

Additional file 1. Summary of nicotinic receptors gene results for the CMC, WSS, SKAT and SKAT-O rare variant methods.

Gene symbol	Chr ^a	bp	Start ^b	Stop ^c	Num ^d	CMC ^e	WSS	Str-CMC(EA)	Str-WSS(EA)	Str-CMC(AA)	Str-WSS(AA)	SKAT	SKAT-O	CMH
<i>CHRNA2</i>	1	154541974	154540257	154552354	17	0.808728921	0.348680929	0.544556598	0.664368278	0.59052239	0.898674216	0.64327	0.81303	0.6269
<i>VSNL1</i>	2	17722119	17721807	17837706	68	0.357154114	0.402916814	0.286187173	0.055556415	0.662453423	0.54819108	0.58467	0.77697	0.1007
<i>CHRNA1</i>	2	167493988	167492831	167509717	10	0.504560618	0.78227641	0.534591302	0.882868774	0.792894507	0.951237438	0.00997	0.01516	0.1759
<i>NEUROD1</i>	2	174400560	174397426	174401985	2	0.242365702	0.31365045	0.487902201	0.655171558	0.533976691	0.21228672	0.3212	0.3128	0.5405
<i>CHRNA2</i>	2	225242790	225241814	225251096	13	0.434254404	0.329603669	0.299413285	0.31923339	0.988663679	0.444396956	0.11401	0.03378	0.077
<i>CHRNA2</i>	2	233405830	233404437	233411038	15	0.897444151	0.156774837	0.839526018	0.278140846	0.912942335	0.705208082	0.08816	0.07985	0.3903
<i>CHRNA9</i>	4	39659708	39659431	39679112	6	0.919299866	0.575892396	0.674316574	0.899464648	0.775201954	0.293749183	0.76532	0.80389	0.9683
<i>GABRG2</i>	5	156589188	156587110	156675113	88	0.721171117	0.803573401	0.88024241	0.407773869	8.04E-06	0.045883175	0.40426	0.60138	0.0009
<i>GABRB2</i>	5	160715878	160715436	160975130	157	0.728506793	0.475301529	0.735331611	0.751896667	2.20E-05	0.144497061	0.98151	0.85155	<.0001
<i>GABRA1</i>	5	156369474	156366532	156419379	28	0.395766739	0.474450367	0.438802878	0.540146849	0.256641422	0.222245022	0.64646	0.81462	0.0876
<i>GLRA1</i>	5	151202360	151202074	151304397	60	0.805835974	0.331071846	0.999585131	0.707122016	0.738990111	0.719770888	0.86452	1	0.8908
<i>CAV1</i>	7	116165233	116164839	116201239	28	0.812626174	0.642933931	0.742587851	0.883928805	0.396199317	0.385372765	0.46926	0.63969	0.6532
<i>CHRNA2</i>	8	27317337	27317278	27336813	34	0.115168979	0.090822817	0.347542575	0.037680581	0.355278693	0.726836986	0.20855	0.10534	0.0345
<i>PTK2B</i>	8	27169105	27168999	27316908	156	0.697526706	0.970756459	0.998813832	0.348254112	0.079954306	0.347518552	0.233	0.15058	0.3773
<i>CHRNA6</i>	8	41131170	41129999	41146165	16	0.260101894	0.583019541	0.356195635	0.702119151	0.102430321	0.100111222	0.70847	0.45875	0.3284
<i>CHRNA3</i>	8	42552633	42552562	42592209	26	0.424351129	0.282199493	0.757687916	0.9957368	0.896861355	0.818551834	0.34054	0.17062	0.0914
<i>LYNX1</i>	8	139101291	139097902	139111799	8	0.351842885	0.529807206	0.885691766	0.317923627	0.098817212	0.715807416	0.31468	0.33211	0.5788
<i>JAK2</i>	9	4940917	4940783	5083727	103	0.869552535	0.122268218	0.273859966	0.013369006	6.58E-07	0.558208852	1	1	<.0001
<i>UBQLN1</i>	9	86275559	86274878	86323168	31	0.043230841	0.107861078	0.162598682	0.064302556	0.970212371	0.89417121	0.0247	0.03397	0.335
<i>RIC3</i>	11	8128158	8127597	8190590	55	0.036029614	0.659703531	0.381574455	0.288557473	0.004980799	0.895152212	0.41353	0.5545	0.0001
<i>CHRM1</i>	11	62676215	62676151	62689012	15	0.382979745	0.064945368	0.713429321	0.081471428	0.082066306	0.788379393	0.04133	0.013	0.0068
<i>CHRNA10</i>	11	3422169	3420727	3426524	2	0.601797615	0.715879793	0.852297947	0.697510417	0.238129535	0.112110875	0.87169	0.76373	0.0947
<i>RAPSN</i>	11	47159565	47159075	47170494	2	0.496461202	0.212652415	0.846293898	0.522103879	0.031217937	0.010532474	0.349	0.33218	0.5516
<i>PHOX2A</i>	11	71950390	71950121	71955220	5	0.351403571	0.750447351	0.318408937	0.567439571	0.902729017	0.485867102	0.24871	0.35163	0.8489
<i>HTR3A</i>	11	109777110	109774553	109789782	8	0.636450433	0.836473031	0.781565493	0.797490982	0.712851608	0.675896751	1	0.77351	0.7287

<i>DRD2</i>	11	113280342	113280317	113346001	60	0.172654624	0.208489292	0.067952049	0.738138888	0.000292892	0.421939874	0.08996	0.13461	0.6393
<i>AGPHD1</i>	15	55558624	55557315	55586825	25	0.256566753	0.018993026	0.174401551	0.070236117	0.3202796	0.766836173	0.38587	0.58597	<.0001
<i>PSMA4</i>	15	55596680	55589857	55598672	3	0.021112702	0.004143498	0.018588061	0.004354023	0.383637569	0.551765897	0.45292	0.38267	0.0031
<i>CHRNA5</i>	15	55616012	55614929	55644700	16	0.103966792	0.000793466	0.038095678	0.001602935	0.260032521	0.038784032	0.29453	0.04838	<.0001
<i>CHRNA3</i>	15	55644676	55642483	55671504	34	0.183048087	0.002858935	0.086546515	0.011124168	0.478999664	0.821276948	0.09435	0.01812	0.0043
<i>CHRNA4</i>	15	55679107	55674500	55691566	11	0.083765686	0.137101499	0.062702214	0.261826222	0.243405168	0.143677653	0.77377	0.47733	0.0043
<i>CHRNA7</i>	15	32325305	32322691	32462384	112	0.119970425	0.689409477	0.662022421	0.078780386	5.49E-06	0.015634252	0.36799	0.52397	0.063
<i>CHRM5</i>	15	34261920	34261089	34357287	82	0.643887234	0.992515563	0.557998439	0.347251277	0.030321101	0.693448808	0.79345	0.58306	0.0001
<i>CHRNA1</i>	17	4801101	4801064	4806369	11	0.067013286	0.023459469	0.361550925	0.061698219	0.017550842	0.695492965	0.58356	0.32517	0.0002
<i>CHRNA3</i>	17	7243660	7242351	7254625	14	0.183563168	0.585287858	0.282296625	0.785394354	0.578073871	0.046100978	0.8452	0.79394	0.0959
<i>CDH2</i>	18	25532080	25530930	25757445	180	0.123771768	0.99994898	0.45893224	0.971334381	<0.00000001	0.081401205	0.95777	0.38752	0.0001
<i>CHRNA4</i>	20	58701557	58700257	58717202	17	0.243570767	0.896805015	0.486211523	0.285993929	0.338600876	0.651954138	0.77314	0.87661	0.094
<i>ID1</i>	20	30193110	30193092	30194313	5	0.510128135	0.612743181	0.922512886	0.585568313	0.903490128	0.78507645	0.26792	0.3751	0.0936
<i>APP</i>	21	27253391	27252861	27543446	262	0.206455729	0.155848351	0.247798485	0.51478267	<0.00000001	0.190542592	0.7255	0.51401	<.0001

a: chromosome.b: gene start in Build 37.1. c: gene stop in Build 37.1. d: the number of SNPs located within the gene.e: EA and AA groups.