

## Supplemental Material

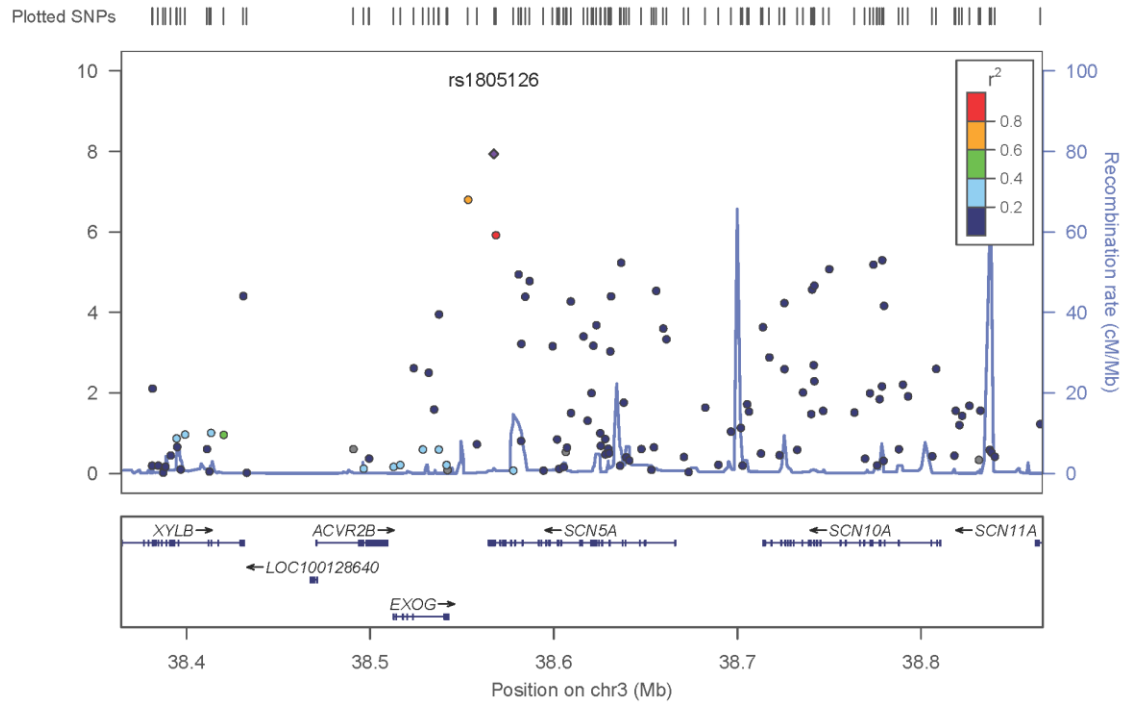
**Supplemental Table 1: Replicated SNPs in the QRS GWAS analysis.** Reported betas and p-values for eMERGE analysis are adjusted for sex, and all betas for CHARGE and eMERGE analyses are for the coded allele.

CHR	SNP	Location	eMERGE QRS				CHARGE QRS				
			Coded Allele	Coded Allele Frequency	BETA (msec)	p-value	Coded Allele	Coded Allele Frequency	BETA (msec)	p-value	Nearest Gene
3	rs1805126*	38567410	T**	0.665	-1.002	1.45E-08	A	0.655	-0.6568	2.52E-20	SCN5A*
3	rs9832895	38636537	C	0.518	0.895	1.18E-07	C	0.497	0.6576	8.68E-18	SCN5A
3	rs6771881	38553268	A	0.756	-1.003	2.23E-07	A	0.745	-0.7659	2.54E-22	EXOG
3	rs12053903	38568397	C	0.329	0.881	7.54E-07	C	0.330	0.646	1.87E-19	SCN5A
3	rs7374138	38580736	C	0.737	0.912	1.49E-06	C	0.718	0.5041	5.59E-10	SCN5A
3	rs11129801	38725379	A	0.294	-0.877	1.82E-06	A	0.301	-0.6296	2.60E-17	SCN10A
3	rs6800541	38749836	C	0.409	0.803	1.97E-06	C	0.398	0.7394	1.88E-27	SCN10A
3	rs12636358	38430905	A	0.047	1.867	2.30E-06	A	0.070	1.185	2.46E-12	XYLBI
3	rs7430439	38778643	A	0.597	-0.794	4.03E-06	A	0.588	-0.5516	8.32E-16	SCN10A
3	rs6798015	38773840	C	0.374	0.793	4.25E-06	C	0.370	0.7187	5.88E-24	SCN10A
3	rs4130467	38586708	G**	0.279	0.846	5.88E-06	C	0.289	0.5274	5.98E-12	SCN5A
3	rs6795970*	38741679	A	0.401	0.765	6.60E-06	A	0.396	0.7476	5.08E-27	SCN10A*
3	rs7374540	38609146	A	0.609	-0.758	1.04E-05	A	0.598	-0.5246	7.67E-14	SCN5A
3	rs6797133	38631037	A	0.394	-0.750	1.14E-05	A	0.395	-0.667	2.61E-21	SCN5A
3	rs9861242	38584338	A	0.250	0.848	1.20E-05	A	0.262	0.5273	7.43E-11	SCN5A
3	rs7373102	38655632	C	0.496	0.680	1.65E-05	C	0.494	0.4128	1.10E-08	SCN5A
6	rs6906287*	119069433	C	0.454	0.717	2.26E-05	C	0.451	0.5383	5.56E-16	C6orf204*
6	rs11970286	118787067	C	0.549	-0.715	2.33E-05	C	0.534	-0.5502	4.89E-16	SLC35F1
6	rs4307206	118920013	A	0.451	0.712	2.59E-05	A	0.450	0.5399	4.56E-16	C6orf204
6	rs1321313*	36726799	G**	0.760	-0.793	6.13E-05	C	0.742	-0.8129	4.60E-25	CDKN1A*
3	rs7430477	38740494	C	0.530	0.661	8.18E-05	C	0.524	0.6061	2.72E-19	SCN10A
3	rs6599257	38779592	C	0.313	0.705	9.58E-05	C	0.306	0.5508	2.23E-14	SCN10A
1	rs2207790*	61670555	T**	0.482	-0.622	2.07E-04	A	0.461	-0.5956	6.31E-18	NFIA*

\*The genome-wide association analysis results for these variants (best or near-best association at each locus/gene in replication analysis) are shown in Table 3.

\*\*This SNP was coded on the opposite strand from that in the CHARGE study. Therefore, while the allele is not identical, the direction of effect is the same.

**Supplemental Figure 1:** LocusZoom plot of the region in chromosome 3 in which most of the replicated associations (18/23) were identified. All variants with  $p < 10^{-4}$  in the eMERGE data set were replicated at  $p < 5 \times 10^{-8}$  in the CHARGE data set.



**Supplemental Table 2: PheWAS associations for replicated SNPs (N=23).** Data for all associations with P<0.01 are shown. ICD9 codes for given associations can be downloaded from <http://knowledgemap.mc.vanderbilt.edu/research/content/phewas>.

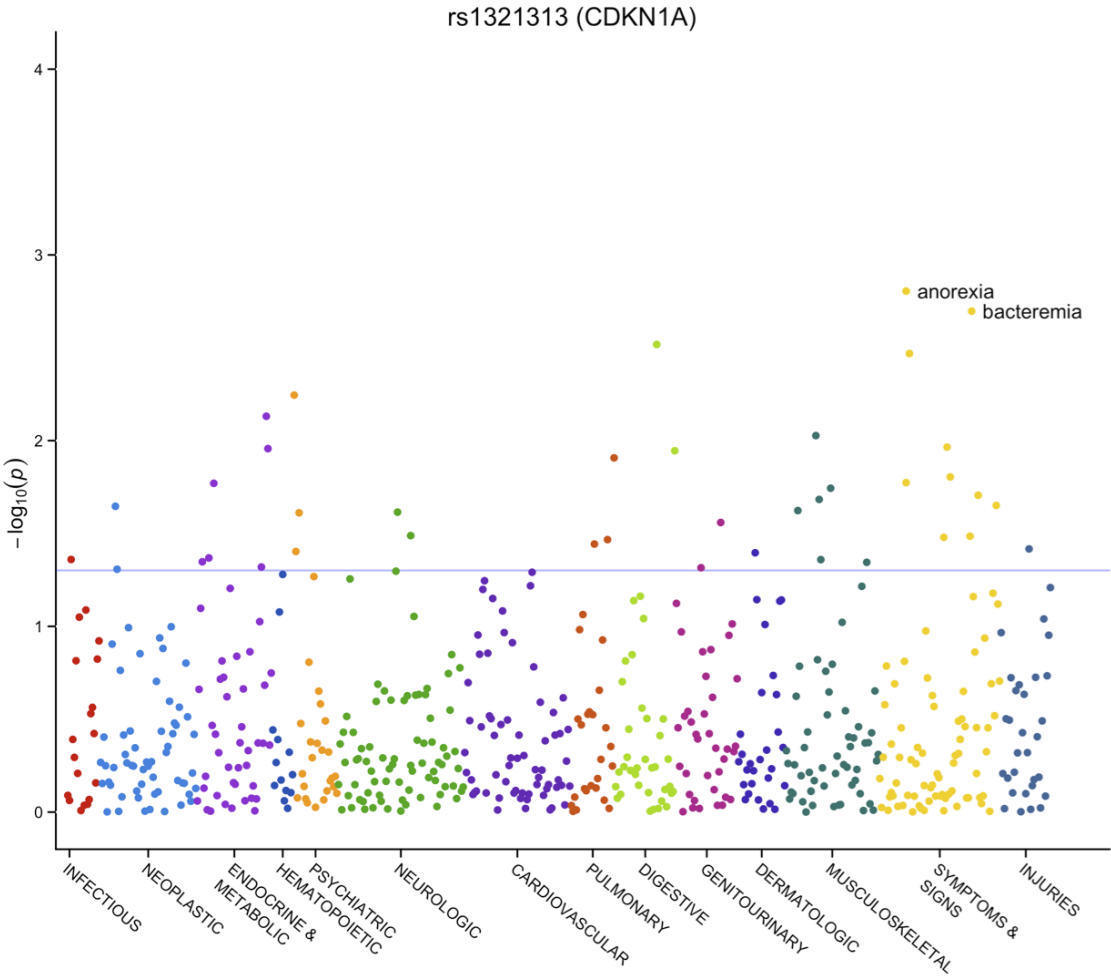
SNP	Chr	Nearest gene	Disease association	cases	odds ratio	P-value
rs11129801	3	SCN10A	Epilepsy and recurrent seizures	181	0.71	6.23E-03
rs11129801	3	SCN10A	Malignant neoplasm of uterus	103	1.49	6.31E-03
rs11129801	3	SCN10A	Migraine	420	0.81	9.81E-03
rs6599257	3	SCN10A	Atrial fibrillation and flutter	1758	0.84	6.53E-04
rs6599257	3	SCN10A	Drug dependence	71	1.68	2.88E-03
rs6599257	3	SCN10A	Cardiac arrhythmias	3075	0.89	3.03E-03
rs6599257	3	SCN10A	Lupus erythematosus	93	0.59	4.31E-03
rs6599257	3	SCN10A	Cholecystitis	121	0.65	4.77E-03
rs6599257	3	SCN10A	Migraine	420	1.23	5.78E-03
rs6795970	3	SCN10A	Cardiac arrhythmias	3075	0.88	7.21E-04
rs6795970	3	SCN10A	Atrial fibrillation and flutter	1758	0.85	8.45E-04
rs6795970	3	SCN10A	Arterial embolism and thrombosis	150	0.69	3.20E-03
rs6795970	3	SCN10A	Cholecystitis	121	0.66	3.44E-03
rs6795970	3	SCN10A	Convulsions	311	1.25	7.01E-03
rs6795970	3	SCN10A	Aphasia	69	0.60	7.25E-03
rs6798015	3	SCN10A	Cholecystitis	121	0.56	1.32E-04
rs6798015	3	SCN10A	Arterial embolism and thrombosis	150	0.67	1.73E-03
rs6798015	3	SCN10A	Atrial fibrillation and flutter	1758	0.86	2.39E-03
rs6798015	3	SCN10A	Genital prolapse	511	0.82	8.87E-03
rs6800541	3	SCN10A	Cardiac arrhythmias	3075	0.89	1.90E-03
rs6800541	3	SCN10A	Atrial fibrillation and flutter	1758	0.86	2.15E-03
rs6800541	3	SCN10A	Cholecystitis	121	0.66	2.64E-03
rs6800541	3	SCN10A	Arterial embolism and thrombosis	150	0.69	3.05E-03
rs6800541	3	SCN10A	Aphasia	69	0.61	8.15E-03
rs6800541	3	SCN10A	Gingival and periodontal diseases	229	0.77	9.66E-03
rs7430439	3	SCN10A	Intestinal malabsorption	156	1.42	2.34E-03
rs7430439	3	SCN10A	Allergic rhinitis	865	1.16	4.83E-03
rs7430439	3	SCN10A	Disturbance of skin sensation	664	0.85	7.85E-03
rs7430439	3	SCN10A	First degree AV block	181	1.34	9.09E-03
rs7430439	3	SCN10A	Cholecystitis	121	0.70	9.44E-03
rs7430477	3	SCN10A	Cholecystitis	121	1.71	5.85E-05
rs7430477	3	SCN10A	Epilepsy and recurrent seizures	181	0.72	2.90E-03
rs7430477	3	SCN10A	Tinnitus	159	1.39	4.46E-03
rs7430477	3	SCN10A	Gingival and periodontal diseases	229	1.30	6.12E-03
rs7430477	3	SCN10A	Convulsions	311	0.80	7.36E-03
rs7430477	3	SCN10A	Migraine	420	0.83	7.87E-03
rs7430477	3	SCN10A	Inflammatory disease of cervix, vagina, and vulva	266	0.79	8.21E-03
rs11970286	6	SLC35F1	Colorectal cancer	316	0.77	1.37E-03
rs11970286	6	SLC35F1	Nasal polyps	127	1.48	2.32E-03
rs11970286	6	SLC35F1	Malignant neoplasm of colon	226	0.75	3.23E-03
rs11970286	6	SLC35F1	Personal history of malignant	130	0.69	3.80E-03

			neoplasm of colon			
rs11970286	6	<i>SLC35F1</i>	Personal history of malignant melanoma of skin	151	1.37	7.37E-03
rs11970286	6	<i>SLC35F1</i>	Hyperplasia of prostate	1615	0.87	9.66E-03
rs12053903	3	<i>SCN5A</i>	Chronic kidney disease	1212	0.85	9.16E-04
rs12053903	3	<i>SCN5A</i>	Atherosclerosis	1511	0.87	1.60E-03
rs12053903	3	<i>SCN5A</i>	Cardiac arrhythmias	3075	0.89	2.80E-03
rs12053903	3	<i>SCN5A</i>	Other peripheral vascular disease	1228	0.88	5.84E-03
rs12053903	3	<i>SCN5A</i>	Disorders resulting from impaired renal function	173	0.71	5.92E-03
rs12053903	3	<i>SCN5A</i>	Osteomyelitis, periostitis, and other infections involving bone	192	0.73	7.56E-03
rs12053903	3	<i>SCN5A</i>	Other paralytic syndromes	65	1.60	8.78E-03
rs12053903	3	<i>SCN5A</i>	Thyrototoxicosis with or without goiter	189	0.74	9.64E-03
rs12053903	3	<i>SCN5A</i>	Fracture of other and unspecified parts of femur	85	0.62	9.96E-03
rs1805126	3	<i>SCN5A</i>	Cardiac arrhythmias	3075	0.88	1.10E-03
rs1805126	3	<i>SCN5A</i>	Diseases of upper respiratory tract	509	0.81	3.83E-03
rs1805126	3	<i>SCN5A</i>	Hyperplasia of prostate	1615	0.85	5.54E-03
rs1805126	3	<i>SCN5A</i>	Chronic kidney disease	1212	0.88	6.02E-03
rs1805126	3	<i>SCN5A</i>	Personal history of malignant melanoma of skin	151	0.70	8.18E-03
rs1805126	3	<i>SCN5A</i>	Dermatophytosis	1229	0.88	8.77E-03
rs4130467	3	<i>SCN5A</i>	Late effects of musculoskeletal and connective tissue injuries	81	1.67	1.55E-03
rs4130467	3	<i>SCN5A</i>	Hyperplasia of prostate	1615	0.85	6.97E-03
rs4130467	3	<i>SCN5A</i>	Systemic lupus erythematosus	81	1.56	7.07E-03
rs7373102	3	<i>SCN5A</i>	Postinflammatory pulmonary fibrosis	173	1.50	1.31E-04
rs7373102	3	<i>SCN5A</i>	Irritable Bowel Syndrome	498	0.81	1.54E-03
rs7373102	3	<i>SCN5A</i>	Diseases of white blood cells	219	1.31	3.98E-03
rs7373102	3	<i>SCN5A</i>	Abnormal glucose	837	0.87	4.46E-03
rs7373102	3	<i>SCN5A</i>	Functional digestive disorders	553	0.84	4.95E-03
rs7373102	3	<i>SCN5A</i>	Elevated blood pressure	829	0.88	7.67E-03
rs7373102	3	<i>SCN5A</i>	Abnormal cardiovascular function test	838	0.88	7.87E-03
rs7373102	3	<i>SCN5A</i>	Anxiety, phobic and dissociative disorders	412	0.84	9.09E-03
rs7374138	3	<i>SCN5A</i>	Malignant neoplasm of female breast	645	1.22	2.10E-03
rs7374138	3	<i>SCN5A</i>	Chronic pharyngitis and nasopharyngitis	462	1.24	3.14E-03
rs7374540	3	<i>SCN5A</i>	Dermatophytosis	1229	0.87	2.05E-03
rs7374540	3	<i>SCN5A</i>	Spondylosis and allied disorders	1244	0.86	2.54E-03
rs7374540	3	<i>SCN5A</i>	Fracture of patella	65	0.56	3.58E-03
rs7374540	3	<i>SCN5A</i>	Deviated nasal septum	275	0.77	3.86E-03
rs7374540	3	<i>SCN5A</i>	Emphysema	138	0.69	5.01E-03

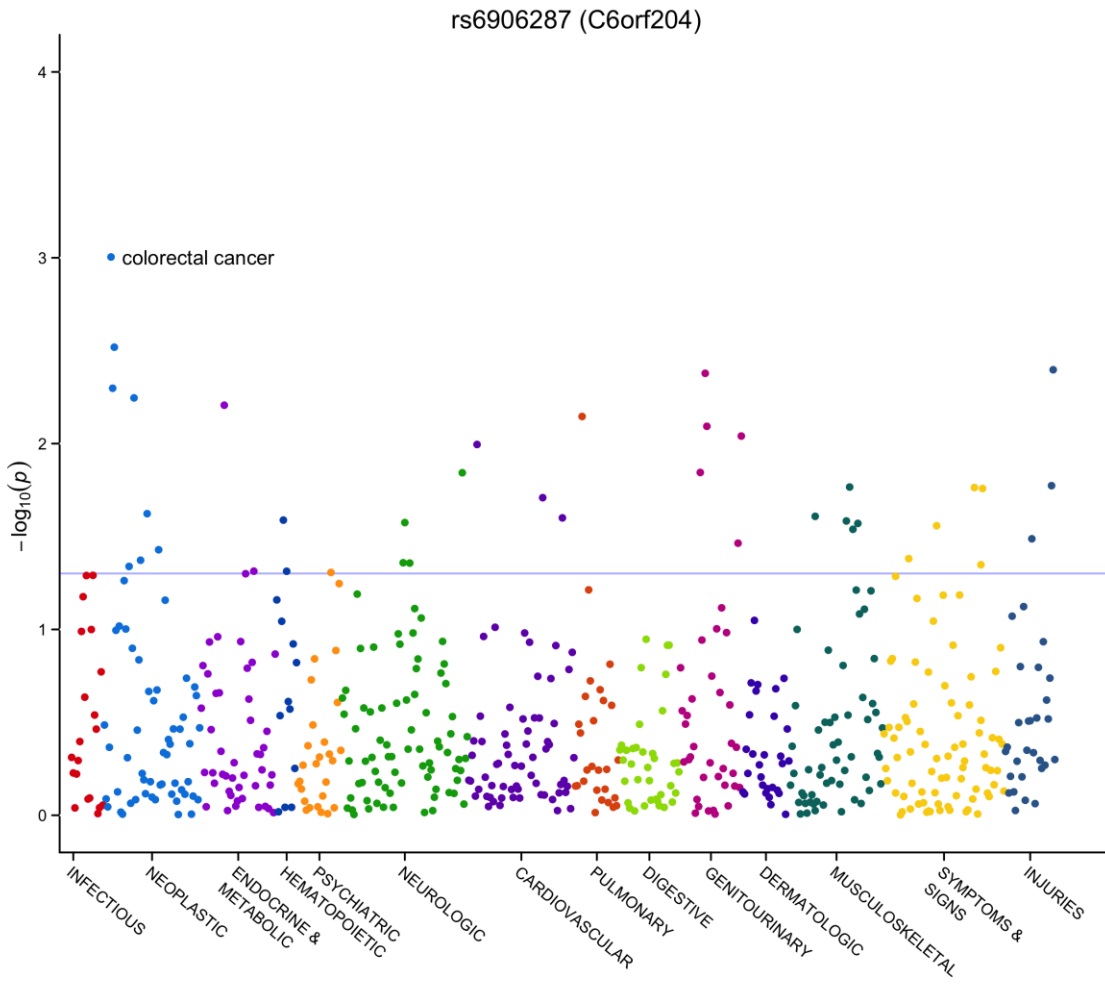
rs7374540	3	SCN5A	Osteopenia	2161	0.89	5.77E-03
rs7374540	3	SCN5A	Candidiasis	201	0.75	6.29E-03
rs7374540	3	SCN5A	Sprains and strains	2928	0.91	6.34E-03
rs7374540	3	SCN5A	Late effects of musculoskeletal and connective tissue injuries	81	1.54	6.47E-03
rs7374540	3	SCN5A	Urinary tract infection	2094	0.89	8.31E-03
rs7374540	3	SCN5A	Polymyalgia Rheumatica	214	0.75	9.38E-03
rs9832895	3	SCN5A	Acute reaction to stress	99	1.56	2.14E-03
rs9832895	3	SCN5A	Mitral valve disorders	551	1.20	5.79E-03
rs9832895	3	SCN5A	Debility	309	1.25	6.76E-03
rs9832895	3	SCN5A	Disorders of tooth development and eruption	55	1.69	7.48E-03
rs9832895	3	SCN5A	Peptic ulcers	427	1.20	9.29E-03
rs9861242	3	SCN5A	Late effects of musculoskeletal and connective tissue injuries	81	1.66	2.18E-03
rs9861242	3	SCN5A	Deficiency of B-complex components	284	1.27	9.71E-03
rs6797133	3	SCN5A	Sleep disorders	52	0.50	2.48E-03
rs6797133	3	SCN5A	Other diseases of appendix	59	0.59	9.88E-03
rs12636358	3	XYLB	Sleep disorders	52	2.46	5.26E-03
rs12636358	3	XYLB	Diseases of hard tissues of teeth	209	1.65	9.73E-03
rs1321313	6	CDKN1A	Anorexia	53	0.36	1.57E-03
rs1321313	6	CDKN1A	Bacteremia	118	0.57	2.01E-03
rs1321313	6	CDKN1A	Anal fissure and fistula	108	1.55	3.04E-03
rs1321313	6	CDKN1A	Abnormal loss of weight	398	0.76	3.39E-03
rs1321313	6	CDKN1A	Dementias	841	0.83	5.69E-03
rs1321313	6	CDKN1A	Overweight, obesity and other hyperalimentation	2501	1.11	7.39E-03
rs1321313	6	CDKN1A	Spondylosis and allied disorders	1244	1.16	9.39E-03
rs2207790	1	NFIA	Postinflammatory pulmonary fibrosis	173	0.70	1.76E-03
rs2207790	1	NFIA	Abnormal serum enzyme levels (acid phosphatase, alkaline phosphatase, amylase, lipase)	205	1.37	1.97E-03
rs2207790	1	NFIA	Multiple myeloma and immunoproliferative neoplasms	54	0.54	2.80E-03
rs2207790	1	NFIA	Neutropenia and leukopenia	238	0.75	2.81E-03
rs2207790	1	NFIA	Facial nerve disorders	67	1.68	3.70E-03
rs2207790	1	NFIA	Cardiomyopathy	420	0.80	4.40E-03
rs2207790	1	NFIA	Pneumothorax	80	0.64	6.59E-03
rs2207790	1	NFIA	Disorders of function of stomach	355	1.23	7.73E-03
rs2207790	1	NFIA	Prostatitis	150	0.72	8.85E-03
rs2207790	1	NFIA	Toxic diffuse goiter	76	1.54	9.47E-03
rs4307206	6	C6orf204	Colorectal cancer	316	0.76	1.01E-03
rs4307206	6	C6orf204	Malignant neoplasm of colon	226	0.74	2.76E-03

rs4307206	6	<i>C6orf204</i>	Hyperplasia of prostate	1615	0.86	3.92E-03
rs4307206	6	<i>C6orf204</i>	Personal history of malignant neoplasm of colon	130	0.69	4.14E-03
rs4307206	6	<i>C6orf204</i>	Penicillin allergy	65	1.64	6.07E-03
rs4307206	6	<i>C6orf204</i>	Disorders of pancreatic internal secretion	84	0.65	7.40E-03
rs4307206	6	<i>C6orf204</i>	Nasal polyps	127	1.40	8.87E-03
rs4307206	6	<i>C6orf204</i>	Personal history of malignant melanoma of skin	151	1.36	9.30E-03
rs6906287	6	<i>C6orf204</i>	Colorectal cancer	316	0.76	9.90E-04
rs6906287	6	<i>C6orf204</i>	Malignant neoplasm of colon	226	0.75	3.03E-03
rs6906287	6	<i>C6orf204</i>	Penicillin allergy	65	1.68	4.01E-03
rs6906287	6	<i>C6orf204</i>	Hyperplasia of prostate	1615	0.86	4.19E-03
rs6906287	6	<i>C6orf204</i>	Personal history of malignant neoplasm of colon	130	0.70	5.04E-03
rs6906287	6	<i>C6orf204</i>	Personal history of malignant melanoma of skin	151	1.38	5.68E-03
rs6906287	6	<i>C6orf204</i>	Disorders of pancreatic internal secretion	84	0.64	6.22E-03
rs6906287	6	<i>C6orf204</i>	Nasal polyps	127	1.41	7.15E-03
rs6906287	6	<i>C6orf204</i>	Prostatitis	150	0.72	8.07E-03
rs6771881	3	<i>EXOG</i>	Hyperplasia of prostate	1615	0.81	8.10E-04
rs6771881	3	<i>EXOG</i>	Chronic liver disease	254	1.33	3.55E-03
rs6771881	3	<i>EXOG</i>	Cardiac arrhythmias	3075	0.88	3.86E-03
rs6771881	3	<i>EXOG</i>	Sexual and gender identity disorders	76	0.51	4.20E-03
rs6771881	3	<i>EXOG</i>	Chronic kidney disease	1212	0.86	5.07E-03
rs6771881	3	<i>EXOG</i>	Cerebral degenerations	137	0.63	5.29E-03
rs6771881	3	<i>EXOG</i>	Diarrhea	880	0.85	9.06E-03

Supplemental Figure 2: Phenome-wide association study plot for *CDKN1A* (rs1321313).



Supplemental Figure 3: Phenome-wide association study plot for *C6orf204* (rs6906287).





**Supplemental Figure 4: Phenome-wide association study plot for *NFIA* (rs2207790).**

