	0.0476	0.663
rs11256516	A	G	5.69E-09	0.132048	0.022667	0.317457	0.0733	0.0418	0.07926
rs12208994	T	G	6.83E-09	0.145765	0.0251537	0.227233	0.0153	0.0452	0.7342
rs17767904	G	A	5.63E-14	0.171135	0.0227682	0.311583	-0.0052	0.0395	0.8961
rs181316459	G	C	1.38E-11	-0.387041	0.057251	0.0477549	0.0724	0.2035	0.7219
rs2160215	T	C	1.64E-42	0.306245	0.0224107	0.296134	-0.0397	0.0384	0.3007
rs2281389	A	G	2.20E-13	-0.2213	0.0301655	0.163543	0.0156	0.0477	0.7445
rs2476601	A	G	1.76E-31	-0.328613	0.0281531	0.855704	0.396	0.0609	7.95E-11
rs2792043	A	C	1.52E-08	0.121001	0.021379	0.501178	-0.0255	0.0367	0.4881
rs4338740	T	C	5.99E-10	0.140786	0.022742	0.31288	0.0235	0.0419	0.5746
rs6065926	A	G	3.29E-11	0.163297	0.024619	0.728487	-0.0949	0.0417	0.02289
rs60946162	C	T	1.37E-12	-0.155383	0.0219261	0.409424	-0.0448	0.0371	0.2273
rs61734579	A	C	1.55E-11	-0.425381	0.063087	0.0389118	-0.0463	0.2164	0.8305
rs72891915	G	A	8.61E-28	0.510963	0.0467639	0.0398985	0.0421	0.1129	0.7089
rs72928038	G	A	2.51E-10	0.202624	0.0320293	0.113825	0.1372	0.0491	0.00518
rs75127309	A	G	7.73E-11	0.276978	0.0425746	0.0582667	0.2013	0.061	0.0009657
rs7940871	C	T	1.73E-11	0.152596	0.022683	0.308396	0.0046	0.0417	0.9124
rs80054410	T	C	5.48E-11	0.15227	0.0232213	0.28246	0.0807	0.0374	0.03088

Table 2. Published associations between associated phenotypes of Hypothyroidism and MG in forward MR

SNP	O A	E A	Pval. x	beta. x	se. x	eaf. x	beta . y	se. y	pval. y
rs10116520	A	G	4.99E- 31	0.0922204	0.00796 132	0.400977	0.01 45	0.03 85	0.7068
rs10118880	G	A	5.89E- 12	-0.059965 4	0.00871 311	0.724067	0.06 29	0.03 95	0.1116
rs10166287	T	G	2.39E- 12	-0.091974 3	0.01312 08	0.102806	-0.0 242	0.05 08	0.634
rs10259879	A	G	6.65E- 12	0.06374	0.00928 469	0.231986	-0.0 042	0.04 18	0.9197
rs10416358	A	G	2.31E- 20	0.0792971	0.00857 547	0.28634	0.00 49	0.04 32	0.9096
rs10494077	G	A	2.92E- 31	0.109462	0.00941 244	0.213715	-0.0 891	0.04 61	0.05352
rs10514934	T	C	1.20E- 13	-0.082317 6	0.01109 94	0.150875	-0.0 429	0.05 68	0.4499
rs10748781	C	A	1.20E- 21	-0.078432 8	0.00820 63	0.652488	0.00 7	0.03 67	0.8484
rs10814915	T	C	1.48E- 19	-0.070825 5	0.00782 937	0.543587	-0.0 012	0.03 69	0.9746
rs10817674	C	A	6.71E- 10	0.0491956	0.00796 987	0.404202	0.02 62	0.03 92	0.5043
rs10818050	A	G	9.33E- 190	0.24571	0.00836 262	0.655429	0.06 46	0.03 85	0.09312
rs10858026	T	G	3.78E- 12	0.06992	0.01006 74	0.807437	-0.0 156	0.04 13	0.705
rs11079035	G	A	4.20E- 15	0.0756235	0.00963 489	0.202659	-0.0 028	0.04 79	0.954
rs111352680	G	A	7.13E- 11	-0.055057 9	0.00844 707	0.32381	-0.0 881	0.04 39	0.04459
rs1131896	G	A	1.37E- 25	-0.100287	0.00959 097	0.2157	-0.0 901	0.04 11	0.02842
rs116776245	G	A	3.50E- 10	0.0872938	0.01391 13	0.083309 1	0.08 91	0.08 06	0.2691
rs116909374	C	T	7.53E- 19	-0.212521	0.02396 84	0.030676 8	0.15 46	0.09 77	0.1136
rs11694732	G	C	2.43E- 44	0.110147	0.00788 54	0.42955	-0.0 554	0.03 73	0.1376
rs11830037	C	A	2.35E- 13	0.0996828	0.01360 49	0.088809 5	-0.0 491	0.06 77	0.4688
rs11897732	G	A	6.29E- 09	0.0463268	0.00797 538	0.582497	0.02 54	0.03 7	0.4917
rs11935941	A	C	3.59E- 30	-0.141463	0.01239 47	0.123206	0.00 97	0.04 5	0.8287

rs11969311	A	C	2.97E-10	-0.0569107	0.00903279	0.252349	0.0614	0.0458	0.1796
rs1203940	T	C	1.13E-25	0.102604	0.00979587	0.792063	-0.0464	0.0439	0.2909
rs12175489	G	A	7.26E-43	-0.151299	0.0110242	0.156735	-0.0755	0.0522	0.1478
rs12206423	C	T	1.61E-08	0.0614412	0.0108764	0.148506	-0.2074	0.058	0.000352
rs1239704	G	A	1.31E-09	-0.0513046	0.00845726	0.691589	-0.0466	0.049	0.3413
rs12407089	G	C	2.32E-28	0.0923609	0.00836234	0.316122	-0.0326	0.0386	0.398
rs12540388	A	T	1.05E-10	-0.0657312	0.0101757	0.1861	-0.0252	0.0433	0.56
rs12697352	G	A	5.24E-10	-0.0499358	0.00803913	0.395907	-0.0043	0.0401	0.9154
rs12756019	G	A	6.53E-13	-0.0576319	0.00801665	0.605562	-0.0255	0.0389	0.5131
rs12897126	T	A	5.37E-17	-0.102215	0.0121998	0.886514	0.0906	0.0495	0.0672
rs12923006	G	A	9.23E-13	0.072125	0.0100994	0.179626	-0.0693	0.0533	0.1935
rs12967678	G	A	5.88E-10	0.0744285	0.0120168	0.117959	0.0764	0.0611	0.2111
rs13137589	A	G	1.17E-14	-0.0631943	0.00818682	0.36779	-0.1278	0.0385	0.0009132
rs1317983	T	C	2.69E-33	0.102264	0.00850572	0.680897	0.0053	0.0398	0.8944
rs1319091	C	A	7.93E-09	-0.0559107	0.00969016	0.795	-0.0427	0.0495	0.3876
rs13447704	T	C	1.28E-08	-0.141098	0.0248049	0.0268399	-0.0722	0.1404	0.6071
rs141686764	A	G	3.33E-08	-0.164372	0.0297604	0.018741	-0.0547	0.1325	0.68
rs1441172	C	T	7.06E-10	-0.0525649	0.00852681	0.31324	0.0255	0.037	0.492
rs144651842	G	A	3.87E-15	0.114059	0.0145133	0.0768931	0.0375	0.7135	0.9581
rs151234	G	C	4.82E-13	0.0851282	0.0117738	0.123296	0.0887	0.0504	0.0786
rs1534424	A	C	1.99E-12	-0.0563343	0.00800768	0.397949	-0.0219	0.0371	0.5553
rs17189980	T	C	8.73E-10	0.159744	0.0260552	0.0219647	-0.1918	0.1123	0.08749

rs17364832	T	G	2.85E- 20	0.0788068	0.00854 317	0.291179	0.01 6	0.04 07	0.6948
rs17389938	G	C	1.61E- 09	0.0665321	0.01102 81	0.143917	-0.0 216	0.05 14	0.6739
rs17447487	C	T	1.44E- 08	-0.103313	0.01822 39	0.051619 5	-0.0 452	0.06 61	0.4939
rs1808192	A	G	8.01E- 09	-0.045993 9	0.00797 357	0.592061	0.01 06	0.03 86	0.7844
rs1885013	G	A	3.22E- 09	0.0504811	0.00852 693	0.693585	-0.1 245	0.04	0.001835
rs1990760	C	T	1.07E- 15	0.0638177	0.00795 928	0.585897	0.03 47	0.03 71	0.3498
rs200293726	A	T	1.89E- 22	-0.084001 1	0.00861 781	0.305176	0.00 61	0.03 97	0.8771
rs2046045	T	G	1.81E- 58	0.127336	0.00789 864	0.414313	0.04 63	0.03 74	0.2157
rs2049218	C	T	4.19E- 37	-0.102774	0.00807 538	0.386346	-0.0 407	0.03 71	0.2724
rs210192	A	G	1.54E- 14	0.0728538	0.00948 093	0.214912	0.07 41	0.03 81	0.05182
rs2124594	T	C	2.23E- 12	-0.059388 2	0.00846 101	0.318009	-0.0 832	0.03 98	0.03653
rs229528	C	T	1.29E- 19	0.0721977	0.00796 744	0.396414	0.16 19	0.03 64	8.71E-06
rs244687	A	G	1.08E- 16	-0.074111 5	0.00893 353	0.748077	0.01 21	0.05 15	0.8148
rs2476601	A	G	8.69E- 188	-0.308807	0.01056 56	0.854556	0.39 6	0.06 09	7.95E-11
rs2629649	T	G	1.47E- 09	0.0507258	0.00838 789	0.312967	0.06 88	0.03 75	0.06623
rs2702968	A	T	1.07E- 09	0.0482097	0.00790 508	0.428279	0.07 11	0.03 66	0.0517
rs2739043	A	G	9.56E- 12	-0.055158 4	0.00809 602	0.633324	0.05 47	0.03 82	0.1523
rs28391281	T	C	1.31E- 10	-0.050342 6	0.00783 427	0.546363	-0.0 283	0.03 76	0.4514
rs28396553	C	T	2.05E- 08	-0.046097 6	0.00822 089	0.64977	0.00 91	0.03 68	0.8045
rs2972343	A	G	9.64E- 12	-0.088255 5	0.01295 62	0.105752	-0.0 278	0.06 64	0.6759
rs2976908	T	G	1.72E- 14	-0.060527 3	0.00789 139	0.483628	-0.0 327	0.03 75	0.3827
rs30233	G	A	1.07E- 11	-0.054028 5	0.00794 838	0.586573	0.01 18	0.03 7	0.7491

rs3103991	A	G	7.61E-10	0.0558276	0.0090733	0.748361	-0.0315	0.048	0.5118
rs3130186	C	T	1.47E-38	-0.129028	0.00993613	0.198053	-0.0355	0.0425	0.4038
rs322901	C	G	1.62E-08	-0.0445694	0.00789034	0.568082	0.004	0.0366	0.9136
rs35717611	C	T	2.89E-11	0.0538069	0.00808853	0.378383	0.0225	0.0419	0.5919
rs3778752	G	T	9.08E-09	0.0452516	0.0078739	0.439791	0.0188	0.0367	0.6086
rs3946137	A	G	1.85E-08	0.0460636	0.00818831	0.349207	-0.0099	0.0382	0.7952
rs41177	G	A	1.18E-09	-0.048636	0.00799532	0.404602	-0.0071	0.0378	0.8504
rs4409785	T	C	1.60E-17	0.0884395	0.010381	0.165694	0.2545	0.045	1.54E-08
rs4606850	C	T	5.14E-10	0.0649986	0.0104585	0.165394	-0.0595	0.0456	0.1924
rs4704447	A	G	6.46E-09	-0.0460311	0.00793057	0.56869	-0.0159	0.0367	0.6658
rs4853459	T	C	2.03E-41	-0.123481	0.00915986	0.769568	0.134	0.0417	0.001326
rs4912068	C	G	9.51E-09	-0.0810188	0.0141167	0.0886769	-0.0181	0.0624	0.7719
rs56011703	C	T	2.95E-09	0.0840995	0.0141718	0.0814699	0.0693	0.0505	0.1698
rs56159866	C	T	2.58E-10	-0.0591346	0.0093534	0.232405	-0.0344	0.0437	0.4321
rs568999	G	C	2.59E-10	-0.0533804	0.00844386	0.315823	-0.0967	0.0404	0.01674
rs56983610	C	A	1.34E-18	-0.104236	0.0118418	0.130597	0.075	0.0478	0.1163
rs57652885	C	T	2.16E-09	-0.107083	0.0178911	0.0531312	-0.2298	0.1815	0.2055
rs61201527	A	C	5.00E-08	0.0641356	0.011765	0.124417	-0.0574	0.0576	0.3183
rs61759532	C	T	4.37E-15	0.0778455	0.00992449	0.189239	0.1328	0.0459	0.003801
rs61916675	A	G	9.43E-11	0.0543359	0.00839048	0.316719	0.0042	0.0387	0.9132
rs61938962	C	T	4.09E-22	0.0805646	0.0083324	0.319262	0.034	0.0395	0.3891
rs6471875	C	A	7.93E-10	0.0489914	0.0079709	0.405069	0.0299	0.0372	0.4212

rs66760320	C	T	7.64E-11	-0.0637918	0.00980279	0.202443	0.0335	0.0408	0.4115
rs6724363	G	T	2.38E-28	0.089522	0.00810683	0.624795	0.0955	0.0412	0.02034
rs6831973	T	C	1.36E-12	0.0558804	0.00788404	0.555522	-0.1566	0.0368	2.07E-05
rs7043516	A	C	2.66E-23	-0.106566	0.0107159	0.166287	0.0265	0.0514	0.6068
rs7127620	A	G	3.62E-10	-0.0514586	0.00820742	0.359376	-0.0353	0.0381	0.3544
rs713427	T	C	8.88E-10	0.0574138	0.00936868	0.221866	-0.0047	0.0527	0.9292
rs71430783	G	T	2.43E-20	0.0929704	0.0100599	0.180111	0.1076	0.0431	0.01261
rs7144089	G	C	9.04E-09	-0.0473475	0.00823749	0.445673	-0.0106	0.037	0.7748
rs71641308	C	T	1.46E-08	0.0745947	0.0131656	0.0963323	0.0912	0.0764	0.2323
rs72616654	C	G	7.36E-11	0.051378	0.00788836	0.553338	-0.0162	0.0378	0.668
rs72729322	C	T	1.85E-09	0.0574537	0.0095589	0.209989	0.0811	0.0474	0.0868
rs72751538	G	T	1.11E-09	0.0947907	0.015558	0.0661338	-0.0837	0.072	0.2452
rs72796365	C	T	3.67E-09	0.141199	0.0239386	0.0260639	-0.0568	0.1377	0.6798
rs735000	C	T	1.25E-10	0.0765716	0.0119025	0.120019	-0.1061	0.0515	0.03916
rs7444908	A	G	6.79E-15	-0.06392	0.00820707	0.356509	0.0202	0.0371	0.5869
rs753760	C	G	3.74E-20	-0.0823464	0.00895538	0.261725	0.0099	0.039	0.8
rs76032549	C	T	6.07E-10	0.0639475	0.010333	0.170413	0.0256	0.0433	0.5547
rs76169968	G	A	1.14E-10	-0.086105	0.013355	0.0991748	0.0878	0.0636	0.1673
rs7701443	A	G	8.30E-09	-0.046864	0.00813299	0.380588	0.0245	0.0369	0.5077
rs774121	T	C	2.16E-15	-0.0711606	0.00897138	0.749326	-0.0679	0.0427	0.1117
rs7754251	G	C	2.60E-25	0.0814232	0.00783265	0.447795	0.0087	0.0367	0.8131
rs78783493	C	T	6.00E-09	-0.054713	0.00940616	0.232825	-0.0063	0.0746	0.9324

rs78953577	G	T	1.67E-11	-0.0613847	0.00911757	0.24797	0.0668	0.0467	0.1525
rs7902146	C	T	3.71E-16	-0.0731997	0.0089842	0.750453	0.1013	0.0398	0.01088
rs79051898	C	T	2.58E-08	-0.067706	0.0121605	0.120524	-0.0018	0.0648	0.978
rs79490353	T	C	5.68E-11	0.200239	0.0305624	0.0161635	0.0068	0.1137	0.9521
rs794999	A	G	2.13E-13	-0.0679624	0.00925834	0.771704	-0.0396	0.0438	0.3658
rs8006310	A	G	4.12E-12	-0.0542998	0.00783208	0.504177	0.0486	0.0366	0.1841
rs8193	C	T	1.10E-12	0.058247	0.00818416	0.352685	0.0312	0.0379	0.4114
rs914960	T	A	1.28E-08	-0.0629918	0.0110739	0.150334	-0.1194	0.0544	0.02807
rs9271365	T	G	6.10E-180	0.229767	0.00803286	0.35872	-0.0935	0.0374	0.01246
rs9292	A	G	1.43E-08	-0.124311	0.0219269	0.968429	0.009	0.1464	0.9507
rs9378805	A	C	6.91E-09	0.0454094	0.00783841	0.469179	0.1097	0.0369	0.002921
rs938726	A	C	1.24E-14	-0.0676073	0.00876677	0.73143	0.0018	0.0485	0.9708
rs9497965	C	T	2.29E-15	0.0655856	0.0082763	0.33673	0.0259	0.037	0.4844
rs9981704	C	T	3.13E-08	0.0561317	0.0101429	0.179356	0.1098	0.042	0.008997

Table 3. Published associations between associated phenotypes of TPOAb and MG in forward MR

SNP	EA	OA	beta. x	se. x	pval. x	beta. y	se. y	pval. y
rs10020296	a	g	0.134	0.0293	4.99E-06	0.0037	0.0376	0.9209
rs11602677	a	g	0.1701	0.0347	9.16E-07	0.0617	0.0407	0.1297
rs13021203	a	t	-1.3043	0.282	3.75E-06	0.0816	0.1513	0.5898
rs16999999	t	c	0.3118	0.0619	4.84E-07	0.0352	0.0583	0.5467
rs239935	a	g	0.1294	0.0282	4.47E-06	-0.1051	0.0369	0.004351
rs353648	t	g	0.2442	0.0522	2.92E-06	0.1526	0.0534	0.004297
rs4406425	t	g	0.1458	0.0319	4.73E-06	-0.0281	0.0377	0.4568
rs4766517	c	g	-0.2344	0.0468	5.40E-07	0.0047	0.0371	0.8984
rs6679677	a	c	0.2771	0.0561	7.85E-07	0.3937	0.0613	1.35E-10
rs927221	a	g	-0.2095	0.0447	2.82E-06	0.042	0.0505	0.4055

Table 4. Published associations between associated phenotypes of FT4 and MG in forward MR

SNP	OA	EA	eaf	beta. x	se. x	pval. x	beta. y	Se. y	Pval. y
rs10759944	A	G	0.2157	-0.0769	0.0068	1.37E-29	0.0675	0.0385	0.08001
rs10818937	C	T	0.7921	0.0475	0.007	1.31E-11	0.0256	0.04	0.5216
rs11078333	A	T	0.6799	0.0513	0.0072	9.91E-13	-0.0862	0.0372	0.02047
rs11160652	G	A	0.6332	-0.0579	0.0069	5.91E-17	0.0025	0.0382	0.9471
rs11206244	C	T	0.7143	-0.1148	0.0069	4.78E-63	-0.0121	0.0394	0.7582
rs11873601	G	T	0.94322	-0.1409	0.0166	2.49E-17	0.1237	0.089	0.1647
rs12348139	T	C	0.92903	0.0674	0.0118	1.13E-08	-0.0896	0.0653	0.17
rs225014	T	C	0.5788	0.0535	0.0067	1.83E-15	-0.048	0.0384	0.2108
rs3780190	A	G	0.5559	-0.093	0.0068	3.37E-43	0.0011	0.0365	0.9767
rs4149056	T	C	0.8773	-0.0506	0.0089	1.34E-08	-0.011	0.0514	0.8304
rs4712971	T	C	0.6419	0.0507	0.0074	5.55E-12	-0.0445	0.0427	0.2974
rs55679545	G	A	0.7111	-0.044	0.0076	8.42E-09	-0.0247	0.0412	0.5487
rs56069042	A	G	0.98031	0.1061	0.0186	1.16E-08	-0.0688	0.1038	0.5072
rs67583169	C	G	0.6763	0.0613	0.0095	9.99E-11	0.0338	0.0492	0.493
rs6785807	G	A	0.8823	0.059	0.0093	2.47E-10	-0.0443	0.0505	0.3801
rs6855450	C	T	0.96383	-0.1164	0.0115	2.76E-24	-0.0055	0.0645	0.9323
rs7198944	T	A	0.8136	-0.0516	0.0092	1.70E-08	-0.0373	0.0511	0.4646
rs73405691	A	G	0.91621	0.0556	0.0098	1.61E-08	0.003	0.0573	0.9586
rs78677597	A	C	0.8837	-0.0734	0.0082	4.88E-19	0.0049	0.0417	0.9067
rs951366	T	C	0.647	0.0367	0.0067	4.39E-08	-0.0673	0.0386	0.0809

Table 5. Published associations between associated phenotypes of TSH and MG in forward MR

SNP	OA	EA	eaf. x	beta. x	se. x	pval. x	beta. y	se. y	Pval. y
rs1045476	A	G	0.6314	-0.049	0.0082	2.36E-09	-0.1043	0.0496	0.03539
rs1079418	A	G	0.2821	-0.1009	0.0066	8.23E-53	0.0083	0.039	0.8322
rs10814915	T	C	0.4583	-0.0421	0.0061	5.06E-12	-0.0012	0.0369	0.9746
rs10957494	A	G	0.4089	0.0402	0.0066	1.10E-09	-0.0026	0.0391	0.9476
rs11654194	A	G	0.7244	-0.0467	0.0061	1.82E-14	0.007	0.037	0.8496
rs11755845	C	T	0.2001	-0.0725	0.0069	1.43E-25	0.0385	0.0408	0.3458
rs1203939	A	G	0.7225	0.0493	0.0072	7.48E-12	-0.0435	0.0439	0.3215
rs12217641	C	T	0.1928	-0.0405	0.0066	8.65E-10	-0.0899	0.0395	0.02304
rs12284404	G	A	0.1722	-0.0667	0.0069	2.48E-22	0.045	0.0427	0.2924
rs12410532	C	T	0.1667	-0.1112	0.0085	4.46E-39	0.0836	0.0489	0.08721
rs1265091	C	T	0.1571	0.0571	0.0086	3.20E-11	-0.1083	0.0469	0.02097
rs12950966	C	G	0.3599	0.0523	0.0061	1.29E-17	0.0336	0.0378	0.3746
rs13329353	T	C	0.342	-0.0614	0.0065	5.17E-21	-0.0613	0.0391	0.1173
rs1351283	A	G	0.5064	0.1279	0.0064	9.27E-90	0.0498	0.0381	0.1911
rs1661584	C	T	0.6314	-0.0451	0.007	1.06E-10	-0.0397	0.0436	0.3632
rs17020122	C	T	0.1424	0.1044	0.0114	5.32E-20	-0.176	0.0767	0.02168
rs17477923	T	C	0.1726	-0.0826	0.0069	2.57E-33	0.0291	0.0422	0.4906
rs17767491	A	G	0.2537	-0.0883	0.0065	3.35E-42	-0.0105	0.0395	0.7895
rs1861628	A	G	0.6039	0.0819	0.007	6.13E-32	0.1014	0.0413	0.01407
rs199461	G	A	0.4125	0.0452	0.0074	1.13E-09	0.0556	0.0417	0.1825
rs2268476	A	G	0.3654	-0.0536	0.0072	6.87E-14	0.0103	0.0441	0.8144
rs2272642	A	G	0.136	-0.0442	0.0079	2.10E-08	-0.0456	0.0471	0.333
rs2439301	A	G	0.7596	0.0587	0.0076	8.15E-15	0.0263	0.0445	0.554
rs28502438	T	C	0.228	-0.0338	0.0061	3.70E-08	-0.0138	0.0366	0.7061
rs2928168	G	T	0.4286	-0.1235	0.0095	5.79E-39	0.0216	0.0507	0.6701
rs334719	A	T	0.92995	0.1668	0.0146	3.24E-30	0.0292	0.0837	0.727
rs40393	T	C	0.7285	-0.0475	0.0064	1.00E-13	0.0016	0.0379	0.9662
rs414755	G	A	0.5934	0.0504	0.0061	1.85E-16	-8.00E-04	0.0368	0.9819
rs4578973	C	T	0.2198	-0.0556	0.0074	8.15E-14	-0.0323	0.0434	0.4567
rs4804413	C	T	0.3654	0.0532	0.0062	8.64E-18	0.0023	0.037	0.9503
rs544873	G	A	0.3897	0.05	0.0063	2.53E-15	0.0215	0.0381	0.5729
rs68137036	A	G	0.1992	-0.0847	0.0068	4.09E-35	0.0096	0.0405	0.8132
rs6847675	T	G	0.1896	-0.1147	0.0076	2.56E-51	0.0135	0.0455	0.7664
rs726019	C	T	0.1442	0.061	0.0103	3.39E-09	0.1339	0.0557	0.01622
rs7529705	G	A	0.3439	0.0531	0.0064	1.39E-16	-0.0239	0.0379	0.5284
rs78571365	A	C	0.03938	-0.0868	0.0153	1.49E-08	-0.1325	0.092	0.1499
rs78775620	C	T	0.0087	-0.1719	0.0228	4.78E-14	-0.0075	0.146	0.9592
rs8015085	G	A	0.2097	0.0671	0.0077	2.45E-18	0.1104	0.0427	0.009729
rs9298749	A	C	0.527	0.0393	0.0064	8.80E-10	-0.0046	0.0374	0.9016
rs9497965	C	T	0.3782	0.0444	0.0062	9.81E-13	0.0259	0.037	0.4844
rs9511147	C	G	0.2143	-0.044	0.0065	1.81E-11	0.0043	0.0382	0.9094

Table 6. Published associations between associated phenotypes of MG and Graves in reverse MR

SNP	EA	OA	eaf. x	beta. x	se. x	pval. x	Pval. y	beta. y	se. y
rs2476601	A	G	0.093468086	0.396	0.0609	7.95E-11	1.76E-31	-0.328613	0.0281531
rs2523595	G	A	0.346952383	0.2602	0.039	2.55E-11	2.90E-27	-0.241016	0.022284
rs35274388	A	G	0.037274795	0.4495	0.0812	3.07E-08	0.489959	0.0675976	0.0979145
rs4409785	C	T	0.175914546	0.2545	0.045	1.54E-08	8.66E-06	0.125031	0.0281078
rs4574025	C	T	0.464516382	0.2874	0.0369	7.09E-15	0.106506	-0.0352837	0.0218597
rs76815088	C	T	0.059448788	-0.8661	0.1128	1.58E-14	1.22E-05	-0.171352	0.0391793

Table 7. Published associations between associated phenotypes of MG and hypothyroidism in reverse MR

SNP	E A	O A	eaf. x	beta. x	se. x	pval. x	pval. y	beta. y	se. y
rs2476601	A	G	0.093468086	0.396	0.0609	7.95E-11	8.69E-188	-0.308807	0.0105656
rs2523595	G	A	0.346952383	0.2602	0.039	2.55E-11	1.18E-099	-0.0510994	0.00840002
rs35274388	A	G	0.037274795	0.4495	0.0812	3.07E-08	0.281255	0.0388861	0.0360891
rs4409785	C	T	0.175914546	0.2545	0.045	1.54E-08	1.60E-17	0.0884395	0.010381
rs4574025	C	T	0.464516382	0.2874	0.0369	7.09E-15	0.00495724	-0.0223496	0.00795418
rs76815088	C	T	0.059448788	-0.8661	0.1128	1.58E-14	1.57E-16	-0.114503	0.0138779

Table 8. Published associations between associated phenotypes of MG and TPOAb/FT4/TSH in reverse MR

SNP (TPOAb)	E A	O A	eaf. x	beta. x	se. x	pval. x	beta. y	se. y	pval. y
rs2476601	A	G	0.093468086	0.396	0.0609	7.95E-11	0.2741	0.0541	4.04E-07
rs4409785	C	T	0.175914546	0.2545	0.045	1.54E-08	-0.093	0.0606	0.1247

SNP (FT4)	E A	O A	eaf. x	beta. x	se. x	pval. x	beta. y	se. y	pval. y
rs4409785	C	T	0.175914546	0.2545	0.045	1.54E-08	-0.0023	0.0089	0.7961

SNP (TSH)	E A	O A	eaf. x	beta. x	se. x	pval. x	beta. y	se. y	pval. y
rs4409785	C	T	0.175914546	0.2545	0.045	1.54E-08	0.021	0.0083	0.01119

Table 9. Graves disease F-statistic in forward MR

SNP	R2	F
rs2792043		1.97E-04
rs2476601		4.19E-04
rs11571297		4.22E-04
rs10199135		1.08E-04
rs60946162		1.54E-04
rs9265530		9.67E-05
rs2647004		1.93E-03
rs2281389		1.65E-04
rs72891915		3.67E-04
rs73744913		2.31E-04
rs12208994		1.03E-04
rs61734579		1.40E-04
rs72928038		1.23E-04
rs181316459		1.41E-04
rs2466074		1.22E-04
rs11256516		1.04E-04
rs75127309		1.30E-04
rs7940871		1.39E-04
rs2160215		5.74E-04
rs4338740		1.18E-04
rs17767904		1.74E-04
rs6065926		1.35E-04
rs80054410		1.32E-04
rs1985791		1.94E-04

Table 10. hypothyroidism F-statistic in forward MR

SNP	R2	F
rs10116520		4.26E-04

rs10118880	1. 50E-04	47. 36443038
rs10166287	1. 56E-04	49. 13710817
rs10259879	1. 50E-04	47. 12881769
rs10416358	2. 71E-04	85. 50588146
rs10494077	4. 29E-04	135. 2444832
rs10514934	1. 75E-04	55. 00265288
rs10748781	2. 90E-04	91. 34775997
rs10814915	2. 60E-04	81. 83195108
rs10817674	1. 21E-04	38. 10195773
rs10818050	2. 73E-03	863. 2929233
rs10858026	1. 53E-04	48. 23534986
rs11079035	1. 96E-04	61. 60518527
rs111352680	1. 35E-04	42. 48389644
rs1131896	3. 47E-04	109. 335566
rs116776245	1. 25E-04	39. 37572908
rs116909374	2. 50E-04	78. 61815658
rs11694732	6. 19E-04	195. 1170097
rs11830037	1. 70E-04	53. 68426253
rs11897732	1. 07E-04	33. 74108764
rs11935941	4. 13E-04	130. 2599572
rs11969311	1. 26E-04	39. 69549941
rs1203940	3. 48E-04	109. 7083796
rs12175489	5. 98E-04	188. 3541488
rs12206423	1. 01E-04	31. 91143093
rs1239704	1. 17E-04	36. 80022635
rs12407089	3. 87E-04	121. 988225
rs12540388	1. 32E-04	41. 72648244
rs12697352	1. 22E-04	38. 583637
rs12756019	1. 64E-04	51. 68175721
rs12897126	2. 23E-04	70. 19740963
rs12923006	1. 62E-04	51. 00088921
rs12967678	1. 22E-04	38. 36172337
rs13137589	1. 89E-04	59. 58302851
rs1317983	4. 59E-04	144. 5508435
rs1319091	1. 06E-04	33. 29087467
rs13447704	1. 03E-04	32. 35668323
rs141686764	9. 68E-05	30. 50530652
rs1441172	1. 21E-04	38. 00281398
rs144651842	1. 96E-04	61. 7623791
rs151234	1. 66E-04	52. 27702144
rs1534424	1. 57E-04	49. 49138728
rs17189980	1. 19E-04	37. 58871941
rs17364832	2. 70E-04	85. 09156902
rs17389938	1. 16E-04	36. 39639039

rs17447487	1.02E-04	32.13842139
rs1808192	1.06E-04	33.27301021
rs1885013	1.11E-04	35.04850248
rs1990760	2.04E-04	64.28830458
rs200293726	3.02E-04	95.0108841
rs2046045	8.24E-04	259.8932551
rs2049218	5.14E-04	161.9712099
rs210192	1.87E-04	59.04726422
rs2124594	1.56E-04	49.26666342
rs229528	2.61E-04	82.11194968
rs244687	2.18E-04	68.82120127
rs2476601	2.70E-03	854.2464555
rs2629649	1.16E-04	36.57207483
rs2702968	1.18E-04	37.19234499
rs2739043	1.47E-04	46.41703738
rs28391281	1.31E-04	41.29252643
rs28396553	9.98E-05	31.44243693
rs2972343	1.47E-04	46.400805
rs2976908	1.87E-04	58.82918487
rs30233	1.47E-04	46.20466432
rs3103991	1.20E-04	37.8586059
rs3130186	5.35E-04	168.6283706
rs322901	1.01E-04	31.90651585
rs35717611	1.40E-04	44.25211012
rs3778752	1.05E-04	33.0282324
rs3946137	1.00E-04	31.64640944
rs41177	1.17E-04	37.00336685
rs4409785	2.30E-04	72.57907311
rs4606850	1.23E-04	38.624818
rs4704447	1.07E-04	33.68923455
rs4853459	5.77E-04	181.7271629
rs4912068	1.05E-04	32.93839888
rs56011703	1.12E-04	35.21551473
rs56159866	1.27E-04	39.97068165
rs568999	1.27E-04	39.96491025
rs56983610	2.46E-04	77.4813668
rs57652885	1.14E-04	35.82318663
rs61201527	9.43E-05	29.71746114
rs61759532	1.95E-04	61.52446848
rs61916675	1.33E-04	41.93699998
rs61938962	2.97E-04	93.48577493
rs6471875	1.20E-04	37.77654381
rs66760320	1.34E-04	42.34747866
rs6724363	3.87E-04	121.9423788

rs6831973	1.59E-04	50.23641239
rs7043516	3.14E-04	98.89566783
rs7127620	1.25E-04	39.30971173
rs713427	1.19E-04	37.55545398
rs71430783	2.71E-04	85.40814987
rs7144089	1.05E-04	33.0370718
rs71641308	1.02E-04	32.10198397
rs72616654	1.35E-04	42.42073479
rs72729322	1.15E-04	36.12579479
rs72751538	1.18E-04	37.12112837
rs72796365	1.10E-04	34.7906857
rs735000	1.31E-04	41.38627186
rs7444908	1.93E-04	60.65889572
rs753760	2.68E-04	84.55093994
rs76032549	1.22E-04	38.29936072
rs76169968	1.32E-04	41.56867676
rs7701443	1.05E-04	33.2028585
rs774121	2.00E-04	62.91554169
rs7754251	3.43E-04	108.0627796
rs78783493	1.07E-04	33.83401798
rs78953577	1.44E-04	45.32724312
rs7902146	2.11E-04	66.38302246
rs79051898	9.84E-05	30.99907195
rs79490353	1.36E-04	42.92592546
rs794999	1.71E-04	53.88506428
rs8006310	1.53E-04	48.06616497
rs8193	1.61E-04	50.65194704
rs914960	1.03E-04	32.35668976
rs9271365	2.59E-03	818.1485297
rs9292	1.02E-04	32.14118546
rs9378805	1.07E-04	33.56083961
rs938726	1.89E-04	59.47099451
rs9497965	1.99E-04	62.79741767
rs9981704	9.72E-05	30.62593425

Table 11. TPOAb F-statistic in forward MR

SNP	R2	F
rs10020296	1.14E-03	20.91350776
rs11602677	1.31E-03	24.02714689
rs13021203	1.17E-03	21.38992677
rs16999999	1.38E-03	25.37017421

rs239935	1.15E-03	21.05343005
rs353648	1.19E-03	21.88279737
rs4406425	1.14E-03	20.88748772
rs4766517	1.37E-03	25.0828011
rs6679677	1.33E-03	24.39494565
rs927221	1.20E-03	21.96370157

Table 12. TSH F-statistic in forward MR

SNP	R2	F
rs1045476	6.57E-04	35.70659646
rs1079418	4.44E-03	233.7103213
rs10814915	8.77E-04	47.63087083
rs10957494	6.83E-04	37.0978068
rs11654194	1.08E-03	58.60816057
rs11755845	2.03E-03	110.3981591
rs1203939	8.63E-04	46.88272491
rs12217641	6.93E-04	37.65357145
rs12284404	1.72E-03	93.4410019
rs12410532	3.34E-03	171.1412492
rs1265091	9.24E-04	44.08157321
rs12950966	1.35E-03	73.50683231
rs13329353	1.64E-03	89.22653521
rs1351283	7.47E-03	399.3601944
rs1661584	7.64E-04	41.5088789
rs17020122	1.64E-03	83.86374827
rs17477923	2.63E-03	143.2999085
rs17767491	3.39E-03	184.5349765
rs1861628	2.62E-03	136.8847398
rs199461	6.87E-04	37.30761018
rs2268476	1.02E-03	55.41771139
rs2272642	5.76E-04	31.30216354
rs2439301	1.10E-03	59.65310005
rs28502438	5.65E-04	30.70136823
rs2928168	3.17E-03	168.9936315
rs334719	2.55E-03	130.517683
rs40393	1.01E-03	55.08219918
rs414755	1.26E-03	68.26300508
rs4578973	1.08E-03	56.45071606
rs4804413	1.42E-03	73.6246364
rs544873	1.16E-03	62.98583771
rs68137036	2.85E-03	155.1432894
rs6847675	4.36E-03	227.7628887
rs726019	6.46E-04	35.07270163

rs7529705	1.35E-03	68.83543618
rs78571365	6.40E-04	32.18394644
rs78775620	1.17E-03	56.84133072
rs8015085	1.40E-03	75.93597788
rs9298749	6.94E-04	37.70588623
rs9497965	9.44E-04	51.28218975
rs9511147	8.43E-04	45.82079708

Table 13. FT4 F-statistic in forward MR

SNP	R2	F
rs10759944	2.59E-03	127.8842981
rs10818937	9.34E-04	46.0440492
rs11078333	1.03E-03	50.76356425
rs11160652	1.43E-03	70.41113031
rs11206244	5.59E-03	276.8011976
rs11873601	1.46E-03	72.04240131
rs12348139	6.62E-04	32.62407062
rs225014	1.29E-03	63.7588285
rs3780190	3.78E-03	187.0382549
rs4149056	6.56E-04	32.32238437
rs4712971	9.52E-04	46.93910984
rs55679545	6.80E-04	33.51664493
rs56069042	6.60E-04	32.53772988
rs67583169	8.44E-04	41.63476413
rs6785807	8.16E-04	40.24579367
rs6855450	2.08E-03	102.4454442
rs7198944	6.38E-04	31.45618995
rs73405691	6.53E-04	32.18694826
rs78677597	1.62E-03	80.12107823
rs951366	6.09E-04	30.00301459

Table 14. F-statistic in reverse MR

Name	SNP	R2	F
MG-GD	rs2476601	1.10E-03	42.27981454
	rs2523595	1.16E-03	44.51051892
	rs35274388	8.01E-04	30.64253005
	rs4409785	8.36E-04	31.9836359
	rs4574025	1.58E-03	60.6593961
	rs76815088	1.54E-03	58.95154139
MG-AITD	rs2476601	1.10E-03	42.27981454
	rs2523595	1.16E-03	44.51051892
	rs35274388	8.01E-04	30.64253005
	rs4409785	8.36E-04	31.9836359
	rs4574025	1.58E-03	60.6593961
	rs76815088	1.54E-03	58.95154139
MG-TPOAb	rs2476601	1.10E-03	42.27981454
	rs4409785	8.36E-04	31.9836359
MG-FT4	rs4409785	8.36E-04	31.9836359
MG-TSH	rs4409785	8.36E-04	31.9836359