

## Supplementary Online Content

**Heterozygosity for a pathogenic variant in *SLC12A3* that causes autosomal recessive Gitelman syndrome is associated with lower serum potassium**

**Supplementary Table 1: The top ExWAS associations with serum potassium levels ( $P < 10^{-3}$ ) P. 2**

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**Supplementary Table 1. The top ExWAS associations with serum potassium levels ( $P < 10^{-3}$ )**

rsNum	Chr37	Pos37	Type	AAchg	GENE	Freq	Beta_SNP	pVal_SNP
rs149279319	16	56685916	intronic		'MT1B	0.0133	-0.1487	1.14E-09
rs200697179	16	56919275	exonic	R642G	'SLC12A3	0.0127	-0.1485	2.39E-09
rs113140045	16	56381927	UTR3		'GNAO1	0.013	-0.1460	2.85E-09
rs142090669	16	55613052	exonic	T449M	'LPCAT2	0.0128	-0.1449	5.25E-09
rs559381844	16	57279927	intronic		'ARL2BP	0.0139	-0.1351	1.49E-08
rs2298846	16	56701315	intronic		'MT1G	0.0231	-0.1027	4.82E-08
rs5802	16	56919235	exonic	S628S	'SLC12A3	0.0225	-0.0964	1.42E-07
rs11643718	16	56933519	exonic	R913Q	'SLC12A3	0.0224	-0.0962	1.62E-07
rs2289116	16	56938290	intronic		'SLC12A3	0.0224	-0.0962	1.62E-07
rs139890356	4	8229378	exonic	R653W	'SH3TC1	0.0004	0.6397	2.70E-07
rs28366003	16	56642491	UTR5		'MT2A	0.0181	-0.1065	3.29E-07
rs142339779	4	3432319	exonic	R603W	'RGS12	0.0005	0.4919	4.74E-06
rs78780944	16	56701977	UTR5		'MT1G	0.0187	-0.0902	8.71E-06
X:153217371	X	153217371	exonic	A1727fs	'HCFC1	0.0004	-0.0569	1.11E-05
7:44621475	7	44621475	intronic		'TMED4	0.0018	0.2499	1.48E-05
rs71445596	12	113515924	intronic		'DTX1	0.3624	-0.0243	1.75E-05
rs201657070	2	234878977	exonic	Y754Y	'TRPM8	0.0022	0.2449	2.02E-05
rs72834384	2	118693249	intronic		'CCDC93	0.0242	0.0701	2.17E-05
12:124922413	12	124922413	intronic		'NCOR2	0.0004	0.5016	2.25E-05
rs11641967	16	71487952	exonic	A9A	'ZNF23	0.0839	-0.0416	2.61E-05
9:101748075	9	101748075	exonic	I110T	'COL15A1	0.0035	0.1738	2.63E-05
5:35876646	5	35876646	UTR3		'IL7R	0.0011	0.3075	2.65E-05
rs968181334	X	70463595	ncRNA_intronic		'BCYRN1	0.0009	0.3379	2.67E-05
rs17844397	5	140481913	exonic	F560F	'PCDHB3	0.1161	0.0363	3.00E-05
rs79936857	8	22570905	exonic	Q221P	'PEBP4	0.0203	0.0863	3.02E-05
rs61732772	8	22570904	exonic	Q221Q	'PEBP4	0.0203	0.0862	3.12E-05
4:68442836	4	68442836	intronic		'STAP1	0.0004	0.4942	3.15E-05
rs772008097	21	34900917	intronic		'GART	0.0011	0.3185	3.18E-05
rs117606853	14	24546566	exonic	I501I	'CPNE6	0.0473	0.0539	3.21E-05
rs753587446	12	123098387	intronic		'KNTC1	0.0016	-0.2518	3.31E-05
rs201883151	12	112610417	intronic		'HECTD4	0.0043	-0.1704	3.46E-05
rs142668436	16	57822523	intronic		'KIFC3	0.0411	0.0574	3.54E-05
rs12708919	16	71986995	intronic		'PKD1L3	0.541	0.0230	3.62E-05
rs3776099	5	140502841	exonic	A421T	'PCDHB4	0.1173	0.0352	4.11E-05
X:128901760	X	128901760	intronic		'XPNPEP2	0.0008	-0.0253	4.29E-05
rs13157538	5	140481833	exonic	T534A	'PCDHB3	0.1118	0.0377	4.30E-05
rs142239059	14	99697665	intronic		'BCL11B	0.0046	0.1650	4.33E-05
rs17480493	5	160026025	intronic		'ATP10B	0.0456	0.0539	4.53E-05
rs117325358	16	72015879	intronic		'PKD1L3	0.0238	-0.0711	4.53E-05
rs745774427	1	26673114	exonic	K12M	'AIM1L	0.0008	0.3599	4.73E-05
rs3214944	12	66309196	UTR3		'HMGA2	0.0739	-0.0438	4.75E-05
rs17844377	5	140476060	exonic	F562F	'PCDHB2	0.1169	0.0351	4.75E-05
rs138209413	9	71606067	exonic	P505L	'PIP5K1B	0.0007	0.4095	4.87E-05
rs117587884	16	57091999	exonic	D1257N	'NLRC5	0.0273	-0.0699	5.30E-05
rs869154238	7	43546680	intronic		'HECW1	0.0023	0.2097	5.36E-05
rs31853	5	140474756	exonic	V128I	'PCDHB2	0.1172	0.0347	5.43E-05

**S. Table 1. The top ExWAS associations with serum potassium levels ( $P < 10^{-3}$ ) (continuing)**

rsNum	Chr37	Pos37	Type	AAchg	GENE	Freq	Beta_SNP	pVal_SNP
rs31849	5	140480355	exonic	K41R	'PCDHB3	0.1172	0.0347	5.43E-05
rs17844392	5	140481594	exonic	I454T	'PCDHB3	0.1172	0.0347	5.43E-05
rs13174972	5	140482013	exonic	G594S	'PCDHB3	0.1172	0.0347	5.43E-05
rs17844416	5	140503443	exonic	G621G	'PCDHB4	0.1172	0.0347	5.43E-05
rs17844417	5	140503531	exonic	R651C	'PCDHB4	0.1172	0.0347	5.43E-05
rs750745978	11	82560040	intronic		'PRCP	0.0012	0.2867	5.77E-05
rs17844387	5	140480578	exonic	Q115Q	'PCDHB3	0.1173	0.0345	5.79E-05
rs31847	5	140482691	UTR3		'PCDHB3	0.1168	0.0346	5.90E-05
rs139521551	19	56390202	exonic	L913L	'NLRP4	0.0011	0.3243	6.24E-05
13:50121325	13	50121325	intronic		'RCBTB1	0.0008	0.3570	6.32E-05
rs553532837	19	6477250	exonic	P120fs	'DENND1C	0.0034	0.1682	6.54E-05
rs201130530	2	29917660	intronic		'ALK	0.0057	0.1383	6.77E-05
rs10774641	12	109717697	exonic	L445L	'FOXN4	0.3619	0.0229	6.85E-05
X:128901759	X	128901759	intronic		'XPNPEP2	0.0008	-0.0244	6.90E-05
rs1907639	3	111794365	intronic		'TMPRSS7	0.4725	0.0221	7.25E-05
rs6624	16	75327916	exonic	L278L	'CFDP1	0.8433	0.0306	7.50E-05
6:135286433	6	135286433	intronic		'HBS1L	0.0012	0.2793	7.75E-05
rs770712350	19	7927987	intronic		'EVI5L	0.0018	-0.2291	7.82E-05
5:31297590	5	31297590	intronic		'CDH6	0.0027	0.1875	7.84E-05
1:12368700	1	12368700	splicing		'VPS13D	0.0022	-0.2046	8.18E-05
rs61760194	12	109948213	exonic	Y602Y	'UBE3B	0.0065	-0.1366	8.19E-05
17:74151243	17	74151243	intronic		'RNF157	0.0009	0.3291	8.40E-05
rs3177413	4	89443162	exonic	N74N	'PYURF	0.1124	0.0345	8.50E-05
rs6821688	4	5982108	intergenic		'JAKMIP1	0.1733	0.0286	8.70E-05
rs2314992	3	69362722	intronic		'FRMD4B	0.084	0.0379	9.02E-05
rs246725	5	140517431	UTR3		'PCDHB5	0.1181	0.0334	9.13E-05
rs374171057	19	19307689	intronic		'RFXANK	0.0054	0.1337	9.50E-05
rs782287606	X	153219258	intronic		'HCFC1	0.0006	-0.1235	9.61E-05
rs2699413	4	3496285	intronic		'DOK7	0.0184	0.0791	9.75E-05
rs10917042	1	22109370	exonic	H27H	'USP48	0.3343	-0.0231	9.94E-05
rs1006480243	1	207782894	exonic	V1602V	'CR1	0.0182	-0.0802	1.02E-04
rs747197324	16	56901007	exonic	L103Q	'SLC12A3	0.0377	0.0559	1.02E-04
rs1055410	5	140480179	UTR5		'PCDHB3	0.1121	0.0338	1.06E-04
rs68010642	4	5981849	intergenic		'JAKMIP1	0.0761	0.0405	1.10E-04
rs379676	12	125899979	intronic		'TMEM132B	0.0862	-0.0381	1.11E-04
rs117994346	16	57792993	intronic		'KIFC3	0.0407	0.0538	1.12E-04
11:110134618	11	110134618	intronic		'RDX	0.0015	0.2470	1.17E-04
5:170736513	5	170736513	exonic	P48P	'TLX3	0.0005	0.4160	1.17E-04
rs187284593	12	112546662	upstream		'NAA25	0.0062	-0.1378	1.18E-04
rs373851260	12	112589820	exonic	R499R	'TRAFD1	0.0062	-0.1378	1.18E-04
rs73423230	12	112681838	intronic		'HECTD4	0.0062	-0.1378	1.18E-04
rs9805001	12	112702958	intronic		'HECTD4	0.0062	-0.1378	1.18E-04
rs7972574	12	112856954	intronic		'PTPN11	0.0062	-0.1378	1.18E-04
rs7973432	12	112856983	intronic		'PTPN11	0.0062	-0.1378	1.18E-04
rs11672826	19	38806331	intronic		'YIF1B	0.2884	-0.0236	1.24E-04
rs2271494	3	113300183	intronic		'SIDT1	0.4404	0.0213	1.28E-04

**S. Table 1. The top ExWAS associations with serum potassium levels ( $P < 10^{-3}$ ) (continuing)**

rsNum	Chr37	Pos37	Type	AAchg	GENE	Freq	Beta_SNP	pVal_SNP
rs2304479	16	56901065	exonic	A122A	'SLC12A3	0.0467	0.0500	1.30E-04
rs146880793	1	67394707	intronic		'MIER1	0.0097	-0.0996	1.30E-04
rs16970932	19	36673300	UTR3		'ZNF565	0.0978	-0.0356	1.32E-04
2:231740558	2	231740558	intronic		'ITM2C	0.001	0.3045	1.33E-04
rs12301915	12	112919869	intronic		'PTPN11	0.0051	-0.1470	1.37E-04
rs909339666	4	522080	intronic		'PIGG	0.0162	0.0843	1.38E-04
rs757737734	3	42739669	exonic	219del	'HHATL	0.0007	0.3571	1.38E-04
rs11715561	3	111785208	intronic		'TMPRSS7	0.472	0.0212	1.43E-04
rs1021165308	9	135786982	intronic		'TSC1	0.0059	-0.1298	1.44E-04
1:150445907	1	150445907	UTR3		'RPRD2	0.0005	0.4514	1.44E-04
rs71386675	16	2581081	UTR5		'CEMP1	0.1318	-0.0317	1.46E-04
rs139506119	7	54823418	intronic		'SEC61G	0.0139	-0.0860	1.47E-04
rs58736171	1	245025693	intronic		'HNRNPU	0.0005	0.4088	1.47E-04
rs2054823	3	113164109	UTR3		'SPICE1	0.4701	0.0209	1.49E-04
rs145247383	6	130687065	upstream		'SAMD3;TMEM200A	0.0129	0.0928	1.53E-04
rs17053432	6	130762287	exonic	G240G	'TMEM200A	0.0129	0.0928	1.53E-04
rs112721028	7	56878632	intergenic		'LOC100130849	0.0272	-0.0650	1.53E-04
rs10562543	19	44005876	intronic		'PHLDB3	0.1178	0.0327	1.53E-04
10:103530128	10	103530128	exonic	S127R	'FGF8	0.0015	0.2435	1.54E-04
rs141291764	5	140476630	exonic	Q752Q	'PCDHB2	0.1104	0.0349	1.58E-04
rs201407316	15	33256253	intronic		'FMN1	0.0016	0.2291	1.58E-04
rs782759875	8	145106582	intronic		'OPLAH	0.0022	0.1999	1.61E-04
rs2277582	15	65684533	exonic	A687A	'IGDCC4	0.2143	0.0252	1.61E-04
rs114010589	1	161565408	intronic		'FCGR2C	0.0867	-0.0364	1.65E-04
rs112432608	9	136209161	UTR3		'MED22	0.0102	-0.1035	1.68E-04
rs2277583	15	65685695	intronic		'IGDCC4	0.2144	0.0251	1.69E-04
rs3810381	19	44031324	exonic	A2A	'ETHE1	0.1181	0.0324	1.70E-04
rs761468830	2	170502710	intronic		'CCDC173	0.0013	-0.2815	1.71E-04
19:1615475	19	1615475	exonic	A544V	'TCF3	0.0037	0.1521	1.73E-04
4:187066338	4	187066338	intronic		'FAM149A	0.0077	-0.1080	1.73E-04
rs768006600	16	66653776	UTR3		'CMTM4	0.0344	-0.0574	1.76E-04
14:105444581	14	105444581	UTR5		'AHNAK2	0.0036	-0.1536	1.77E-04
rs150495888	8	98711884	intronic		'MTDH	0.0015	-0.2433	1.77E-04
rs974404613	15	43785147	ncRNA_intronic		'RNU6-28P	0.0009	0.3336	1.78E-04
rs6709768	2	242606036	intronic		'ATG4B	0.4511	-0.0209	1.79E-04
rs1500481	2	234702459	exonic	Y271H	'MROH2A	0.5376	0.0208	1.80E-04
22:26773620	22	26773620	intronic		'SEZ6L	0.0015	0.2398	1.82E-04
rs689453	16	69752373	exonic	E24E	'NQO1	0.118	0.0321	1.82E-04
rs4079422	5	177166053	intronic		'FAM153A	0.3473	-0.0216	1.85E-04
rs3763121	5	141027462	intronic		'FCHSD1	0.1538	0.0282	1.85E-04
rs72549251	3	186978515	intronic		'MASP1	0.0031	0.1852	1.88E-04
rs184019002	14	24459567	exonic	M1T	'DHRS4L2	0.0377	0.0535	1.89E-04
rs12437686	15	65686908	intronic		'IGDCC4	0.2264	0.0245	1.91E-04
rs61748069	12	109936056	exonic	S280P	'UBE3B	0.0015	0.2641	2.01E-04
rs9989475	17	78971176	intronic		'CHMP6	0.0814	-0.0381	2.04E-04
rs2303309	15	34152756	intronic		'RYR3	0.001	0.3128	2.08E-04

**S. Table 1. The top ExWAS associations with serum potassium levels ( $P < 10^{-3}$ ) (continuing)**

rsNum	Chr37	Pos37	Type	AAchg	GENE	Freq	Beta_SNP	pVal_SNP
rs9806130	15	66644563	intronic		'TIPIN	0.2203	0.0242	2.12E-04
rs6503640	17	39742899	exonic	C63Y	'KRT14	0.9991	-0.3084	2.18E-04
rs2117365	2	238638406	intronic		'LRRFIP1	0.0034	0.1745	2.18E-04
7:150763857	7	150763857	intronic		'SLC4A2	0.0005	0.3988	2.20E-04
rs201532255	5	21975174	intronic		'CDH12	0.05	0.0464	2.24E-04
rs765402844	22	19466555	intronic		'UFD1L	0.0054	-0.1236	2.25E-04
rs9315899	13	42793298	intronic		'DGKH	0.3704	-0.0212	2.29E-04
rs773298053	6	31648123	exonic	S10G	'LY6G5C	0.006	0.1180	2.29E-04
rs116961762	18	77229778	intronic		'NFATC1	0.0054	-0.1402	2.30E-04
1:19185916	1	19185916	intronic		'TAS1R2	0.0008	-0.3250	2.31E-04
rs16962810	16	84126901	exonic	G246G	'MBTPS1	0.0212	-0.0705	2.32E-04
rs1130910	2	242611050	intronic		'ATG4B	0.4513	-0.0205	2.32E-04
rs78125729	2	242168967	UTR3		'HDLBP	0.0034	0.1687	2.34E-04
rs184465798	2	32188239	intronic		'MEMO1	0.0045	0.1519	2.36E-04
rs144184005	2	32641041	exonic	T894T	'BIRC6	0.0046	0.1503	2.37E-04
rs1131195	2	242618050	exonic	D115D	'DTYMK	0.4511	-0.0204	2.42E-04
rs114948167	3	181431124	intronic		'SOX2-OT	0.0244	0.0658	2.43E-04
rs950498062	16	70187563	intronic		'PDPR	0.0268	-0.0616	2.44E-04
12:40930193	12	40930193	intronic		'MUC19	0.001	-0.2934	2.45E-04
rs4520846	16	81142358	intronic		'PKD1L2	0.5034	-0.0201	2.51E-04
14:105877861	14	105877861	intronic		'TEX22	0.0004	0.4325	2.51E-04
19:45016116	19	45016116	exonic	C419C	'CEACAM20	0.4595	0.0202	2.52E-04
rs11538894	2	242611287	intronic		'ATG4B	0.4512	-0.0204	2.53E-04
rs34576450	18	32826777	UTR3		'ZNF397	0.1799	-0.0263	2.53E-04
14:21936780	14	21936780	intronic		'RAB2B	0.0005	0.3967	2.54E-04
9:41325964	9	41325964	intronic		SPATA31A5/7	0.001	0.2583	2.55E-04
rs368069888	1	248813943	exonic	77_81del	'OR2T27	0.0004	0.4403	2.57E-04
rs757821665	12	88569940	intronic		'TMTC3	0.0042	0.1396	2.58E-04
rs2682585	19	44081288	exonic	H6R	'PINLYP	0.8371	-0.0270	2.59E-04
10:129923822	10	129923822	intronic		'MKI67	0.0014	0.2413	2.62E-04
rs3766196	1	47284526	UTR3		'CYP4B1	0.1283	-0.0302	2.66E-04
rs755646384	14	102551160	exonic	279_280del	'HSP90AA1	0.0071	0.1072	2.71E-04
rs10980933	9	114306055	UTR3		'ZNF483	0.0052	0.1253	2.72E-04
rs199537784	16	69985274	exonic	L2P	'CLEC18A	0.0223	-0.0698	2.72E-04
22:29611642	22	29611642	intronic		'EMID1	0.0026	-0.1766	2.76E-04
rs78100345	12	65269030	exonic	P583L	'TBC1D30	0.0316	-0.0578	2.77E-04
rs142689137	11	122931221	intronic		'HSPA8	0.0005	0.4174	2.78E-04
1:113082312	1	113082312	intronic		'ST7L	0.0015	-0.2350	2.82E-04
rs145968067	16	58010499	exonic	H42Y	'TEPP	0.0067	-0.1209	2.83E-04
rs780974144	16	58079114	exonic	G592R	'MMP15	0.0067	-0.1209	2.83E-04
2:30828979	2	30828979	intronic		'LCLAT1	0.002	0.2002	2.83E-04
19:8167614	19	8167614	exonic	P1694fs	'FBN3	0.0005	-0.4252	2.85E-04
rs363343	10	119014948	intronic		'SLC18A2	0.75	0.0232	2.89E-04
rs767467039	3	88515798	intergenic		'C3orf38	0.0025	0.2054	2.92E-04
rs55805642	19	55574432	UTR5		'RDH13	0.0687	0.0390	2.92E-04
rs2298847	16	56701294	splicing		'MT1G	0.0731	-0.0398	2.96E-04

**S. Table 1. The top ExWAS associations with serum potassium levels ( $P < 10^{-3}$ ) (continuing)**

rsNum	Chr37	Pos37	Type	AAchg	GENE	Freq	Beta_SNP	pVal_SNP
rs782415123	X	47078312	UTR5		'CDK16	0.0009	0.3035	2.96E-04
rs371610401	16	71101221	exonic	E710X	'HYDIN	0.0048	-0.1439	3.00E-04
rs138928125	19	54483118	intronic		'CACNG8	0.0133	0.0872	3.05E-04
6:32136989	6	32136989	UTR3		'AGPAT1	0.0067	-0.1088	3.06E-04
rs2280788	17	34207405	upstream		'CCL5	0.0075	-0.1046	3.10E-04
rs740178	16	72832135	exonic	A568A	'ZFHX3	0.8069	0.0253	3.10E-04
rs17547816	7	48311658	exonic	E799K	'ABCA13	0.0357	0.0538	3.17E-04
rs16962780	16	84124454	intronic		'MBTPS1	0.0211	-0.0691	3.19E-04
rs34701895	16	84135372	exonic	I6T	'MBTPS1	0.0213	-0.0687	3.22E-04
rs541595665	4	5020942	intronic		'CYTL1	0.0011	0.2639	3.27E-04
5:31405867	5	31405867	intronic		'DROSHA	0.0015	0.2310	3.32E-04
9:138677994	9	138677994	intronic		'KCNT1	0.001	0.2746	3.32E-04
rs761070924	8	22013940	exonic	C39F	'LGI3	0.0145	0.0845	3.33E-04
rs12323975	15	66674634	intergenic		'MAP2K1	0.1822	0.0252	3.33E-04
rs144242846	12	11174321	exonic	R284G	'TAS2R19	0.0053	0.1325	3.33E-04
10:71128271	10	71128271	intronic		'HK1	0.004	0.1386	3.34E-04
rs902348387	13	21861760	intergenic		'MIPEPP3	0.0061	0.1132	3.34E-04
rs112425716	16	69832622	exonic	P36P	'WWP2	0.0347	-0.0547	3.34E-04
rs12647859	4	91230579	exonic	G382S	'CCSER1	0.055	0.0433	3.34E-04
rs147766686	16	84118805	intronic		'MBTPS1	0.0213	-0.0685	3.45E-04
rs80250389	6	20118843	intronic		'MBOAT1	0.0265	0.0593	3.49E-04
rs7298903	12	117747210	UTR5		'NOS1	0.0613	-0.0413	3.50E-04
rs11549690	11	63991581	exonic	R222C	'TRPT1	0.054	0.0442	3.50E-04
rs563906302	3	88178216	intronic		'CGGBP1	0.0279	-0.0579	3.50E-04
rs2977234	1	17555508	exonic	T297T	'PADI1	0.192	0.0252	3.52E-04
18:55289139	18	55289139	UTR5		'NARS	0.0008	0.3145	3.53E-04
10:96098534	10	96098534	intronic		'NOC3L	0.001	0.2720	3.60E-04
rs11749883	5	54965513	intronic		'SLC38A9	0.7638	0.0230	3.62E-04
rs62308569	4	56840830	intronic		'CEP135	0.0041	-0.1471	3.62E-04
rs1062708	19	49513273	exonic	L205L	'RUVBL2	0.5879	0.0199	3.65E-04
rs41264839	1	159904202	intronic		'IGSF9	0.0564	-0.0425	3.68E-04
15:89455794	15	89455794	intronic		'MFGE8	0.0012	0.2513	3.68E-04
rs8110644	19	36831372	exonic	Y453Y	'ZFP14	0.0984	-0.0332	3.70E-04
rs2052455	5	141025581	intronic		'FCHSD1	0.1498	0.0272	3.70E-04
rs73426512	18	32822352	intronic		'ZNF397	0.1737	-0.0258	3.73E-04
rs2075262	12	109704177	UTR3		'ACACB	0.3988	0.0201	3.73E-04
rs182855092	2	204073435	exonic	G2499S	'NBEAL1	0.0093	-0.1050	3.79E-04
rs374269858	2	64118367	UTR3		'UGP2	0.0019	0.2226	3.79E-04
rs146093678	5	14369071	intronic		'TRIO	0.0055	0.1327	3.82E-04
rs1035539	16	75276775	exonic	P94S	'BCAR1	0.7202	0.0218	3.86E-04
rs56219209	12	124417973	exonic	N4346N	'DNAH10	0.0403	-0.0500	3.89E-04
rs111854458	12	124427887	intronic		'CCDC92	0.0403	-0.0500	3.89E-04
rs540849894	6	135621622	intronic		'AHI1	0.0026	0.1929	3.92E-04
11:62751218	11	62751218	intronic		'SLC22A6	0.0024	0.1773	3.93E-04
rs41315964	15	66779698	intronic		'MAP2K1	0.1695	0.0254	3.95E-04
rs199876662	11	89645253	exonic	V287V	'TRIM49D1;TRIM49D2P	0.0338	0.0495	3.95E-04

**S. Table 1. The top ExWAS associations with serum potassium levels ( $P < 10^{-3}$ ) (continuing)**

rsNum	Chr37	Pos37	Type	AAChg	GENE	Freq	Beta_SNP	pVal_SNP
rs374597781	8	1719235	exonic	S5S	'CLN8	0.0035	0.1616	3.97E-04
rs757999930	8	1949720	exonic	121_124del	'KBTBD11	0.0035	0.1616	3.97E-04
rs363420	10	119014931	intronic		'SLC18A2	0.7495	0.0227	4.00E-04
rs56128826	19	55574431	UTR5		'RDH13	0.0686	0.0380	4.01E-04
rs1018795041	11	130131483	exonic	I96V	'ZBTB44	0.0019	-0.2198	4.05E-04
rs144530053	14	45481271	exonic	P1077P	'FAM179B	0.0036	0.1647	4.05E-04
rs530969919	4	56436089	intronic		'PDCL2	0.0009	0.3093	4.07E-04
rs2229944	5	160721319	exonic	A398A	'GABRB2	0.0544	0.0433	4.07E-04
rs201522325	2	131414404	exonic	R691W	'POTEJ	0.0005	0.4023	4.14E-04
rs12299116	12	112747532	intronic		'HECTD4	0.004	-0.1503	4.16E-04
12:56753745	12	56753745	intronic		'STAT2	0.0005	0.3807	4.17E-04
rs28723485	15	66624166	intronic		'DIS3L	0.1829	0.0247	4.19E-04
rs111306873	1	223566859	exonic	D14D	'CCDC185	0.0959	0.0324	4.22E-04
rs75945379	1	223566876	exonic	R20Q	'CCDC185	0.0959	0.0324	4.22E-04
rs6679661	1	223567267	exonic	P150P	'CCDC185	0.0959	0.0324	4.22E-04
rs6689850	1	223567401	exonic	V195A	'CCDC185	0.0959	0.0324	4.22E-04
rs6682552	1	223567808	exonic	R331W	'CCDC185	0.0959	0.0324	4.22E-04
rs3775841	4	120425777	intronic		'PDE5A	0.3881	-0.0201	4.22E-04
rs1010878	12	12977400	intronic		'DDX47	0.1901	0.0248	4.25E-04
rs141948438	10	95093731	intronic		'MYOF	0.0057	0.1283	4.27E-04
17:43351768	17	43351768	intronic		'MAP3K14	0.002	0.1943	4.29E-04
rs248743	12	12869787	upstream		'CDKN1B	0.0734	-0.0371	4.29E-04
rs1049339	19	36640764	UTR3		'CAPNS1	0.0918	-0.0337	4.33E-04
rs2627765	2	55883317	exonic	R464R	'PNPT1	0.435	-0.0198	4.34E-04
9:70972020	9	70972020	ncRNA_intronic		'PGM5-AS1	0.002	-0.1983	4.36E-04
rs11071885	15	66625161	exonic	P923P	'DIS3L	0.183	0.0246	4.40E-04
rs75532475	15	66832466	exonic	I421M	'ZWILCH	0.183	0.0246	4.40E-04
rs201710028	18	67813072	intronic		'RTTN	0.0041	0.1464	4.41E-04
rs576117601	3	52439043	intronic		'BAP1	0.0013	0.2489	4.42E-04
rs2122693	12	57423972	intronic		'MYO1A	0.0399	-0.0498	4.44E-04
rs1008328	19	36595436	exonic	L1390F	'WDR62	0.5968	0.0197	4.45E-04
rs61761603	10	75258901	exonic	G1514A	'USP54	0.0602	0.0411	4.52E-04
rs74326324	18	31708740	intronic		'NOL4	0.0969	-0.0329	4.52E-04
rs17035364	2	68592496	exonic	R5W	'PLEK	0.0035	0.1595	4.54E-04
17:76993513	17	76993513	exonic	P64P	'CANT1	0.0013	-0.2401	4.55E-04
rs984196272	16	57679244	intronic		'GPR56	0.0378	0.0501	4.55E-04
rs12316701	12	69153071	intronic		'SLC35E3	0.1755	0.0255	4.61E-04
rs2298063	1	223567531	exonic	P238P	'CCDC185	0.0958	0.0322	4.61E-04
rs4646487	1	47279175	exonic	R173W	'CYP4B1	0.1296	-0.0289	4.67E-04
rs141618950	12	106460782	exonic	R595L	'NUAK1	0.0102	-0.0964	4.68E-04
rs768281552	4	46060393	intronic		'GABRG1	0.0059	0.1245	4.69E-04
rs3087642	2	86440436	UTR3		'MRPL35	0.278	0.0213	4.71E-04
17:73554535	17	73554535	intronic		'LLGL2	0.0027	0.1659	4.73E-04
rs909468496	4	47901149	intronic		'NFXL1	0.0008	0.3067	4.74E-04
rs4579962	11	117692334	intronic		'FXD2/6	0.0937	0.0331	4.82E-04
rs142807989	19	50249883	exonic	S279F	'TSKS	0.0009	-0.3270	4.83E-04

**S. Table 1. The top ExWAS associations with serum potassium levels ( $P < 10^{-3}$ ) (continuing)**

rsNum	Chr37	Pos37	Type	AAchg	GENE	Freq	Beta_SNP	pVal_SNP
20:49307761	20	49307761	UTR5		'FAM65C	0.0024	0.1749	4.83E-04
rs996374252	16	57656696	intronic		'GPR56	0.0379	0.0499	4.84E-04
19:8612896	19	8612896	intronic		'MYO1F	0.002	0.1921	4.86E-04
10:5756079	10	5756079	intronic		'FAM208B	0.006	0.1108	4.86E-04
rs149929766	16	75033679	exonic	Y37F	'ZNRF1	0.004	0.1498	4.87E-04
17:26729210	17	26729210	intronic		'SLC46A1	0.0053	0.1184	4.90E-04
rs901824	11	68206173	intronic		'LRP5	0.2096	-0.0239	4.90E-04
rs447102	1	216370108	intronic		'USH2A	0.1334	-0.0283	4.90E-04
8:134237641	8	134237641	exonic	G120C	'WISP1	0.0018	0.2013	4.96E-04
rs41306345	15	66782048	intronic		'MAP2K1	0.1829	0.0244	4.96E-04
rs76597070	1	3669356	exonic	R104K	'CCDC27	0.0038	-0.1574	4.98E-04
rs889683237	1	3701664	exonic	P394L	'LRRC47	0.0038	-0.1574	4.98E-04
1:159900753	1	159900753	intronic		'IGSF9	0.0029	0.1587	5.03E-04
rs62013199	15	79229644	intronic		'CTSH	0.2056	-0.0246	5.03E-04
rs753542464	1	9790725	exonic	918_919del	'CLSTN1	0.0021	0.1883	5.04E-04
rs1555790	1	2524485	intronic		'MMEL1	0.0894	-0.0339	5.06E-04
rs1126742	1	47398496	exonic	F434S	'CYP4A11	0.2056	-0.0239	5.06E-04
rs149628023	1	237991614	intronic		'RYR2	0.0067	-0.1137	5.10E-04
rs17438451	2	86438600	UTR3		'MRPL35	0.278	0.0212	5.10E-04
rs201704028	8	3009020	exonic	T1977M	'CSMD1	0.0038	0.1513	5.18E-04
rs4865614	5	54960609	exonic	L140L	'SLC38A9	0.766	0.0225	5.19E-04
rs149678604	4	114274230	exonic	V1486L	'ANK2	0.067	0.0379	5.19E-04
rs542671909	22	20785579	exonic	D194N	'SCARF2	0.0011	0.2533	5.21E-04
rs12977470	19	45004305	UTR5		'ZNF180	0.6115	-0.0197	5.26E-04
3:96533621	3	96533621	exonic	G52R	'EPHA6	0.0014	0.2297	5.27E-04
rs113505281	1	212909472	UTR3		'NSL1	0.0897	-0.0330	5.29E-04
rs41300110	1	17570767	UTR3		'PADI1	0.1442	0.0273	5.31E-04
rs760104690	1	9780743	intronic		'PIK3CD	0.0045	0.1288	5.35E-04
19:54971776	19	54971776	intronic		'LENG8	0.003	0.1550	5.38E-04
rs35319285	6	52546620	exonic	P27L	'TMEM14A	0.0052	0.1400	5.38E-04
rs4073997	17	79526402	exonic	G570G	'NPLOC4	0.4871	0.0190	5.39E-04
rs1872624	5	177029836	intronic		'B4GALT7	0.3773	0.0197	5.46E-04
5:149771048	5	149771048	intronic		'TCOF1	0.0006	0.3449	5.47E-04
6:157098902	6	157098902	upstream		'ARID1B	0.0022	0.1869	5.48E-04
rs953849520	19	40739936	intronic		'AKT2	0.0092	-0.0903	5.49E-04
rs11947234	4	120474859	exonic	Y414Y	'PDE5A	0.3876	-0.0197	5.51E-04
15:83241704	15	83241704	intronic		'CPEB1	0.0017	0.2038	5.58E-04
rs45576132	16	84127473	intronic		'MBTPS1	0.0208	-0.0665	5.59E-04
rs28470886	4	57397082	exonic	H80H	'THEGL	0.3758	0.0201	5.65E-04
rs11944	2	86440718	downstream		'MRPL35;REEP1	0.2766	0.0210	5.68E-04
rs139032867	12	111800826	exonic	133_135del	'FAM109A	0.1221	-0.0291	5.68E-04
rs147342229	10	90683040	UTR3		'STAMBPL1	0.0053	0.1317	5.69E-04
rs12445252	16	57057679	intronic		'NLRC5	0.1668	0.0254	5.73E-04
rs72648904	2	179613651	exonic	D4492D	'TTN	0.0064	0.1201	5.74E-04
rs9935751	16	57713679	intronic		'GPR97	0.0897	0.0327	5.74E-04
rs7174	12	121017171	exonic	L98L	'POP5	0.6941	-0.0210	5.74E-04



**S. Table 1. The top ExWAS associations with serum potassium levels ( $P < 10^{-3}$ ) (continuing)**

rsNum	Chr37	Pos37	Type	AAChg	GENE	Freq	Beta_SNP	pVal_SNP
16:54319553	16	54319553	intronic		'IRX3	0.0025	0.1701	5.75E-04
rs77099580	3	183752964	exonic;splicing	R80R	'HTR3D;HTR3D	0.0019	0.2108	5.75E-04
rs2231566	19	36605552	intronic		'POLR2I	0.1947	-0.0243	5.81E-04
rs28550555	4	57397050	exonic	R70R	'THEGL	0.376	0.0200	5.81E-04
rs782182635	X	153002002	intronic		'ABCD1	0.001	0.0831	5.82E-04
rs12442757	15	65689267	exonic	N301S	'IGDCC4	0.2227	0.0228	5.86E-04
rs115463767	5	112339578	intronic		'DCP2	0.002	0.2136	5.87E-04
rs4433920	19	44571154	exonic	H391H	'ZNF223	0.6401	0.0198	5.87E-04
9:108158122	9	108158122	UTR3		'SLC44A1	0.005	0.1209	5.87E-04
rs729459	5	177035964	exonic	H259H	'B4GALT7	0.4601	0.0191	5.89E-04
rs1031904	5	141059158	exonic	D218H	'ARAP3	0.1011	0.0314	5.90E-04
rs977922492	22	51010604	ncRNA_intronic		'CHKB-CPT1B	0.0068	0.1024	5.93E-04
rs10405713	19	54782670	exonic	T202A	'LILRB2	0.0176	0.0719	5.94E-04
13:19748388	13	19748388	intronic		'TUBA3C	0.0014	-0.2266	5.97E-04
rs115207628	10	19620208	intronic		'MALRD1	0.0023	-0.1830	5.98E-04
16:24881363	16	24881363	intronic		'SLC5A11	0.0022	-0.1816	6.01E-04
16:28996289	16	28996289	intronic		'LAT	0.0035	-0.1482	6.02E-04
12:108954901	12	108954901	exonic	S10S	'SART3	0.0005	0.3698	6.04E-04
12:108954905	12	108954905	exonic	A9G	'SART3	0.0005	0.3698	6.04E-04
17:7130509	17	7130509	exonic	G481G	'DVL2	0.004	0.1342	6.05E-04
7:6312193	7	6312193	UTR5		'CYTH3	0.001	0.2623	6.09E-04
5:137688761	5	137688761	intronic		'KDM3B	0.0031	0.1533	6.10E-04
rs1673082	19	37241141	exonic	H235H	'ZNF850	0.8589	-0.0273	6.12E-04
6:72922612	6	72922612	UTR5		'RIMS1	0.0022	0.1812	6.12E-04
rs2408204	5	54988582	UTR5		'SLC38A9	0.7662	0.0222	6.14E-04
rs147367079	18	6943451	intronic		'LAMA1	0.0107	-0.0910	6.14E-04
rs1935	10	64927823	exonic	E2353D	'JMJD1C	0.6486	-0.0199	6.24E-04
rs71418678	2	209207440	intronic		'PIKFYVE	0.0016	0.2187	6.27E-04
rs552919551	3	111578544	intronic		'PHLDB2	0.0095	0.0966	6.28E-04
rs71594518	5	145252239	exonic	G98D	'GRXCR2	0.0022	0.1990	6.32E-04
rs34892428	5	145252377	exonic	S52N	'GRXCR2	0.0022	0.1990	6.32E-04
rs1130381	6	32632691	exonic	P88L	'HLA-DQB1	0.0118	0.0777	6.32E-04
rs181303335	X	135076884	intronic		'SLC9A6	0.0204	0.0388	6.37E-04
rs71385734	16	2160503	exonic	A1555A	'PKD1	0.1495	-0.0267	6.42E-04
17:27904593	17	27904593	intronic		'GIT1	0.0005	0.3687	6.45E-04
rs144140864	18	67406415	intronic		'DOK6	0.0046	0.1373	6.46E-04
rs34717557	18	67721492	exonic	S1687C	'RTTN	0.0046	0.1373	6.46E-04
rs140245773	18	67833385	exonic	E614E	'RTTN	0.0046	0.1373	6.46E-04
rs34353615	18	67836115	exonic	N555K	'RTTN	0.0046	0.1373	6.46E-04
rs151203272	18	67857959	intronic		'RTTN	0.0046	0.1373	6.46E-04
rs28997579	2	28464198	exonic	Y263Y	'BRE	0.0319	0.0534	6.47E-04
17:42452287	17	42452287	intronic		'ITGA2B	0.0011	0.2608	6.59E-04
rs13056405	22	50942121	exonic	S608N	'LMF2	0.1596	-0.0255	6.61E-04
rs371551427	12	113633605	exonic	E273E	'IQCD	0.006	-0.1228	6.72E-04
rs72646775	1	17592121	intronic		'PADI3	0.1481	0.0266	6.73E-04
7:5342628	7	5342628	UTR3		'SLC29A4	0.0026	0.1641	6.75E-04

**S. Table 1. The top ExWAS associations with serum potassium levels ( $P < 10^{-3}$ ) (continuing)**

rsNum	Chr37	Pos37	Type	AAchg	GENE	Freq	Beta_SNP	pVal_SNP
rs4865616	5	54960687	exonic	S114S	'SLC38A9	0.7649	0.0219	6.76E-04
rs4845986	1	11288633	intronic		'MTOR	0.7558	-0.0220	6.76E-04
rs61943635	12	113717901	intronic		'TPCN1	0.0544	0.0405	6.77E-04
rs9682156	3	101231895	intronic		'SENP7	0.0503	-0.0427	6.83E-04
2:190313045	2	190313045	intronic		'WDR75	0.0067	-0.1023	6.89E-04
rs144073736	16	69704090	intronic		'NFAT5	0.1005	0.0309	6.89E-04
rs17208425	5	140871425	exonic	E873G	'PCDHGC5	0.1459	0.0262	6.98E-04
rs9948912	18	34853641	intronic		'CELF4	0.4124	0.0193	6.99E-04
12:56551194	12	56551194	intronic		'MYL6B	0.0022	0.1795	7.01E-04
6:34512160	6	34512160	exonic	R25G	'SPDEF	0.0026	0.1638	7.03E-04
rs1002838669	17	18034560	exonic	E1349fs	'MYO15A	0.0022	0.1996	7.04E-04
rs1036106219	17	18034563	exonic	A1350E	'MYO15A	0.0022	0.1996	7.04E-04
10:32099514	10	32099514	intronic		'ARHGAP12	0.002	0.1863	7.04E-04
8:17928732	8	17928732	intronic		'ASAHI	0.0004	-0.3980	7.11E-04
19:15061225	19	15061225	intronic		'SLC1A6	0.007	-0.1024	7.12E-04
5:1239488	5	1239488	intronic		'SLC6A18	0.0006	0.3393	7.13E-04
rs41294530	1	53442376	exonic	E159E	'SCP2	0.02	-0.0661	7.13E-04
rs918558	5	140870949	exonic	A714A	'PCDHGC5	0.146	0.0262	7.13E-04
rs180970562	18	55862978	intronic		'NEDD4L	0.0859	-0.0334	7.16E-04
rs2288487	16	71509588	exonic	L288L	'ZNF19	0.1544	-0.0254	7.16E-04
rs2288488	16	71509634	exonic	P272P	'ZNF19	0.1544	-0.0254	7.16E-04
rs2075661	5	140856265	exonic	A194A	'PCDHGC3	0.146	0.0262	7.16E-04
rs2074912	5	140870516	exonic	D570G	'PCDHGC5	0.146	0.0262	7.16E-04
rs17208397	5	140798639	exonic	V405L	'PCDHGB7	0.1516	0.0258	7.22E-04
rs1002519	5	140869003	exonic	L66L	'PCDHGC5	0.1459	0.0261	7.25E-04
16:69363855	16	69363855	intronic		'COG8;PDF	0.0009	0.2824	7.25E-04
3:129324892	3	129324892	exonic	P197P	'PLXND1	0.0007	0.3160	7.27E-04
rs397822024	1	47279558	intronic		'CYP4B1	0.1267	-0.0282	7.30E-04
rs199714181	4	44450588	UTR5		'KCTD8	0.0113	0.0887	7.33E-04
rs726684	5	140772427	exonic	L16R	'PCDHGA8	0.1515	0.0258	7.33E-04
rs4648390	1	2700372	intronic		'TTC34	0.0904	-0.0329	7.36E-04
rs11977829	7	30113706	exonic	T440T	'PLEKHA8	0.2349	-0.0223	7.37E-04
rs77813243	7	99221882	intronic		'ZSCAN25	0.029	-0.0558	7.39E-04
rs4798530	18	7040277	intronic		'LAMA1	0.0121	-0.0839	7.46E-04
rs985188199	18	12680617	intronic		'CEP76;PSMG2	0.0012	0.2379	7.49E-04
19:19256497	19	19256497	UTR3		MEF2B	0.0033	0.1446	7.49E-04
rs142618454	5	179267889	exonic	A119T	'C5orf45	0.0023	0.1908	7.50E-04
rs775596768	X	110406205	exonic	178_178del	'PAK3	0.0005	0.3619	7.53E-04
rs9682312	3	101231894	intronic		'SENP7	0.0503	-0.0424	7.54E-04
rs58124158	16	57067595	intronic		'NLRC5	0.4624	-0.0187	7.54E-04
rs3217292	18	61569849	intronic		'SERPINB2	0.0863	0.0328	7.55E-04
rs56044827	3	41960004	exonic	I224I	'ULK4	0.0007	0.3281	7.55E-04
rs188391904	15	41482114	intronic		'EXD1	0.001	0.2776	7.58E-04
rs140686087	15	43378305	exonic	T72I	'UBR1	0.001	0.2776	7.58E-04
rs191411399	15	43784180	intronic		'RNU6-28P	0.001	0.2776	7.58E-04
rs569311944	15	48527279	intronic		'SLC12A1	0.001	0.2776	7.60E-04

**S. Table 1. The top ExWAS associations with serum potassium levels ( $P < 10^{-3}$ ) (continuing)**

rsNum	Chr37	Pos37	Type	AAchg	GENE	Freq	Beta_SNP	pVal_SNP
rs920751748	13	41835880	intronic		'MTRF1	0.0011	-0.2591	7.60E-04
19:42125660	19	42125660	UTR3		'CEACAM4	0.3367	-0.0196	7.65E-04
rs2285853	19	624683	intronic		'POLRMT	0.3819	0.0192	7.66E-04
rs2301735	19	36577550	intronic		'WDR62	0.195	-0.0237	7.67E-04
rs11225057	11	101775673	intronic		'ANGPTL5	0.0198	-0.0652	7.69E-04
rs111995400	5	13780991	exonic	T2966T	'DNAH5	0.0891	-0.0330	7.70E-04
rs111313933	5	13789035	intronic		'DNAH5	0.0891	-0.0330	7.70E-04
rs943949932	10	115803799	upstream		'ADRB1	0.0004	-0.4150	7.70E-04
rs2275929	10	5042664	intronic		'AKR1C2	0.1714	0.0249	7.72E-04
rs52814161	1	209803199	exonic	Y339H	'LAMB3	0.0016	0.2148	7.73E-04
rs55796412	16	19049253	exonic	T245S	'TMC7	0.0268	0.0580	7.79E-04
1:63789808	1	63789808	exonic	A360D	'FOXD3	0.0004	0.3988	7.84E-04
rs10832030	11	13399791	intronic		'ARNTL	0.7567	0.0221	7.85E-04
rs557018270	2	70187725	UTR3		'ASPRV1	0.0009	-0.2809	7.85E-04
rs3830219	5	141029177	intronic		'FCHSD1	0.1004	0.0303	7.85E-04
rs9925879	16	57713685	intronic		'GPR97	0.0947	0.0312	7.90E-04
rs1048118	X	47483800	exonic	N428N	'CFP	0.186	0.0199	7.92E-04
rs75282394	8	22162271	intronic		'PIWIL2	0.0036	0.1433	7.93E-04
2:237276926	2	237276926	exonic	G486E	'IQCA1	0.0016	0.2092	7.94E-04
rs73101168	12	46601260	intronic		'SLC38A1	0.0059	-0.1220	7.95E-04
rs34308924	4	120481431	intronic		'PDE5A	0.3864	-0.0191	8.01E-04
rs138953940	16	84087976	UTR3		'MBTPS1	0.0192	-0.0663	8.01E-04
rs55633368	1	207135736	exonic	T158T	'FCAMR	0.0276	-0.0557	8.02E-04
18:6032303	18	6032303	intronic		'L3MBTL4	0.0004	0.3971	8.02E-04
rs45502093	4	114120284	intronic		'ANK2	0.0701	0.0358	8.04E-04
rs139402655	20	58420371	intronic		'PHACTR3	0.0008	-0.3262	8.07E-04
rs201953852	8	124031586	intronic		'DERL1	0.0019	-0.2091	8.11E-04
rs371659413	4	44176780	UTR3		'KCTD8	0.0071	0.1111	8.16E-04
rs752231914	7	100424597	intronic		'EPHB4	0.0045	0.1234	8.16E-04
rs11577939	1	40036669	intronic		'LOC101929516	0.0039	0.1495	8.16E-04
rs9631141	20	47635339	intronic		'ARFGEF2	0.0073	0.0995	8.20E-04
rs2003782	16	2156447	exonic	L2481L	'PKD1	0.1492	-0.0262	8.21E-04
rs832070	3	97753931	intronic		'GABRR3	0.6966	0.0199	8.26E-04
rs750457797	19	1489860	exonic	R76W	'PCSK4	0.0006	0.3654	8.31E-04
rs369230	16	89645437	intronic		'CPNE7	0.8123	0.0237	8.32E-04
rs150658349	6	143511335	UTR3		'AIG1	0.0902	0.0318	8.33E-04
19:50102614	19	50102614	exonic	D1255A	'PRR12	0.0027	0.1585	8.34E-04
rs143030946	1	210012467	exonic	R426R	'DIEXF	0.0014	0.2413	8.35E-04
rs73214128	12	121442241	exonic	A136A	'C12orf43	0.0265	-0.0571	8.37E-04
rs11537857	12	121454148	exonic	G44R	'C12orf43	0.0265	-0.0571	8.37E-04
rs752835343	7	49951572	intronic		'VWC2	0.0155	-0.0748	8.41E-04
rs776006250	16	72821612	exonic	2605_2607d	'ZFXH3	0.0065	-0.1151	8.43E-04
16:818794	16	818794	UTR3		'MSLN	0.0038	-0.1333	8.47E-04
rs2228559	9	137713948	exonic	I1520I	'COL5A1	0.0119	-0.0858	8.54E-04
rs769946937	16	28834686	exonic	G36S	'ATXN2L	0.003	0.1495	8.56E-04
rs61756665	6	111702530	exonic	F405Y	'REV3L	0.0031	-0.1759	8.56E-04

**S. Table 1. The top ExWAS associations with serum potassium levels ( $P < 10^{-3}$ ) (continuing)**

rsNum	Chr37	Pos37	Type	AAchg	GENE	Freq	Beta_SNP	pVal_SNP
rs764618501	16	74666437	exonic	T521A	'RFWD3	0.0028	0.1763	8.57E-04
rs184847845	21	47720481	UTR3		'C21orf58	0.0006	0.3546	8.62E-04
rs4865615	5	54960673	exonic	S119T	'SLC38A9	0.7656	0.0215	8.66E-04
rs748550581	5	77656446	UTR5		'SCAMP1	0.0007	0.3109	8.66E-04
rs35842338	7	105655745	intronic		'CDHR3	0.0224	0.0596	8.67E-04
19:49133937	19	49133937	UTR3		'DBP	0.0004	0.3914	8.76E-04
19:3273824	19	3273824	intronic		'CELF5	0.0005	0.3592	8.78E-04
rs10774907	12	117647403	UTR3		'NOS1	0.3296	0.0198	8.78E-04
rs1443638	18	34850846	exonic	A327A	'CELF4	0.4126	0.0189	8.79E-04
4:74453616	4	74453616	exonic	R96L	'RASSF6	0.0004	0.4186	8.79E-04
rs146661177	7	134217899	intronic		'AKR1B10	0.0008	-0.3163	8.82E-04
rs570464067	19	43441282	UTR5		'PSG7	0.0012	0.2360	8.82E-04
rs774997021	12	53073970	exonic	54_54del	'KRT1	0.0007	0.3113	8.86E-04
5:68417680	5	68417680	exonic	S577C	'SLC30A5	0.0018	0.1918	8.90E-04
rs61870067	11	1088049	intronic		'MUC2	0.001	-0.2830	8.92E-04
rs35723406	11	61111346	exonic	A334G	'DAK	0.0903	0.0324	8.93E-04
rs61758138	5	139815809	exonic	Q143E	ANKHD1-EIF4EB	0.0202	-0.0653	8.93E-04
rs35171532	7	66582460	intronic		'TYW1	0.356	0.0192	8.96E-04
rs1056766	19	625198	exonic	T293T	'POLRMT	0.3841	0.0190	8.97E-04
rs2304913	11	27147124	intronic		'BBOX1-AS1	0.0841	-0.0325	8.98E-04
rs13059888	3	113128051	exonic	P264P	'CFAP44	0.1361	-0.0267	9.03E-04
rs74331768	16	2161793	exonic	S1125S	'PKD1	0.139	-0.0268	9.06E-04
rs34186470	19	46914921	exonic	H383Y	'CCDC8	0.0876	0.0326	9.06E-04
rs3747807	7	86800351	exonic	A3A	'DMTF1	0.907	0.0315	9.08E-04
rs971910475	10	115988529	intronic		'TDRD1	0.0182	0.0675	9.08E-04
rs56088143	16	67688172	intronic		'RLTPR	0.0519	-0.0412	9.09E-04
rs3766701	1	186319282	intronic		'MIR548F1	0.1949	-0.0227	9.19E-04
rs2301710	5	137027953	intronic		'KLHL3	0.6336	-0.0190	9.19E-04
rs193009453	11	125513857	intronic		'CHEK1	0.0023	-0.1854	9.20E-04
rs11586422	1	150679358	intronic		'HORMAD1	0.268	0.0209	9.27E-04
rs2238549	19	622336	exonic	E555A	'POLRMT	0.3838	0.0190	9.27E-04
rs11537856	12	121442883	exonic	F92F	'C12orf43	0.0257	-0.0571	9.28E-04
rs402647	5	180053307	intronic		'FLT4	0.9967	0.1423	9.31E-04
rs916478440	2	242210398	intronic		'HDLBP	0.0036	0.1501	9.32E-04
rs6591651	11	61058867	intronic		'VWCE	0.0902	0.0322	9.36E-04
rs117085906	11	125279992	intronic		'PKNOX2	0.0017	-0.2087	9.36E-04
1:38327960	1	38327960	UTR3		'INPP5B	0.0004	-0.3931	9.36E-04
rs118115569	21	27012088	UTR5		'JAM2	0.0241	0.0584	9.37E-04
rs151093478	10	1229036	UTR3		'ADARB2	0.0093	0.0906	9.38E-04
rs6431634	2	234703136	intronic		'MROH2A	0.5152	0.0183	9.39E-04
rs13337017	16	75272367	UTR5		'BCAR1	0.1082	-0.0296	9.40E-04
rs386385084	16	75297143	intronic		'BCAR1	0.4135	0.0184	9.41E-04
rs2272507	12	72955901	intronic		'TRHDE	0.0175	0.0661	9.42E-04
rs41314165	3	105397446	intronic		'CBLB	0.0638	0.0379	9.43E-04
rs12779623	10	19425531	exonic	Q411R	'MALRD1	0.0477	-0.0430	9.46E-04
rs367726336	6	45514481	intronic		'RUNX2	0.0004	0.3904	9.47E-04

**S. Table 1. The top ExWAS associations with serum potassium levels ( $P < 10^{-3}$ ) (continuing)**

rsNum	Chr37	Pos37	Type	AAchg	GENE	Freq	Beta_SNP	pVal_SNP
rs116188786	4	74846990	exonic	G79G	'PF4	0.0011	0.2427	9.47E-04
rs34367546	2	27015610	intronic		'CENPA	0.0274	0.0557	9.48E-04
rs2274824	6	155574207	intronic		'TIAM2	0.8264	-0.0241	9.50E-04
rs772585060	7	47879098	exonic	D1905E	'PKD1L1	0.0004	-0.4141	9.51E-04
11:62283562	11	62283562	UTR3		'AHNAK	0.0005	0.3552	9.54E-04
rs111500624	10	94591098	intergenic		'EXOC6	0.0063	0.1121	9.55E-04
rs3184504	12	111884608	exonic	W60R	'SH2B3	0.5367	-0.0183	9.57E-04
rs374520840	8	69030902	intronic		'PREX2	0.001	0.3015	9.61E-04
rs117149407	8	72111658	intronic		'EYA1	0.001	0.3015	9.61E-04
rs6889283	5	139653439	intronic		'PFDN1	0.5558	-0.0183	9.62E-04
rs142118765	2	242182034	exonic	G637G	'HDLBP	0.0036	0.1525	9.64E-04
rs1483895	3	69362706	intronic		'FRMD4B	0.8945	-0.0297	9.65E-04
rs149601529	17	27959544	exonic	P863S	'SSH2	0.0019	0.2062	9.66E-04
19:18879393	19	18879393	exonic	P370P	'CRTC1	0.0004	0.3899	9.68E-04
9:131466330	9	131466330	intronic		'PKN3	0.0004	0.3902	9.69E-04
20:3219079	20	3219079	intronic		'SLC4A11	0.002	-0.1870	9.70E-04
rs185248802	1	228467072	exonic	T2441T	'OBSCN	0.0326	-0.0506	9.83E-04
rs145427664	22	35785929	exonic	R237G	'HMOX1	0.0046	-0.1331	9.83E-04
rs10488085	7	30087381	intronic		'PLEKHA8	0.2232	-0.0219	9.86E-04
rs3803167	12	111785586	exonic	D1306D	'CUX2	0.1579	-0.0249	9.87E-04
rs1056266531	12	104152110	intronic		'STAB2	0.0006	0.3464	9.87E-04
rs35292176	19	44501627	exonic		'LOC101928063	0.5819	0.0185	9.91E-04
16:29820839	16	29820839	intronic		'MAZ	0.0033	0.1412	9.93E-04
rs146107679	18	24035650	UTR3		'KCTD1	0.0633	0.0370	9.94E-04
rs2235638	16	1573890	exonic	A1070V	'IFT140	0.01	-0.0892	9.94E-04
rs368135891	5	41731812	UTR3		'OXCT1	0.0249	0.0582	9.96E-04
rs6762186	3	69402923	intronic		'FRMD4B	0.2381	0.0212	9.98E-04
22:19709348	22	19709348	exonic	E273G	'SEPT5	0.0034	0.1399	9.99E-04
rs9934488	16	2155297	intronic		'PKD1	0.1326	-0.0266	9.99E-04

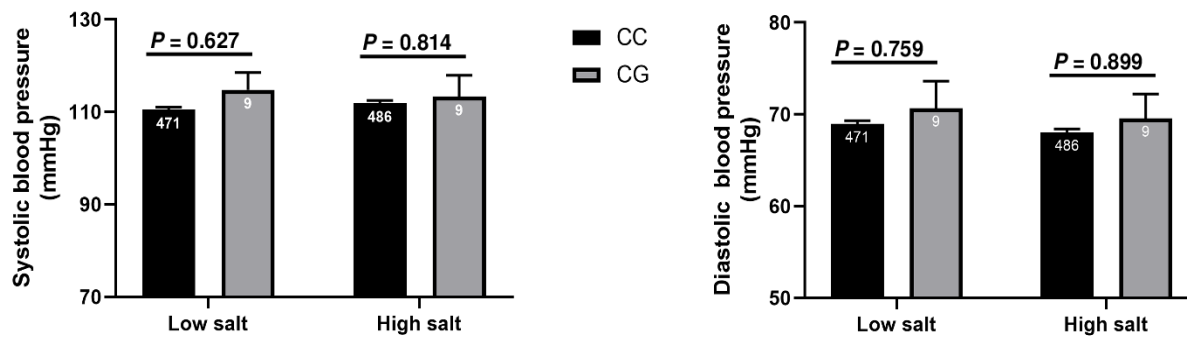
**Supplementary Table 2. Association results of top SNPs with potassium levels adjusted for rs200697179**

rsNum	Chr37	Pos37	Type	GENE	Beta_SNP	pVal_SNP	Adjusted Beta	Adjusted pVal
rs149279319	16	56685916	intronic	MT1B	-0.14866	1.14E-09	-0.1132	2.07E-01
rs113140045	16	56381927	UTR3	GNAO1	-0.14602	2.85E-09	-0.06608	4.35E-01
rs142090669	16	55613052	exonic	LPCAT2	-0.14488	5.25E-09	-0.05486	3.94E-01
rs559381844	16	57279927	intronic	ARL2BP	-0.13512	1.49E-08	-0.02083	7.45E-01
rs2298846	16	56701315	intronic	MT1G	-0.10274	4.82E-08	-0.04301	1.25E-01
rs5802	16	56919235	exonic	SLC12A3	-0.09641	1.42E-07	-0.03299	2.32E-01
rs11643718	16	56933519	exonic	SLC12A3	-0.09619	1.62E-07	-0.03174	2.53E-01
rs2289116	16	56938290	intronic	SLC12A3	-0.09619	1.62E-07	-0.03174	2.53E-01
rs28366003	16	56642491	UTR5	MT2A	-0.10654	3.29E-07	-0.01939	5.75E-01

**Supplementary table 3. Main phenotypes in p.R642G heterozygotes and Gitelman syndrome patients**

Traits	p.R642G heterozygotes	Gitelman syndrome patients
Potassium	↓	↓↓
Chloride	↓	↓↓
<b>Bicarbonate</b>	↑	↑↑
Sodium	↔	↔/↓
Magnesium	NA	↓↓
urine calcium	NA	↓↓
Glucose	↔	↔/↑
Blood pressure	↔	↔/↓
BUN	↓	NA
Bone fracture rate	↑	NA

↑: increase, ↓: decrease, ↔: no change, NA: not available



**Supplementary figure 1. No significant difference in blood pressure between carriers and noncarriers of p.R642G in either low salt or high salt diet.**