

Supplemental Material

Urinary albumin, sodium, and potassium and cardiovascular outcomes in the UK Biobank: observational and Mendelian randomization analyses

Running Title: Urinary biomarkers in the UK Biobank

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Supplemental Tables

Table S1. Variants included in the instrument variable for Mendelian randomization analyses.

UNa/UK						
SNP	EA	OA	EAF	BETA	SE	P
rs1194277	G	C	0.508	0.015	0.002	1.57E-10
rs7157772	T	G	0.612	0.015	0.002	4.66E-10
rs299938	G	A	0.234	-0.017	0.003	2.13E-09
rs8096658	G	C	0.488	-0.014	0.002	2.69E-08
rs2903625	T	A	0.384	0.014	0.002	2.41E-08
rs34783010	T	G	0.193	-0.022	0.003	7.07E-13
rs1698114	G	A	0.484	0.016	0.003	1.39E-09
rs6754311	C	T	0.248	0.017	0.003	1.03E-09
rs3770435	C	T	0.362	0.017	0.003	3.06E-11
rs4665972	C	T	0.607	-0.024	0.002	2.89E-22
rs11373337	NA	A	0.705	0.015	0.003	6.74E-09
rs6440008	C	T	0.386	-0.017	0.002	4.07E-12
rs12496573	A	G	0.211	0.016	0.003	3.36E-08
rs2035562	G	A	0.672	-0.014	0.003	4.02E-08
rs1229984	C	T	0.978	-0.056	0.008	3.82E-12
rs9291156	G	A	0.455	-0.014	0.002	7.09E-09
rs2057655	A	G	0.185	-0.017	0.003	2.31E-08
rs13188076	T	G	0.232	-0.020	0.003	2.22E-12
rs56108664	T	C	0.199	0.020	0.003	4.29E-11
rs34867029	T	NA	0.704	-0.015	0.003	3.94E-08
rs2455357	G	A	0.705	0.016	0.003	4.25E-08
rs6452788	A	G	0.236	-0.021	0.003	1.79E-13
rs2394893	A	G	0.605	0.014	0.002	2.27E-08
rs791903	C	G	0.556	0.013	0.002	2.72E-08
rs62458486	A	G	0.226	-0.016	0.003	2.37E-08
rs372106593	NA	G	0.446	-0.013	0.002	4.30E-08
rs11514731	G	C	0.179	-0.020	0.003	1.28E-10
rs12700027	A	G	0.110	0.023	0.004	2.07E-09
rs33951980	T	C	0.130	-0.021	0.004	7.08E-09
rs4873492	T	C	0.170	0.020	0.003	6.29E-10
rs11103388	A	G	0.330	0.014	0.003	2.75E-08
UNa/UCr						
SNP	EA	OA	EAF	BETA	SE	P
rs12363886	A	C	0.482	-0.013	0.002	3.29E-08

rs11062590	G	C	0.092	-0.025	0.004	2.42E-09
rs35335867	NA	C	0.248	-0.019	0.003	1.15E-11
rs11659764	A	T	0.054	0.030	0.005	3.08E-08
rs8096658	G	C	0.488	-0.014	0.002	7.96E-09
rs1698114	G	A	0.484	0.015	0.003	9.36E-09
rs1047891	A	C	0.316	-0.027	0.003	1.34E-24
rs35169442	C	G	0.198	0.021	0.003	9.87E-12
rs1260326	C	T	0.607	-0.028	0.002	4.05E-29
rs62140396	A	G	0.118	0.022	0.004	5.33E-09
rs13056137	A	C	0.264	0.017	0.003	2.53E-10
rs6440008	C	T	0.386	-0.017	0.003	4.65E-12
rs2035561	C	T	0.671	-0.014	0.003	3.29E-08
rs1229984	C	T	0.978	-0.050	0.008	7.36E-10
rs13127170	G	A	0.552	0.014	0.002	1.61E-08
rs4697700	C	G	0.236	0.016	0.003	1.17E-08
rs13188076	T	G	0.232	-0.024	0.003	6.48E-17
rs1423553	C	T	0.672	0.014	0.003	3.75E-08
rs702634	A	G	0.692	0.016	0.003	6.62E-10
rs13242739	A	T	0.051	-0.031	0.006	2.37E-08
rs33951980	T	C	0.130	-0.023	0.004	1.44E-10
rs2953661	C	A	0.696	-0.017	0.003	4.02E-09
rs2954021	G	A	0.506	-0.016	0.002	1.36E-10
rs558455	G	A	0.580	0.016	0.002	1.67E-10
rs4873492	T	C	0.170	0.022	0.003	1.07E-11
rs12378270	A	G	0.061	0.032	0.006	6.49E-09
UK/UCr						
SNP	EA	OA	EAF	BETA	SE	P
rs35041900	T	C	0.093	-0.024	0.004	1.74E-09
rs66495454	NA	G	0.378	0.014	0.002	9.63E-09
rs2664284	C	G	0.255	0.018	0.003	5.84E-12
rs4408310	A	C	0.539	0.014	0.002	4.33E-09
rs57739486	T	C	0.158	0.017	0.003	2.75E-08
rs35335867	NA	C	0.248	-0.024	0.003	8.42E-19
rs2472297	T	C	0.267	0.021	0.003	4.44E-16
rs11648252	G	C	0.795	0.016	0.003	2.09E-08
rs71352040	A	T	0.071	0.025	0.004	1.17E-08
rs4803380	T	C	0.022	-0.047	0.008	1.53E-09
rs34783010	T	G	0.193	0.026	0.003	3.10E-19
rs2603274	C	A	0.817	0.018	0.003	1.53E-09
rs1047891	A	C	0.316	-0.031	0.002	1.60E-37

rs4973766	T	C	0.456	-0.022	0.002	4.29E-21
rs1664781	A	G	0.693	0.014	0.002	1.75E-08
rs72704785	A	G	0.179	-0.024	0.003	1.03E-14
rs10872423	T	C	0.194	-0.019	0.003	2.46E-11
rs3129996	C	A	0.906	-0.021	0.004	4.20E-08
rs2260051	T	A	0.558	-0.013	0.002	1.44E-08
rs9269041	A	G	0.647	-0.014	0.002	1.89E-09
rs77213792	G	C	0.068	-0.027	0.005	2.78E-09
rs10950655	C	T	0.505	0.013	0.002	4.53E-09
rs756018	G	C	0.110	-0.026	0.004	1.19E-12
UAlb/UCr						
SNP	EA	OA	EAF	BETA	SE	P
rs35388680	NA	C	0.407	0.013	0.002	1.92E-08
rs35202981	G	A	0.140	0.020	0.003	3.03E-09
rs58953262	NA	C	0.521	0.013	0.002	4.48E-08
rs1204672	C	T	0.572	0.014	0.002	5.35E-09
rs12032996	A	G	0.162	-0.018	0.003	1.59E-08
rs17358122	T	C	0.220	-0.015	0.003	3.71E-08
rs55668525	T	G	0.192	0.017	0.003	4.03E-09
rs10157710	T	C	0.801	0.025	0.003	4.48E-18
rs3781470	A	C	0.355	0.013	0.002	3.11E-08
rs79051478	C	G	0.104	0.058	0.004	1.50E-52
rs780836	C	G	0.715	0.014	0.003	2.56E-08
rs188126412	T	C	0.028	0.073	0.007	6.58E-24
rs116867125	A	G	0.019	0.059	0.009	6.08E-12
rs79386054	T	C	0.017	0.055	0.010	9.79E-09
rs7910002	C	G	0.698	0.014	0.003	2.45E-08
rs67339103	A	G	0.212	0.020	0.003	7.90E-12
rs7115200	G	T	0.440	0.013	0.002	1.14E-08
rs34183365	NA	C	0.415	0.014	0.002	3.73E-08
rs2601006	T	C	0.343	-0.014	0.002	2.14E-08
rs8036643	C	G	0.645	0.015	0.002	8.72E-10
rs35335867	NA	C	0.248	-0.019	0.003	1.33E-12
rs146311723	C	T	0.174	0.017	0.003	2.19E-08
rs2472297	T	C	0.267	0.025	0.003	2.65E-21
rs9673084	A	G	0.271	0.019	0.003	3.06E-13
rs4488444	G	A	0.756	-0.016	0.003	7.55E-09
rs11078597	C	T	0.186	0.017	0.003	1.87E-08
rs35572189	A	G	0.361	-0.013	0.002	3.82E-08
rs784257	C	T	0.813	-0.017	0.003	5.10E-09

rs11882796	T	A	0.542	0.014	0.002	3.58E-09
rs10419198	T	C	0.250	-0.015	0.003	4.20E-08
rs10207567	C	G	0.812	0.020	0.003	3.51E-11
rs1047891	A	C	0.316	-0.018	0.002	8.39E-13
rs35687319	T	C	0.128	0.022	0.004	4.95E-10
rs4665972	C	T	0.607	-0.017	0.002	4.31E-13
rs2627770	T	C	0.732	-0.015	0.003	1.01E-08
rs12714144	T	A	0.127	-0.021	0.003	1.91E-09
rs2295762	G	A	0.360	0.014	0.002	2.11E-08
rs112607182	T	C	0.075	0.029	0.005	3.55E-10
rs6535594	A	G	0.495	0.013	0.002	1.17E-08
rs4109437	A	G	0.038	0.057	0.006	2.58E-21
rs146996008	NA	A	0.419	0.014	0.002	5.57E-09
rs13179493	C	T	0.293	-0.014	0.003	3.09E-08
rs114118094	T	A	0.075	-0.030	0.004	8.96E-12
rs40480	G	C	0.362	0.014	0.002	2.75E-09
rs10947788	T	C	0.289	0.015	0.003	1.41E-08
rs4410790	C	T	0.634	0.024	0.002	1.00E-22
rs3735533	C	T	0.926	0.025	0.004	2.36E-08
rs17158386	A	G	0.261	0.019	0.003	2.45E-12
rs28601761	G	C	0.420	-0.017	0.002	4.03E-13

Abbreviations: UNa/UK, urinary sodium to potassium ratio; UNa/UCr, urinary sodium to creatinine ratio; UK/UCr, urinary potassium to creatinine ratio; UAlb/UCr, urinary albumin to creatinine ratio; SNP, single-nucleotide polymorphism; EA, effect allele; OA, other allele; EAF, effect allele frequency; SE, standard error; P, p-value.

Table S2. Description of data used and statistical power for Mendelian randomization.

Outcomes	PMID	Sample size	UNa/UK				UNa/UCr				UK/UCr				UA1b/UCr			
			R2*	Effect obs	Power obs effect	Power fixed effect	R2*	Effect obs	Power obs effect	Power fixed effect	R2*	Effect obs	Power obs effect	Power fixed effect	R2*	Effect obs	Power obs effect	Power fixed effect
AF	30061737	1,030,836	0.0031	0.898	30	46	0.0031	0.905	26	46	0.0031	0.986	4	46	0.0063	1.155	78	76
CAD	26343387	184,305	0.0032	0.962	7	36	0.0032	0.936	11	36	0.0028	0.947	8	32	0.0060	1.042	9	59
Stroke	29531354	446,696	0.0031	0.929	12	32	0.0033	0.879	30	34	0.0030	0.892	22	31	0.0063	1.059	14	57
T2D	30054458	659,316	0.0018	0.968	5	30	0.0025	0.990	3	40	0.0018	1.036	6	30	0.0034	1.243	88	51
SBP		337,222	0.0034	0.124	99	100	0.0033	0.120	98	100	0.0031	-0.009	5	100	0.0064	0.157	100	100
DBP		337,222	0.0034	0.076	73	100	0.0033	0.078	74	100	0.0031	0.001	3	100	0.0064	0.136	100	100
SBP	28739976	150,134	0.0028	0.124	72	87	0.0029	0.120	70	88	0.0027	-0.009	4	86	0.0055	0.157	100	99
SBP	28739976	150,134	0.0028	0.076	35	87	0.0029	0.078	37	88	0.0027	0.001	3	86	0.0055	0.136	98	99
BMI	25673413	339,224	0.0022	0.049	26	98	0.0021	-0.054	31	98	0.0019	-0.154	98	98	0.0039	-0.170	100	100
WHR	25673412	210,082	0.0022	0.044	15	90	0.0021	-0.007	4	88	0.0019	-0.076	34	85	0.0039	-0.062	42	99

Characteristics of the consortia used in our study: number of samples, proportion of phenotypic variance explained by the instruments (tested in UK Biobank), statistical power considering the effect from observational analyses and for a fixed effect of 1.15 (binary traits) and 0.15 (continuous traits). Power estimates >75% in bold.

Abbreviations: effect obs, effect from observational analyses; AF, atrial fibrillation; CAD, coronary artery disease; T2D, type 2 diabetes; SBP and DBP, systolic and diastolic blood pressure, respectively; BMI, body mass index; WHR, waist-to-hip ratio.

* The variance explained varied somewhat across different outcomes due to lack of variants in some GWAS summary statistics.

Table S3. Observational associations of the urinary sodium to potassium ratio (UNa/UK), sodium and potassium adjusted for creatinine (UNa/UCr and UK/UCr), and urinary albumin to creatinine ratio (UAlb/UCr) with cardiovascular outcomes in UK Biobank using multivariable-adjusted Cox proportional hazards models, and multivariable-adjusted linear and logistic regression for main and sensitivity analyses.

UNa/UK	Main					Sensitivity				
Outcome	N	HR/OR/Beta	Lower	Upper	P	N	HR/OR/Beta	Lower	Upper	P
AF	9,196	0.898	0.879	0.917	<2e-16	5,499	0.895	0.869	0.921	5.03E-14
CAD	7,375	0.962	0.939	0.985	1.24E-03	4,659	0.977	0.947	1.009	1.53E-01
HF	2,775	0.960	0.924	0.997	3.41E-02	1,422	0.999	0.944	1.057	9.72E-01
HS	978	0.982	0.92	1.049	5.91E-01	714	0.967	0.893	1.047	4.07E-01
IS	1,888	0.929	0.886	0.973	1.94E-03	1,268	0.946	0.891	1.004	6.69E-02
LIPID	67,898	0.940	0.93	0.957	<2e-16	28,978	0.913	0.899	0.926	<2e-16
T2D	19,876	0.968	0.951	0.984	1.84E-04	7,758	0.986	0.959	1.014	3.16E-01
SBP		0.124	0.121	0.127	<2e-16		0.131	0.127	0.134	<2e-16
DBP		0.076	0.073	0.079	<2e-16		0.080	0.077	0.083	<2e-16
BF		0.026	0.024	0.029	<2e-16		0.022	0.019	0.024	<2e-16
BMI		0.049	0.047	0.052	<2e-16		0.049	0.046	0.052	<2e-16
WHR		0.044	0.042	0.047	<2e-16		0.045	0.042	0.048	<2e-16
UNa/UCr	Main					Sensitivity				
Outcome	N	HR/OR/Beta	Lower	Upper	P	N	HR/OR/Beta	Lower	Upper	P
AF	9,219	0.905	0.887	0.924	<2e-16	5,516	0.895	0.87	0.922	8.48E-14
CAD	7,387	0.936	0.914	0.958	1.93E-08	4,665	0.942	0.913	0.973	2.37E-04
HF	2,776	0.937	0.904	0.972	4.76E-04	1,423	0.967	0.914	1.024	2.47E-01
HS	978	0.955	0.897	1.018	1.60E-01	714	0.965	0.892	1.045	3.82E-01
IS	1,888	0.879	0.84	0.92	3.04E-08	1,268	0.881	0.83	0.935	3.26E-05

LIPID	67,898	0.958	0.948	0.967	<2e-16	28,978	0.942	0.928	0.956	2.46E-15
T2D	19,876	0.990	0.974	1.006	2.25E-01	7,758	1.024	0.995	1.053	1.02E-01
SBP		0.120	0.118	0.123	<2e-16		0.128	0.125	0.131	<2e-16
DBP		0.078	0.076	0.081	<2e-16		0.084	0.08	0.087	<2e-16
BF		-0.040	-0.042	-0.037	<2e-16		-0.048	-0.05	-0.045	<2e-16
BMI		-0.054	-0.057	-0.051	<2e-16		-0.061	-0.064	-0.058	<2e-16
WHR		-0.007	-0.009	-0.005	1.58E-09		-0.009	-0.011	-0.006	2.08E-11
UK/UCr	Main					Sensitivity				
Outcome	N	HR/OR/Beta	Lower	Upper	P	N	HR/OR/Beta	Lower	Upper	P
AF	9,229	0.986	0.962	1.009	2.35E-01	5,513	0.997	0.967	1.028	8.50E-01
CAD	7,385	0.947	0.922	0.972	5.46E-05	4,666	0.945	0.914	0.977	9.22E-04
HF	2,789	0.916	0.877	0.956	6.07E-05	1,425	0.934	0.879	0.992	2.52E-02
HS	979	0.942	0.879	1.011	9.83E-02	715	0.984	0.907	1.067	6.95E-01
IS	1,894	0.892	0.847	0.939	1.57E-05	1,270	0.890	0.836	0.948	2.89E-04
LIPID	67,898	1.030	1.018	1.043	6.52E-07	28,978	1.050	1.034	1.067	8.47E-10
T2D	19,876	1.036	1.016	1.057	4.82E-04	7,758	1.051	1.02	1.083	1.10E-03
SBP		-0.009	-0.012	-0.006	2.80E-09		-0.015	-0.018	-0.012	<2e-16
DBP		0.001	-0.002	0.004	5.45E-01		-0.003	-0.007	0	4.56E-02
BF		-0.099	-0.101	-0.096	<2e-16		-0.095	-0.098	-0.093	<2e-16
BMI		-0.154	-0.157	-0.151	<2e-16		-0.150	-0.153	-0.147	<2e-16
WHR		-0.076	-0.079	-0.074	<2e-16		-0.074	-0.077	-0.071	<2e-16
UAlb/UCr	Main					Sensitivity				
Outcome	N	HR/OR/Beta	Lower	Upper	P	N	HR/OR/Beta	Lower	Upper	P
AF	9,251	1.155	1.13	1.18	<2e-16	5,529	1.113	1.081	1.146	4.40E-13
CAD	7,397	1.042	1.017	1.067	6.87E-04	4,672	1.015	0.984	1.047	3.56E-01
HF	2,791	1.226	1.181	1.272	<2e-16	1,425	1.210	1.145	1.28	1.61E-11

HS	979	1.153	1.077	1.233	3.90E-05	715	1.132	1.043	1.228	2.95E-03
IS	1,895	1.059	1.01	1.111	1.82E-02	1,271	1.031	0.971	1.095	3.22E-01
LIPID	67,898	1.056	1.045	1.068	<2e-16	28,978	1.060	1.044	1.076	2.61E-14
T2D	19,876	1.243	1.222	1.265	<2e-16	7,758	1.226	1.193	1.26	<2e-16
SBP		0.157	0.154	0.16	<2e-16		0.161	0.157	0.164	<2e-16
DBP		0.136	0.133	0.139	<2e-16		0.145	0.141	0.148	<2e-16
BF		-0.106	-0.108	-0.103	<2e-16		-0.114	-0.117	-0.112	<2e-16
BMI		-0.170	-0.173	-0.167	<2e-16		-0.185	-0.189	-0.182	<2e-16
WHR		-0.062	-0.064	-0.059	<2e-16		-0.071	-0.074	-0.068	<2e-16

Main analyses were performed excluding participants with kidney disease and/or cardiovascular disease at baseline. Sensitivity analyses was performed excluding participants with kidney disease and/or cardiovascular disease at baseline and/or participants using medications affecting renal excretion. Estimates are from multivariable-adjusted linear (continuous risk factors), Cox proportional hazards models (cardiovascular outcomes) or logistic (lipid treatment and T2D) regression. The estimates represent SD change in outcome variable per SD change in the urinary biomarker tested. Binary outcomes: atrial fibrillation (AF), coronary artery disease (CAD), heart failure (HF), hemorrhagic stroke (HS), ischemic stroke (IS), lipid medications (LIP) and type 2 diabetes (T2D). Continuous outcomes: systolic and diastolic blood pressure (SBP, and DBP; respectively), body fat percentage (BF), body mass index (BMI), waist-to-hip ratio (WHR). Models are adjusted for sex, age, center in UK, ethnicity, smoking, blood pressure (SBP and DBP), medication, lipids, T2D, obesity (BMI, WHR, body fat percentage) alcohol, Townsend index. P-values significant after Bonferroni correction ($p \leq 4.17E-03$) are bold. N, incident events in the UK Biobank. Abbreviations: HR, hazard ratio; OR, odds ratio; CI, confidence interval; P, p-value.

Table S4. Observational associations of the urinary sodium to potassium ratio (UNa/UK) with cardiovascular outcomes in UK Biobank using multivariable-adjusted Cox proportional hazards models, and multivariable-adjusted linear and logistic regression for main and sensitivity analyses. Models are adjusted for **a.** sex, age, center in UK, ethnicity, smoking, medication, lipids, T2D, obesity (BMI, WHR, body fat percentage) alcohol, and Townsend index; **b.** sex, age, center in UK, and ethnicity.

a.

UNa/UK	Main					Sensitivity				
Outcome	N	HR/OR/Beta	Lower	Upper	P	N	HR/OR/Beta	Lower	Upper	P
AF	9,205	0.891	0.873	0.91	<2e-16	5501	0.892	0.867	0.918	6.40E-15
CAD	7,378	0.986	0.963	1.01	2.53E-01	4660	1.013	0.982	1.046	4.03E-01
HF	2,777	0.959	0.924	0.996	3.01E-02	1424	1.024	0.968	1.083	4.06E-01
HS	979	0.997	0.935	1.064	9.31E-01	715	0.992	0.917	1.073	8.41E-01
IS	1,892	0.958	0.915	1.003	6.98E-02	1271	0.98	0.924	1.04	5.15E-01
LIPID		0.933	0.923	0.944	<2e-16		0.910	0.895	0.925	<2e-16
T2D		0.960	0.943	0.977	2.67E-06		0.985	0.957	1.012	2.68E-01
BF		0.043	0.041	0.045	<2e-16		0.043	0.040	0.045	<2e-16
BMI		0.075	0.072	0.078	<2e-16		0.081	0.078	0.084	<2e-16
WHR		0.056	0.054	0.059	<2e-16		0.060	0.058	0.063	<2e-16

b.

UNa/UK	Main					Sensitivity				
Outcome	N	HR/OR/B	Lower	Upper	P	N of events	HR/OR/B	Lower	Upper	P
AF	10356	0.936	0.918	0.955	1.02E-10	6080	0.916	0.892	0.941	2.35E-10
CAD	8130	1.045	1.022	1.069	1.39E-04	5076	1.063	1.032	1.095	5.55E-05
HF	3328	1.049	1.012	1.086	8.14E-03	1639	1.077	1.023	1.135	4.99E-03
HS	1071	0.998	0.939	1.062	9.57E-01	766	1.004	0.931	1.082	9.18E-01
IS	2127	1.012	0.969	1.057	5.92E-01	1397	1.036	0.979	1.095	2.23E-01
LIPID		1.044	1.035	1.052	<2e-16		0.956	0.943	0.969	3.94E-11
T2D		1.101	1.085	1.116	<2e-16		1.058	1.033	1.082	8.03E-06
SBP		0.137	0.134	0.139	<2e-16		0.138	0.135	0.141	<2e-16
DBP		0.095	0.092	0.097	<2e-16		0.094	0.091	0.097	<2e-16
BF		0.051	0.048	0.053	<2e-16		0.040	0.038	0.043	<2e-16
BMI		0.089	0.086	0.092	<2e-16		0.080	0.077	0.084	<2e-16
WHR		0.066	0.064	0.069	<2e-16		0.061	0.059	0.064	<2e-16

Main analyses were performed excluding participants with kidney disease and/or cardiovascular disease at baseline. Sensitivity analyses was performed excluding participants with kidney disease and/or cardiovascular disease at baseline and/or participants using medications affecting renal excretion. Estimates are from multivariable-adjusted linear (continuous risk factors), Cox proportional hazards models (cardiovascular outcomes) or logistic (lipid treatment and T2D) regression. The estimates represent SD change in outcome variable per SD change in the urinary biomarker tested. Binary outcomes: atrial fibrillation (AF), coronary artery disease (CAD), heart failure (HF), hemorrhagic stroke (HS), ischemic stroke (IS), lipid medications (LIP) and type 2 diabetes (T2D). Continuous outcomes: body fat percentage (BF), body mass index (BMI), waist-to-hip ratio (WHR). P-values significant after Bonferroni correction ($p \leq 4.17E-03$) are bold. N, incident events in the UK Biobank. Abbreviations: HR, hazard ratio; OR, odds ratio; CI, confidence interval; P, p-value.

Table S5. Observational associations of urinary sodium, potassium and albumin with cardiovascular risk factors in UK Biobank using multivariable-adjusted logistic regression for main analyses.

Sodium	Beta	lower	upper	P
BF	0.0022	0.0022	0.0023	<2e-16
BMI	0.0038	0.0037	0.0039	<2e-16
WHR	0.0022	0.0021	0.0022	<2e-16
Potassium				
BF	0.0021	0.0020	0.0021	<2e-16
BMI	0.0034	0.0033	0.0034	<2e-16
WHR	0.0015	0.0014	0.0015	<2e-16
Albumin				
BF	0.0001	0.0001	0.0002	1.46E-09
BMI	0.0003	0.0002	0.0003	<2e-16
WHR	0.0003	0.0002	0.0003	<2e-16

Continuous outcomes: body fat percentage (BF), body mass index (BMI), waist-to-hip ratio (WHR). Models are adjusted for sex, age, center in UK, ethnicity, smoking, blood pressure, medication, lipids, type two diabetes, obesity (BMI, WHR, body fat percentage) alcohol, Townsend index. Significant p-values in bold. Abbreviations: P, p-value.

Table S6. Sex-stratified associations of the urinary sodium to potassium ratio (UNa/UK), sodium and potassium adjusted for creatinine (UNa/UCr and UK/UCr), and urinary albumin to creatinine ratio (UAlb/UCr) with cardiovascular outcomes in UK Biobank using multivariable-adjusted Cox proportional hazards models, and multivariable-adjusted linear and logistic regression for main analysis.

UNa/UK											
Females						Males					
Outcome	N	HR/OR/Beta	Lower	Higher	P	N	HR/OR/Beta	Lower	Higher	P	P interaction
AF	3,329	0.917	0.886	0.949	6.22E-07	5,867	0.887	0.863	0.911	<2e-16	4.25E-02
CAD	1,925	0.992	0.948	1.037	7.15E-01	5,450	0.949	0.923	0.976	2.78E-04	7.59E-03
HF	971	0.979	0.92	1.042	5.13E-01	1,804	0.946	0.902	0.993	2.30E-02	1.90E-01
HS	487	1.02	0.931	1.117	6.75E-01	491	0.94	0.857	1.033	1.98E-01	9.09E-02
IS	720	0.963	0.894	1.037	3.18E-01	1,168	0.904	0.851	0.96	1.00E-03	1.70E-01
LIPIDS	28,711	0.945	0.931	0.959	3.25E-13	39,186	0.937	0.923	0.950	<2e-16	1.24E-06
T2D	8,375	0.999	0.973	1.025	9.37E-01	11,501	0.939	0.917	0.961	8.73E-08	1.01E-03
SBP		0.131	0.127	0.135	<2e-16		0.116	0.112	0.120	<2e-16	9.14E-01
DBP		0.072	0.068	0.076	<2e-16		0.081	0.077	0.086	<2e-16	7.79E-05
BF		0.017	0.014	0.020	<2e-16		0.038	0.035	0.041	<2e-16	2.00E-03
BMI		0.043	0.039	0.047	<2e-16		0.058	0.054	0.062	<2e-16	1.11E-01
WHR		0.035	0.032	0.038	<2e-16		0.056	0.053	0.059	<2e-16	2.01E-04
UNa/UCr											
Females						Males					
Outcome	N	HR/OR/Beta	Lower	Higher	P	N	HR/OR/Beta	Lower	Higher	P	P interaction
AF	3,341	0.914	0.886	0.943	2.30E-08	5,878	0.898	0.875	0.923	5.88E-15	1.83E-01
CAD	1,929	0.941	0.903	0.981	5.00E-03	5,458	0.933	0.907	0.96	1.30E-06	2.59E-01
HF	972	0.954	0.901	1.01	1.06E-01	1,804	0.925	0.882	0.969	1.00E-03	2.04E-01

HS	487	1.014	0.93	1.106	7.45E-01	491	0.888	0.808	0.975	1.30E-02	1.59E-02
IS	719	0.895	0.835	0.959	2.00E-03	1,169	0.865	0.814	0.919	2.68E-06	4.87E-01
LIPIDS	28,711	0.958	0.945	0.972	3.39E-09	39,186	0.960	0.946	0.974	3.97E-08	8.61E-01
T2D	8,375	0.986	0.962	1.010	2.56E-01	11,501	0.991	0.969	1.014	4.59E-01	3.17E-01
SBP		0.120	0.117	0.124	<2e-16		0.119	0.115	0.123	<2e-16	6.89E-01
DBP		0.073	0.069	0.076	<2e-16		0.087	0.082	0.091	<2e-16	6.08E-05
BF		-0.050	-0.053	-0.047	<2e-16		-0.023	-0.026	-0.020	<2e-16	<2e-16
BMI		-0.066	-0.070	-0.063	<2e-16		-0.034	-0.037	-0.030	<2e-16	<2e-16
WHR		-0.012	-0.015	-0.009	5.21E-16		0.002	-0.001	0.005	2.52E-01	1.66E-05
UK/UCr											
Females						Males					
Outcome	N	HR/OR/Beta	Lower	Higher	P	N	HR/OR/Beta	Lower	Higher	P	P interaction
AF	3,349	0.969	0.934	1.006	9.70E-02	5,880	0.998	0.967	1.029	8.79E-01	2.20E-01
CAD	1,932	0.912	0.869	0.958	2.23E-04	5,453	0.964	0.934	0.995	2.50E-02	2.09E-02
HF	978	0.913	0.852	0.978	9.00E-03	1,811	0.919	0.869	0.971	3.00E-03	8.76E-01
HS	488	0.983	0.894	1.081	7.18E-01	491	0.901	0.811	1	5.00E-02	3.30E-01
IS	725	0.867	0.801	0.939	4.14E-04	1,169	0.911	0.851	0.977	8.00E-03	2.76E-01
LIPIDS	28,711	1.018	1.001	1.035	3.71E-02	39,186	1.046	1.029	1.064	8.38E-08	3.19E-11
T2D	8,375	0.971	0.943	1.000	5.39E-02	11,501	1.103	1.073	1.134	2.06E-12	3.89E-08
SBP		-0.014	-0.018	-0.010	1.78E-12		-0.006	-0.010	-0.001	9.71E-03	3.28E-05
DBP		0.001	-0.003	0.005	6.32E-01		-0.0005	-0.005	0.004	8.42E-01	1.57E-02
BF		-0.099	-0.102	-0.096	<2e-16		-0.095	-0.099	-0.092	<2e-16	6.76E-16
BMI		-0.160	-0.164	-0.156	<2e-16		-0.141	-0.145	-0.137	<2e-16	<2e-16
WHR		-0.068	-0.071	-0.065	<2e-16		-0.086	-0.090	-0.083	<2e-16	1.50E-02
UA1b/UCr											
Females						Males					

Outcome	N	HR/OR/Beta	Lower	Higher	P	N	HR/OR/Beta	Lower	Higher	P	P interaction
AF	3,362	1.125	1.08	1.172	1.28E-08	5,889	1.176	1.147	1.206	<2e-16	4.39E-01
CAD	1,938	1.066	1.011	1.123	1.80E-02	5,459	1.049	1.021	1.077	4.84E-04	1.90E-02
HF	980	1.243	1.156	1.336	4.40E-09	1,811	1.228	1.175	1.283	<2e-16	2.23E-01
HS	488	1.083	0.974	1.204	1.42E-01	491	1.201	1.1	1.312	4.61E-05	3.44E-01
IS	725	1.027	0.942	1.12	5.44E-01	1,170	1.077	1.017	1.141	1.10E-02	5.05E-01
LIPIDS	28,711	1.056	1.037	1.075	4.14E-09	39,186	1.065	1.050	1.080	<2e-16	7.93E-15
T2D	8,375	1.116	1.083	1.150	<2e-16	11,501	1.316	1.288	1.345	<2e-16	<2e-16
SBP		0.171	0.167	0.175	<2e-16		0.150	0.147	0.154	<2e-16	<2e-16
DBP		0.139	0.134	0.143	<2e-16		0.137	0.133	0.142	<2e-16	6.95E-04
BF		-0.152	-0.156	-0.149	<2e-16		-0.059	-0.062	-0.056	<2e-16	<2e-16
BMI		-0.232	-0.237	-0.228	<2e-16		-0.099	-0.103	-0.095	<2e-16	<2e-16
WHR		-0.087	-0.091	-0.084	<2e-16		-0.033	-0.036	-0.030	<2e-16	<2e-16

Sex-stratified associations in the main cohort were performed excluding participants with kidney disease and/or cardiovascular disease at baseline. Estimates are from multivariable-adjusted linear (continuous risk factors), Cox proportional hazards models (cardiovascular outcomes) or logistic (lipid treatment and T2D) regression. The estimates represent SD change in outcome variable per SD change in urinary biomarkers. Binary outcomes: atrial fibrillation (AF), coronary artery disease (CAD), heart failure (HF), hemorrhagic stroke (HS), ischemic stroke (IS), lipid medications (LIP) and type 2 diabetes (T2D). Continuous outcomes: systolic and diastolic blood pressure (SBP, and DBP; respectively), body fat percentage (BF), body mass index (BMI), waist-to-hip ratio (WHR). Associations are adjusted for sex, age, center in UK, ethnicity, smoking, blood pressure [SBP and DBP], medication, lipids, T2D, obesity [BMI, WHR, body fat percentage] alcohol, Townsend index. P-values significant after Bonferroni correction ($p \leq 4.17E-03$) are bold. N, incident events in the UK Biobank. Abbreviations: HR, hazard ratio; OR, odds ratio; CI, confidence interval; P, p-value.

Table S7. Mendelian randomization analyses of associations of the urinary sodium to potassium ratio (UNa/UK), sodium and potassium adjusted for creatinine (UNa/UCr and UK/UCr) and urinary albumin to creatinine ratio (UAlb/UCr) with different cardiovascular risk factors and outcomes.

UNa/UK								
Method	N SNP	Beta	SE	P	Global test P	Outlier corrected Beta	SD	P
SBP UKB					<0.001	n outliers = 8		
IVW	26	2.118	1.876	2.59E-01		2.630	1.093	2.59E-02
MR Egger	26	-9.190	8.238	2.76E-01				
WM	26	0.941	1.267	4.58E-01				
SBP ICBP					<0.001	n outliers = 3		
IVW	20	1.981	1.667	2.35E-01		0.496	1.214	6.87E-01
MR Egger	20	-4.085	6.521	5.39E-01				
WM	20	-0.044	1.541	9.77E-01				
DBP UKB					<0.001	n outliers = 7		
IVW	26	1.243	0.844	1.41E-01		2.053	0.610	2.81E-03
MR Egger	26	1.121	3.856	7.74E-01				
WM	26	0.828	0.626	1.86E-01				
DBP ICBP					0.007	n outliers = 1		
IVW	20	1.194	0.832	1.51E-01		0.591	0.713	4.16E-01
MR Egger	20	0.831	3.356	8.07E-01				
WM	20	1.424	0.921	1.22E-01				
BMI					<0.001	n outliers = 6		
IVW	17	0.159	0.182	3.82E-01		0.351	0.119	1.31E-02
MR Egger	17	-0.033	1.056	9.76E-01				
WM	17	0.246	0.136	6.95E-02				

WHR					0.039	n outliers = 0		
IVW	17	0.220	0.086	1.05E-02				
MR Egger	17	0.736	0.480	1.46E-01				
WM	17	0.240	0.094	1.10E-02				
UNa/UCr								
Method	N SNP	Beta	SE	P	Global test P	Outlier corrected Beta	SD	P
SBP UKB					<0.001	n outliers = 7		
IVW	24	3.233	1.768	6.75E-02				
MR Egger	24	2.375	6.432	7.16E-01				
WM	24	3.265	1.159	4.85E-03				
SBP ICBP					<0.001	n outliers = 3		
IVW	20	2.660	1.551	8.62E-02				
MR Egger	20	3.252	5.509	5.62E-01				
WM	20	4.862	1.395	4.90E-04				
DBP UKB					<0.001	n outliers = 4		
IVW	24	1.663	0.716	2.01E-02				
MR Egger	24	3.794	2.561	1.53E-01				
WM	24	0.818	0.644	2.05E-01				
DBP ICBP					0.003	n outliers = 1		
IVW	20	0.956	0.769	2.14E-01				
MR Egger	20	3.472	2.670	2.10E-01				
WM	20	2.232	0.837	7.68E-03				
BMI					<0.001	n outliers = 1		
IVW	14	-0.289	0.098	3.20E-03				
MR Egger	14	-0.286	0.432	5.20E-01				
WM	14	-0.389	0.081	1.60E-06				

WHR					0.542	n outliers = 0		
IVW	14	0.235	0.061	1.08E-04				
MR Egger	14	0.250	0.257	3.50E-01				
WM	14	0.217	0.086	1.14E-02				
UK/UCr								
Method	N SNP	Beta	SE	P	Global test P	Outlier corrected Beta	SD	P
SBP UKB					<0.001	n outliers = 2		
IVW	20	1.998	1.221	1.02E-01				
MR Egger	20	5.694	4.381	2.10E-01				
WM	20	1.790	1.163	1.24E-01				
SBP ICBP					<0.001	n outliers = 2		
IVW	17	2.195	1.998	2.72E-01				
MR Egger	17	-3.643	7.707	6.43E-01				
WM	17	5.035	1.613	1.80E-03				
DBP UKB					<0.001	n outliers = 1		
IVW	20	0.456	0.604	4.51E-01				
MR Egger	20	-0.171	2.209	9.39E-01				
WM	20	0.532	0.618	3.89E-01				
DBP ICBP					<0.001	n outliers = 3		
IVW	17	0.700	1.357	6.06E-01				
MR Egger	17	-5.809	5.054	2.68E-01				
WM	17	2.127	0.985	3.08E-02				
BMI					<0.001	n outliers = 3		
IVW	11	-0.300	0.187	1.09E-01				
MR Egger	11	-0.906	0.726	2.44E-01				
WM	11	-0.115	0.118	3.30E-01				

WHR						n outliers = 1		
IVW	11	0.072	0.100	4.68E-01	0.028	0.027	0.080	7.45E-01
MR Egger	11	-0.054	0.410	8.98E-01				
WM	11	0.063	0.099	5.29E-01				
UA1b/UCr								
Method	N SNP	Beta	SE	P	Global test P	Outlier corrected Beta	SD	P
SBP UKB					<0.001	n outliers = 5		
IVW	42	3.355	0.927	2.95E-04		2.753	0.671	2.06E-04
MR Egger	42	1.126	2.289	6.26E-01				
WM	42	2.174	0.757	4.07E-03				
SBP ICBP					<0.001	n outliers = 4		
IVW	36	2.186	1.311	9.53E-02		2.296	1.026	3.18E-02
MR Egger	36	-0.407	3.575	9.10E-01				
WM	36	1.372	1.151	2.34E-01				
DBP UKB					<0.001	n outliers = 7		
IVW	42	0.974	0.553	7.83E-02		0.848	0.393	3.77E-02
MR Egger	42	0.984	1.386	4.82E-01				
WM	42	0.967	0.455	3.34E-02				
DBP ICBP					<0.001	n outliers = 6		
IVW	36	0.602	0.854	4.80E-01		0.809	0.645	2.18E-01
MR Egger	36	-1.275	2.329	5.88E-01				
WM	36	0.260	0.695	7.08E-01				
BMI					<0.001	n outliers = 2		
IVW	29	-0.134	0.071	5.90E-02		-0.056	0.065	4.02E-01
MR Egger	29	0.103	0.346	7.68E-01				
WM	29	-0.025	0.075	7.44E-01				

WHR					0.178	n outliers = 0		
IVW	29	0.187	0.055	7.36E-04				
MR Egger	29	0.359	0.266	1.90E-01				
WM	29	0.215	0.076	4.83E-03				
T2D					0.003	n outliers = 1		
IVW	26	0.411	0.142	3.76E-03		0.282	0.117	2.30E-02
MR Egger	26	0.432	0.730	5.60E-01				
WM	26	0.208	0.160	1.94E-01				
AF					<0.001	n outliers = 4		
IVW	41	0.095	0.120	4.28E-01		0.105	0.086	2.32E-01
MR Egger	41	0.225	0.317	4.83E-01				
WM	41	0.058	0.113	6.09E-01				

Three separate methods were used to estimate causal effects of urinary biomarkers with different risk factors for cardiovascular disease: the standard inverse-variance weighted (IVW) regression; and two robust regression methods, the weighted median-based method (WM), and Egger regression. We applied the global test to correct for pleiotropy. Significant p-values ($p \leq 0.05$) in bold.

Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; BMI, body mass index; WHR, waist-to-hip ratio; T2D, type two diabetes; AF, atrial fibrillation; N, number of SNPs; SE, standard error; SD, standard deviation; P, P-value.

Table S8. Mendelian randomization analyses of associations of systolic and diastolic blood pressure in the UK Biobank (SBP and DBP, respectively) and type two diabetes (T2D) with urinary sodium to potassium ratio (UNa/UK) and urinary albumin to creatinine ratio (UAlb/UCr).

SBP								
Method	N SNP	Beta	SE	P	Global test P	Outlier corrected Beta	SE	P
UNa/UK					<0.001	n outliers = 11		
IVW	290	0.0015	0.0007	3.42E-02		0.0018	0.0006	2.68E-03
MR Egger	290	-0.0089	0.0023	1.44E-04				
WM	290	0.0008	0.0008	2.75E-01				
UAlb/UCr					<0.001	n outliers = 12		
IVW	290	0.0067	0.0007	2.00E-21		0.0067	0.0006	9.48E-24
MR Egger	290	0.0063	0.0023	7.14E-03				
WM	290	0.0069	0.0008	1.26E-19				
DBP								
Method	N SNP	Beta	SE	P	Global test P	Outlier corrected Beta	SE	P
UNa/UK					<0.001	n outliers = 12		
IVW	253	-0.0013	0.0013	3.15E-01		-0.0006	0.0011	5.77E-01
MR Egger	253	-0.0140	0.0043	1.41E-03				
WM	253	0.0003	0.0014	8.55E-01				
UAlb/UCr					<0.001	n outliers = 12		
IVW	253	0.0084	0.0014	8.08E-10		0.0083	0.0012	9.23E-12
MR Egger	253	0.0083	0.0048	8.48E-02				
WM	253	0.0090	0.0014	3.37E-11				
T2D								
Method	N SNP	Beta	SE	P	Global test P	Outlier corrected Beta	SE	P

UA1b/UCr					<0.001	n outliers = 5		
IVW	156	0.0193	0.0051	1.42E-04		0.0210	0.0042	1.89E-06
MR Egger	156	0.0239	0.0126	5.98E-02				
WM	156	0.0253	0.0064	7.04E-05				

Three separate methods were used to estimate causal effects of urinary biomarkers with different risk factors for cardiovascular disease: the standard inverse-variance weighted (IVW) regression; and two robust regression methods, the weighted median-based method (WM), and Egger regression. We applied the global test to correct for pleiotropy. Significant p-values ($p \leq 0.05$) in bold.

Abbreviations: N, number of SNPs; SE, standard error; SD, standard deviation; P, P-value.

Table S9. Association of urinary albumin to creatinine ratio (UAlb/UCr), systolic blood pressure (SBP) and waist-to-hip ratio (WHR) with type 2 diabetes (T2D) and atrial fibrillation (AF) from mediation MR analyses to address whether UAlb/UCr had a causal effect on T2D and AF, independently of SBP and WHR.

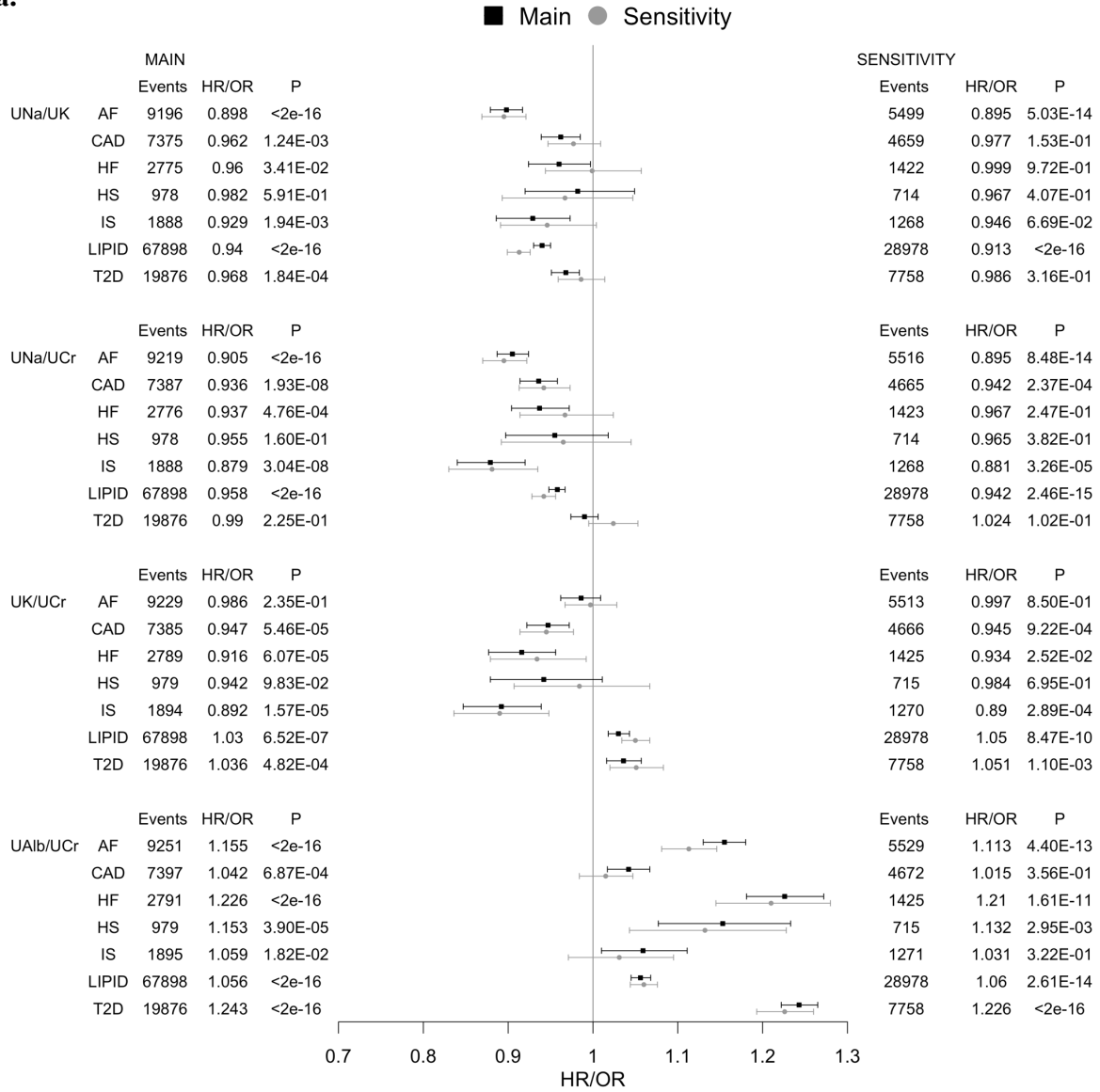
T2D	Beta	SE	P
UAlb/UCr	0.4809	0.1987	1.55E-02
SBP	0.0195	0.0044	9.06E-06
WHR	0.1339	0.1018	1.88E-01
AF			
UAlb/UCr	0.0951	0.1521	5.32E-01
SBP	0.0124	0.0035	3.19E-04
WHR	-0.1970	0.0825	1.70E-02

Estimates are from multivariable MR regression-based model. Significant p-values ($p \leq 0.05$) in bold. Abbreviations: SE, standard error; P, P-value.

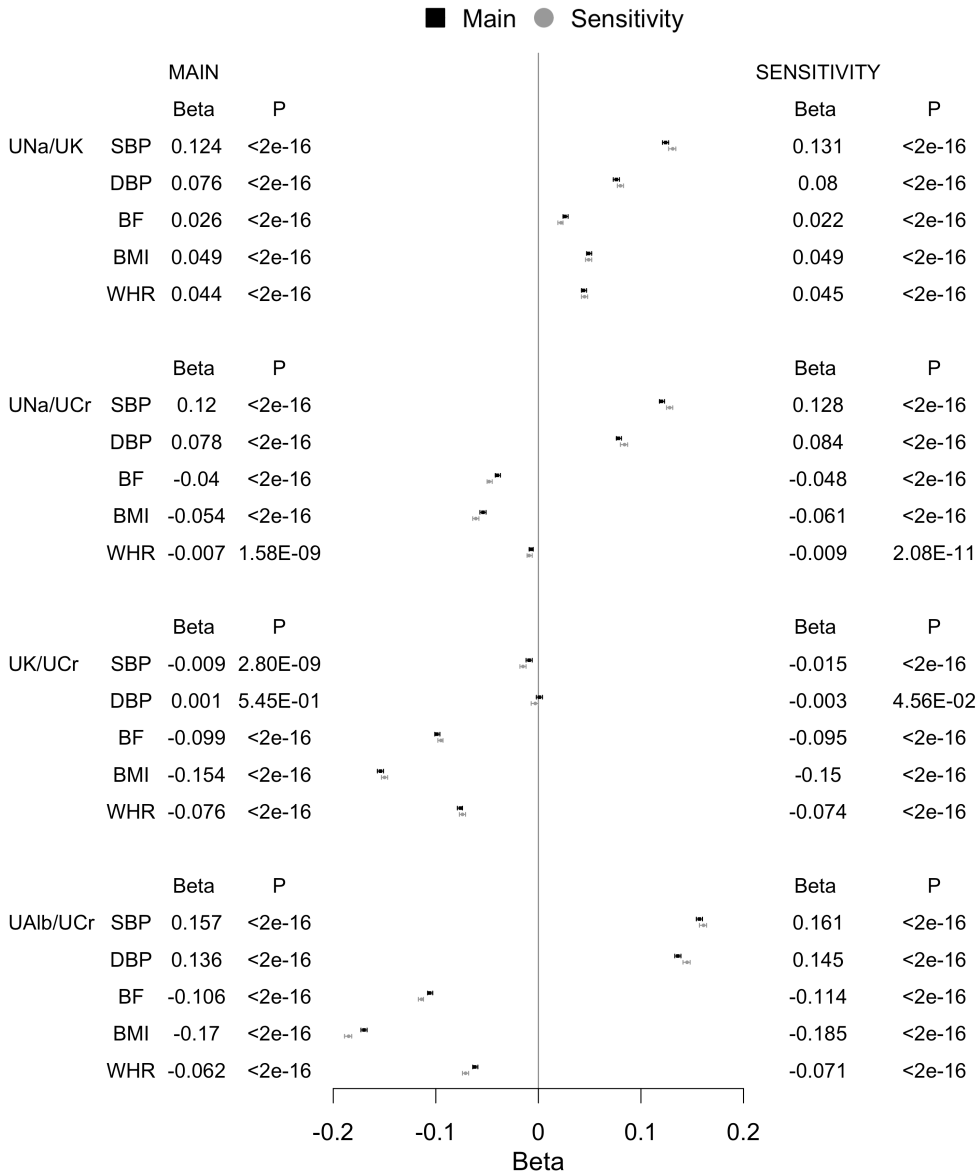
Supplemental Figures

Figure S1.

a.



b.



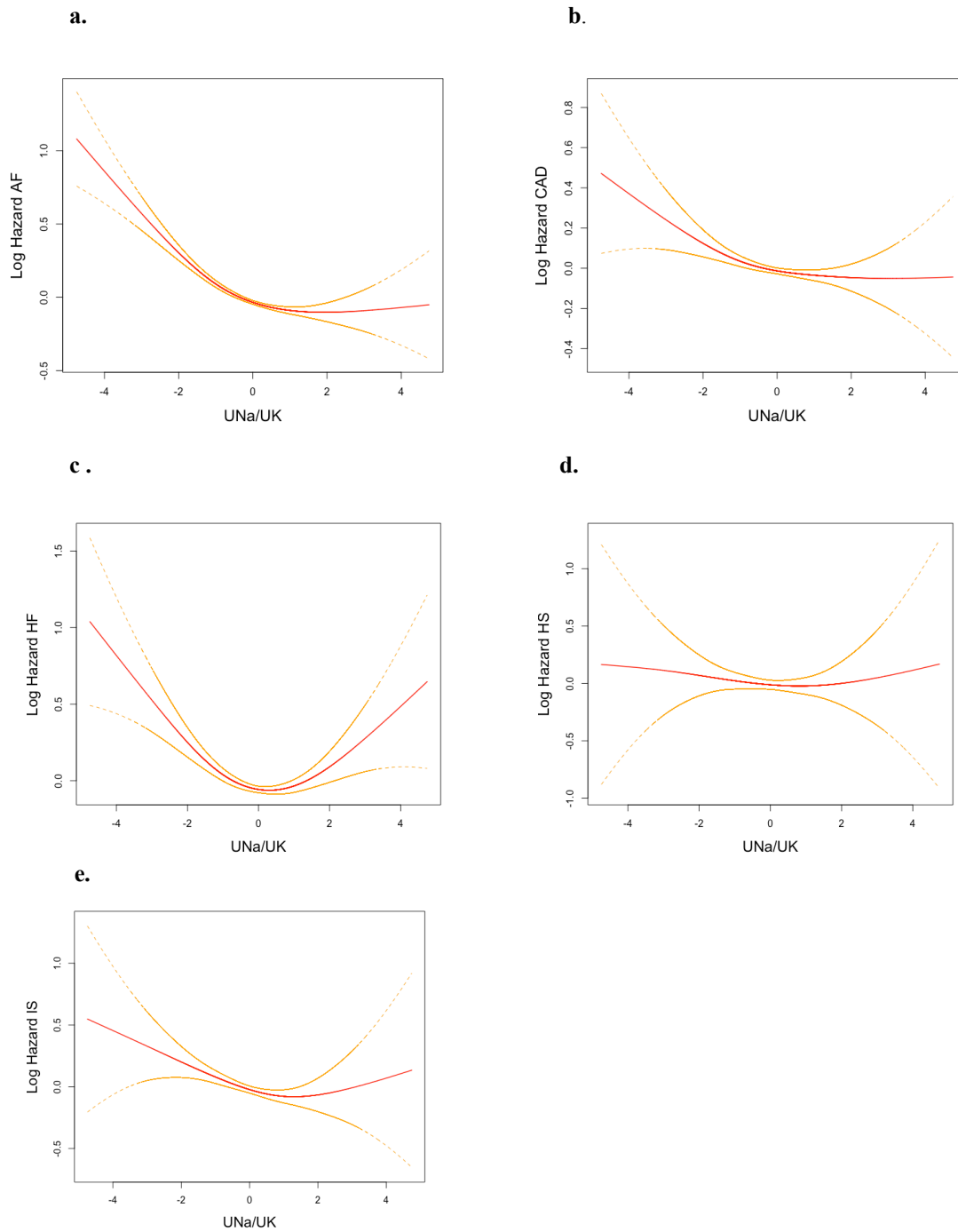
Association results (BETA/HR/OR) of urinary sodium to potassium ratio (Na/UK), urinary sodium to creatinine ratio (UNa/UCr), urinary potassium to creatinine ratio (UK/UCr) and urinary albumin to creatinine ratio (UAlb/UCr) with cardiovascular outcomes in UK Biobank using multivariable-adjusted linear and logistic regression, and multivariable-adjusted Cox proportional hazards models. a. Binary outcomes: atrial fibrillation (AF); coronary artery disease (CAD); heart failure (HF); hemorrhagic and ischemic stroke (HS and IS, respectively); lipid medications (LIP) and type 2 diabetes (T2D). **b.** Continuous outcomes:

systolic and diastolic blood pressure (SBP and DBP, respectively), body fat percentage (BF); body mass index (BMI), waist-to-hip ratio (WHR).

Main analyses were performed excluding participants with kidney disease and/or cardiovascular disease at baseline. Sensitivity analyses was performed excluding participants with kidney disease and/or cardiovascular disease at baseline and/or participants using medications affecting renal excretion. The betas from linear regression represent SD change in outcome variable per SD change in urinary biomarkers. Model adjustment: sex, age, region of the UK Biobank assessment center, ethnicity, smoking, alcohol, physical activity, Townsend index, blood pressure (DBP and SBP), obesity (BMI, body fat percentage, WHR), lipid medications, T2D, and medications affecting renal excretion.

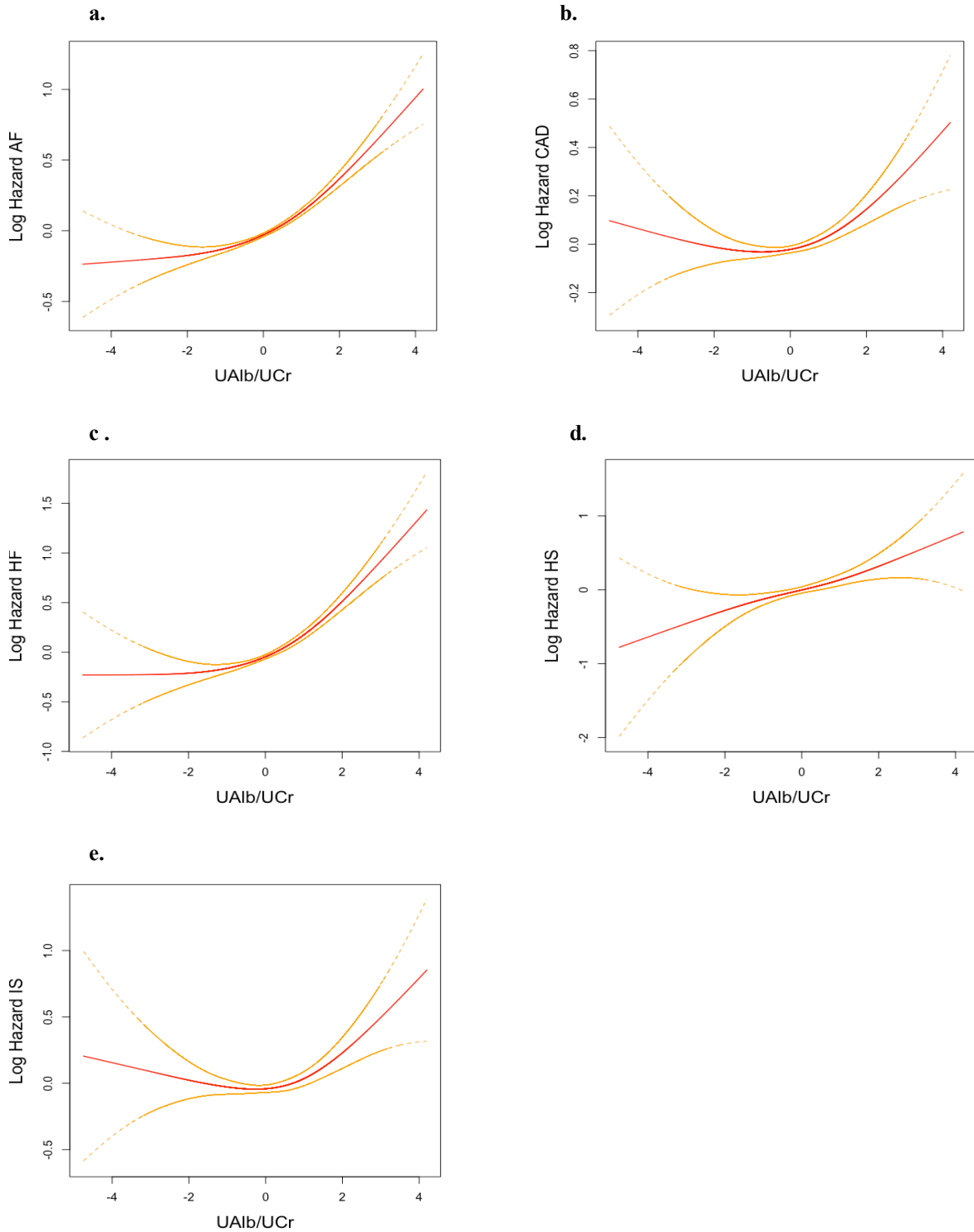
Abbreviations: HR, hazard ratio; OR, odds ratio.

Figure S2.



Relations of the urinary sodium to potassium ratio (UNa/UK) with a. atrial fibrillation (AF); b. coronary artery disease (CAD); c. heart failure (HF); d. hemorrhagic stroke (HS); e. ischemic stroke (IS). Lines are based on a regression spline of Cox proportional hazards.

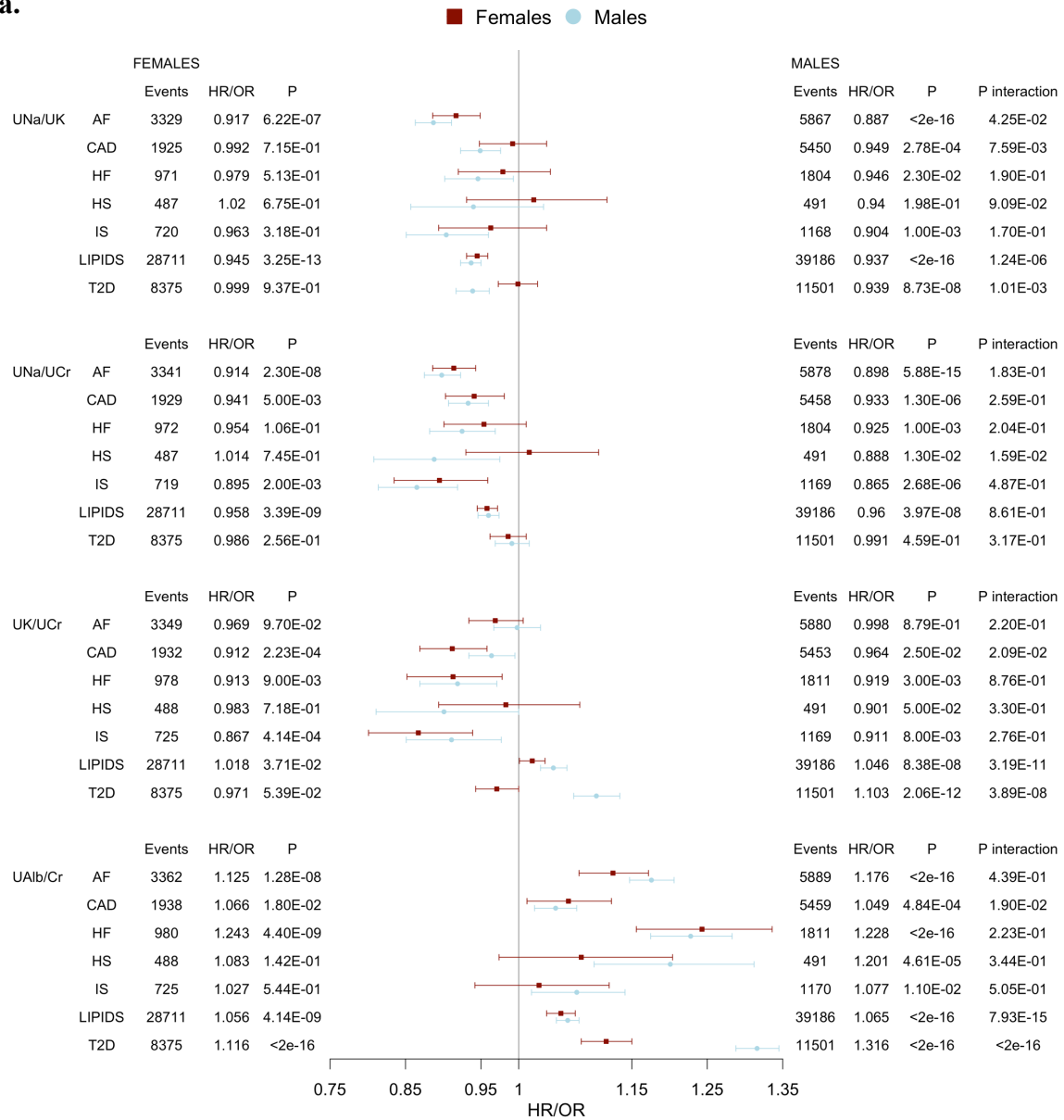
Figure S3.



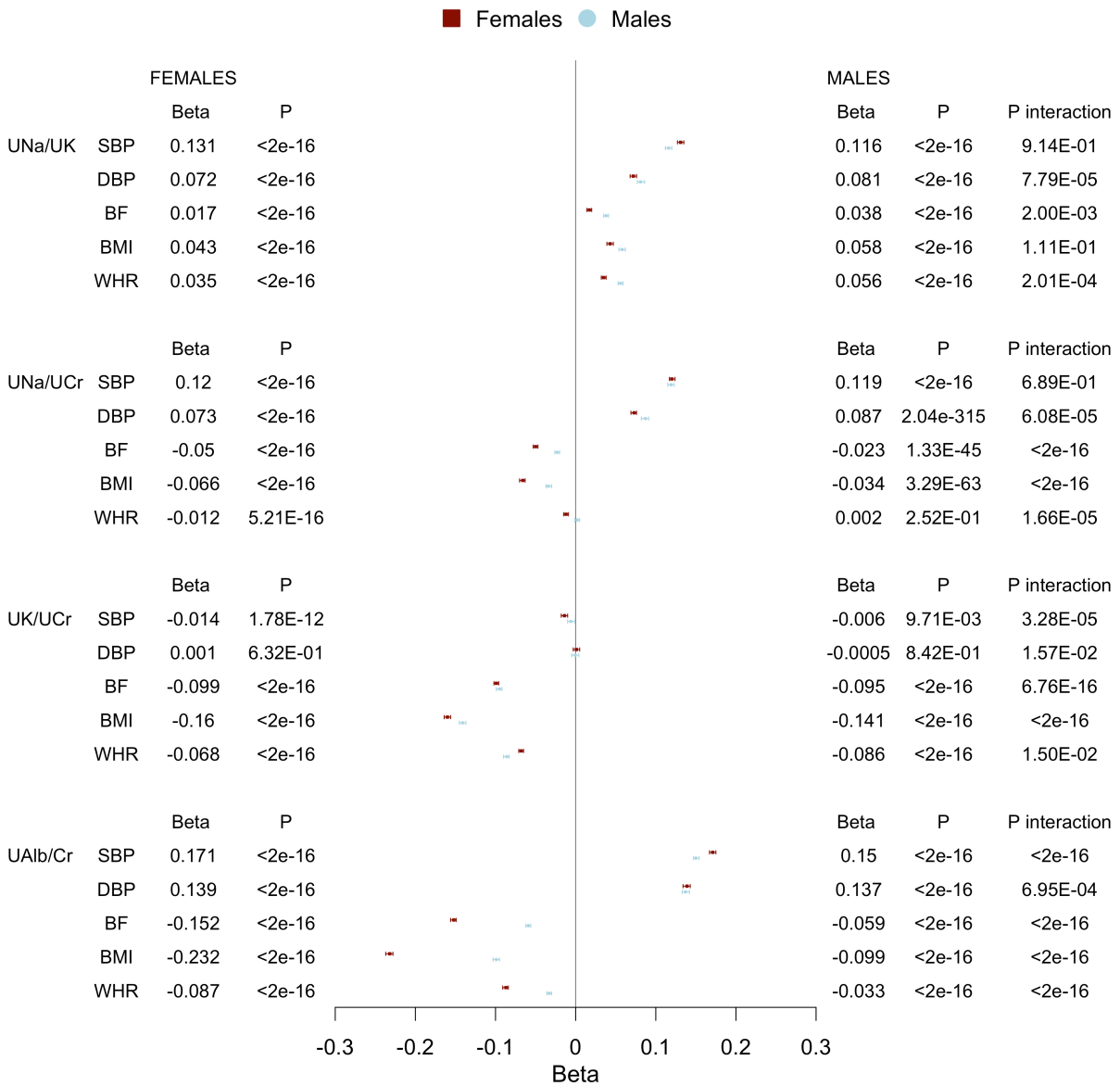
Relations of the urinary albumin to creatinine ratio (UAib/UCr) with a. atrial fibrillation (AF); b. coronary artery disease (CAD); c. heart failure (HF); d. hemorrhagic stroke (HS); e. ischemic stroke (IS). Lines are based on a regression spline of Cox proportional hazards.

Figure S4.

a.



b.



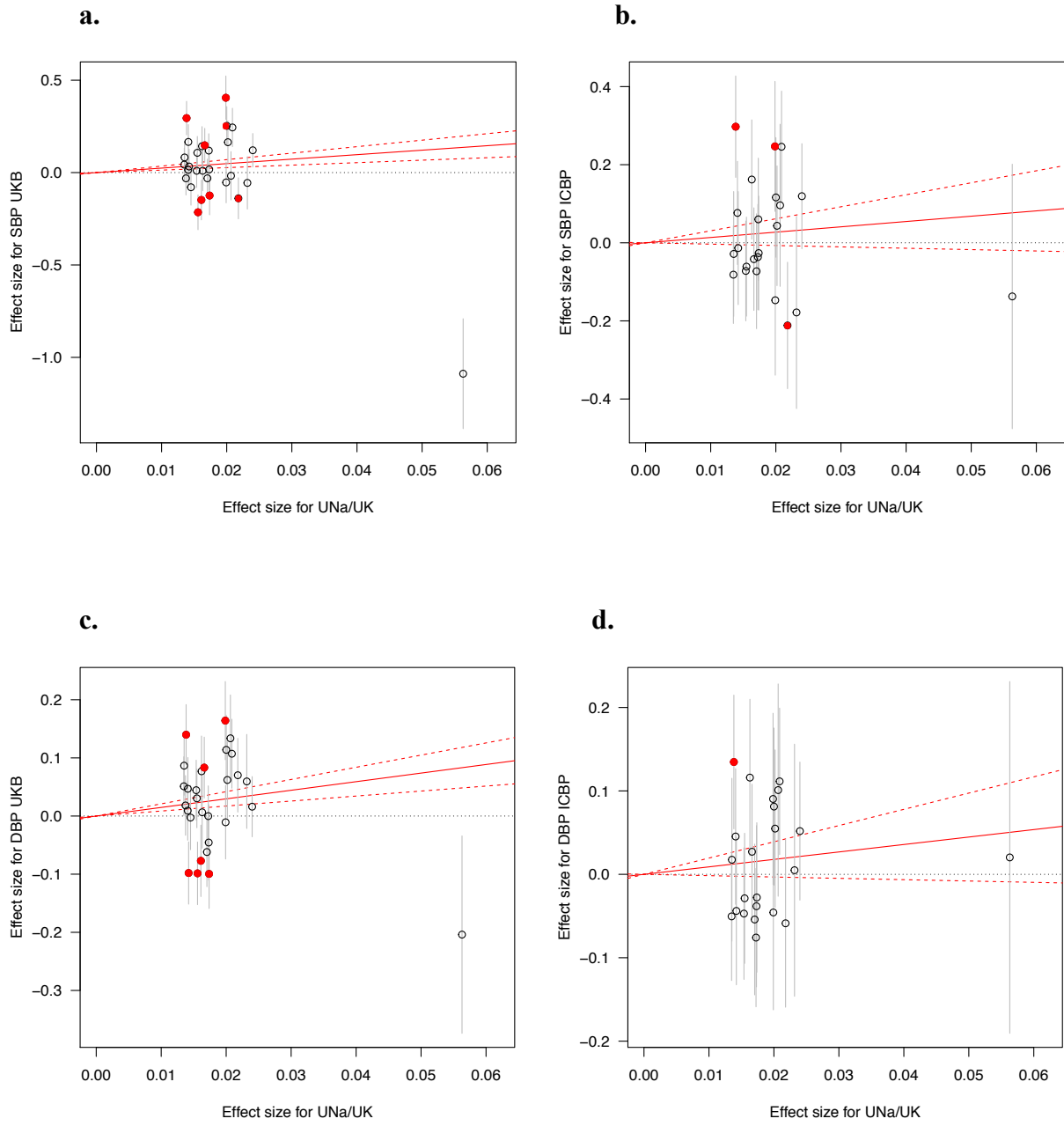
Association results (BETA/HR/OR) of urinary sodium to potassium ratio (Na/UK), urinary sodium to creatinine ratio (UNa/UCr), urinary potassium to creatinine ratio (UK/UCr) and urinary albumin to creatinine ratio (UAlb/UCr) stratified by sex with cardiovascular outcomes in UK Biobank using multivariable-adjusted linear and logistic regression, and multivariable-adjusted Cox proportional hazards models in main analyses. a. Binary outcomes: atrial fibrillation (AF); coronary artery disease (CAD); heart failure (HF); hemorrhagic and ischemic stroke (HS and IS, respectively); lipid medications (LIP) and type 2

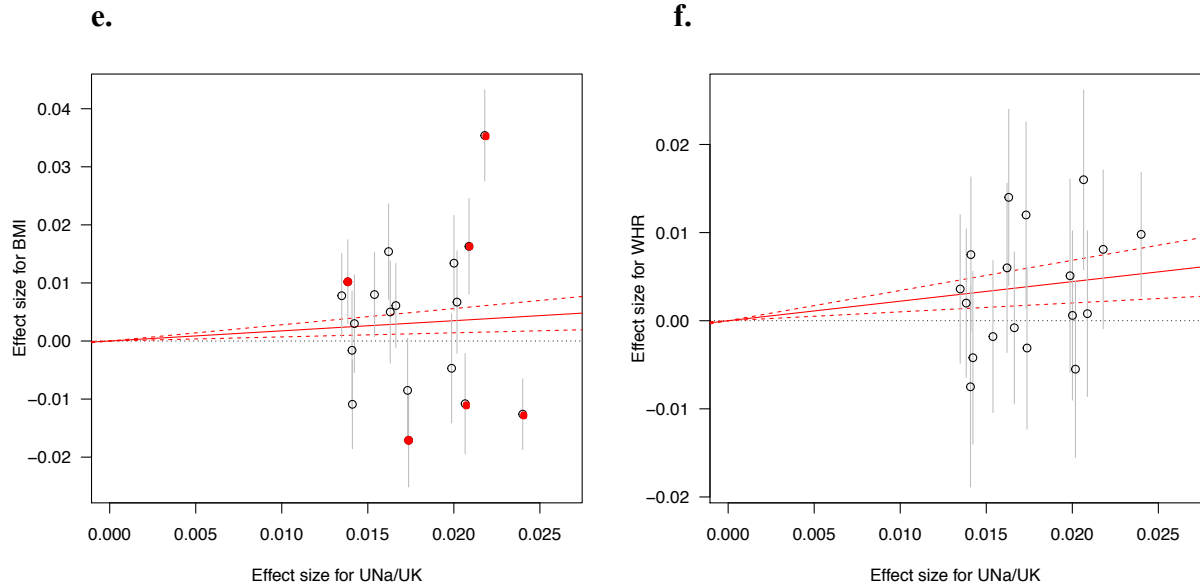
diabetes (T2D). **b.** Continuous outcomes: systolic and diastolic blood pressure (SBP and DBP, respectively), body fat percentage (BF); body mass index (BMI), waist-to-hip ratio (WHR).

Sex-stratified analysis (N males= 212,534; N females= 265,777) performed in the main cohort excluding participants with diagnosis indicating decreased kidney function (N= 7,221) and/or cardiovascular disease at baseline (N= 17,087). The betas from linear regression represent SD change in outcome variable per SD change in UNa/UK. Model adjustment: sex, age, region of the UK Biobank assessment center, ethnicity, smoking, alcohol, physical activity, Townsend index, blood pressure (DBP and SBP), obesity (BMI, body fat percentage, WHR), lipid medications, T2D, and medications affecting renal excretion.

Abbreviations: HR, hazard ratio; OR, odds ratio.

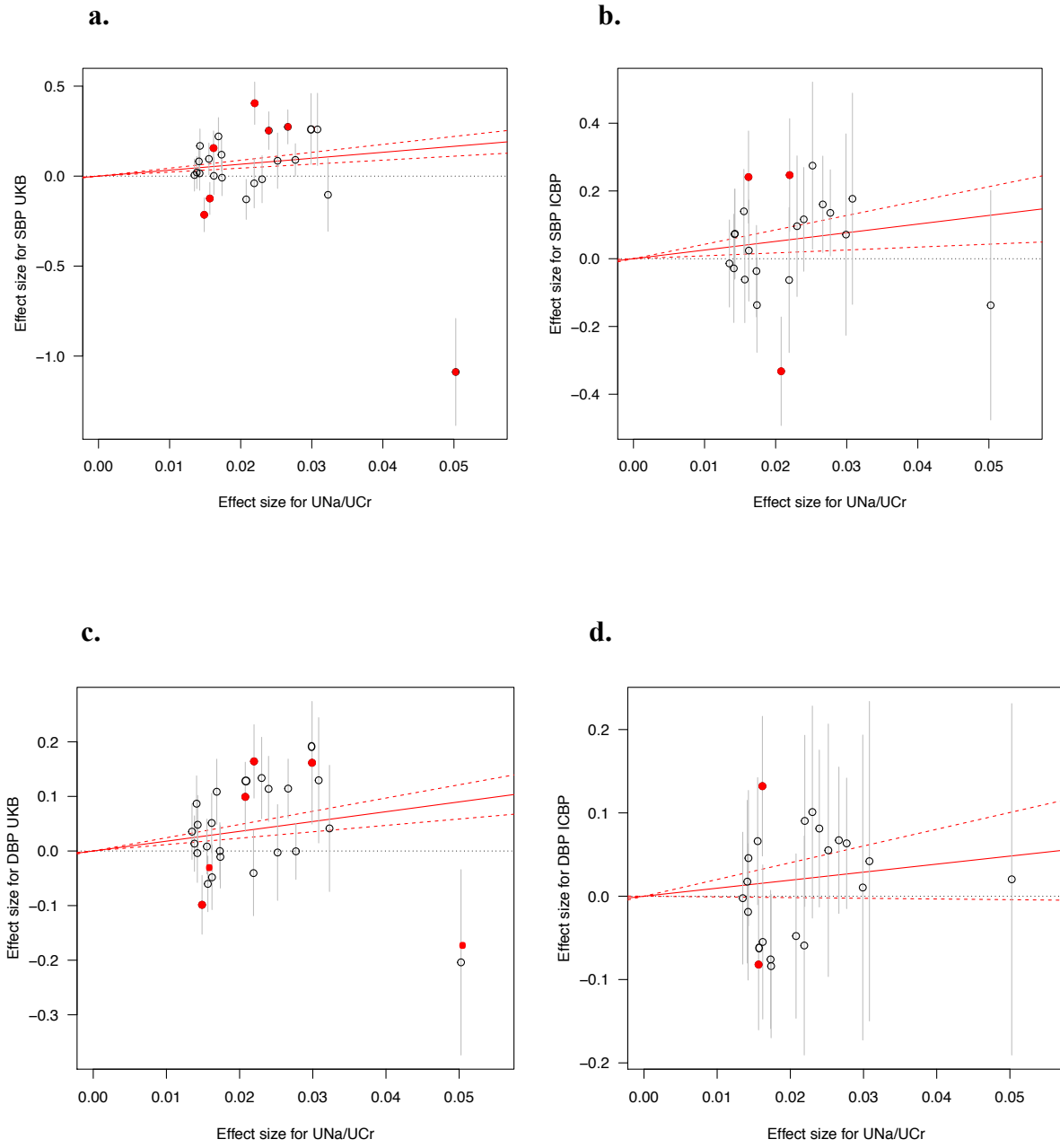
Figure S5.

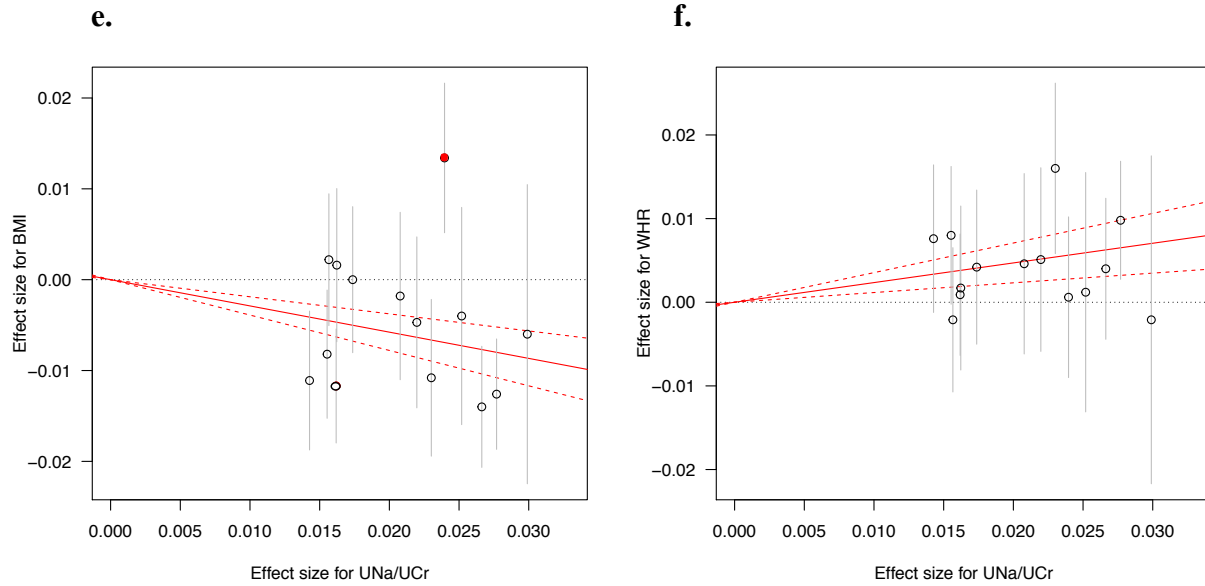




Effects of genetic variants on urinary sodium to potassium ratio (UNa/UK) and risk of a. systolic blood pressure in UK Biobank (SBP UKB); b. systolic blood pressure from International Consortium of Blood Pressure (SBP ICBP); c. diastolic blood pressure in UK Biobank (DBP UKB); d. diastolic blood pressure from International Consortium of Blood Pressure (DBP ICBP); e. body mass index (BMI); f. waist-to-hip ratio (WHR). Variants showing significant heterogeneity are highlighted in red.

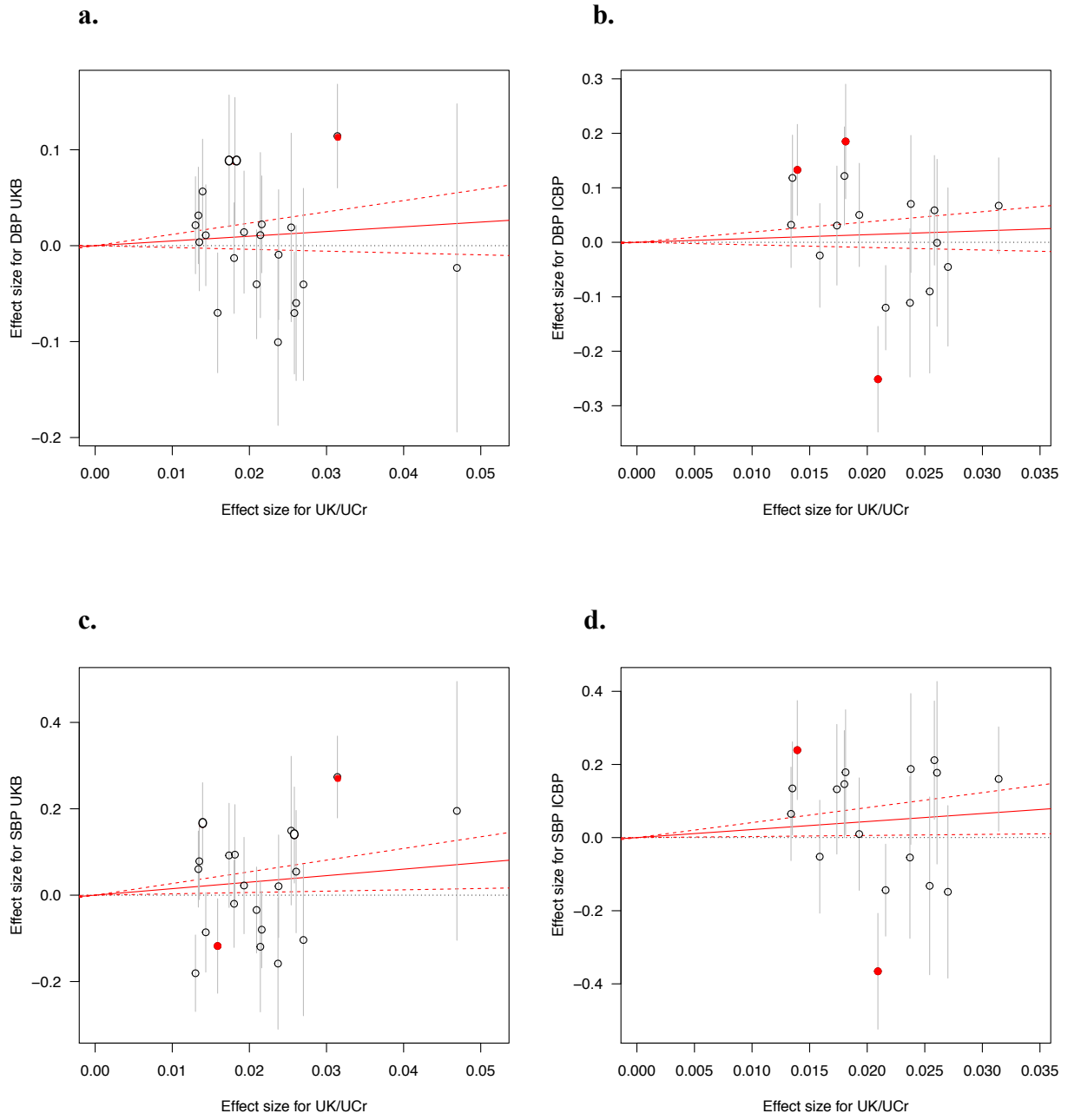
Figure S6.

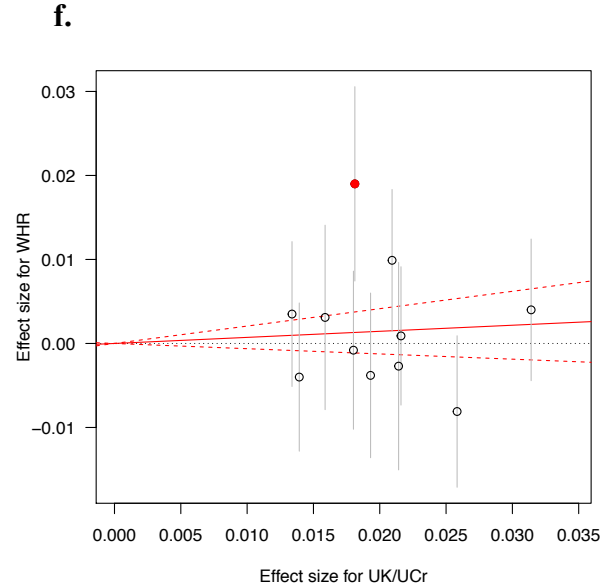
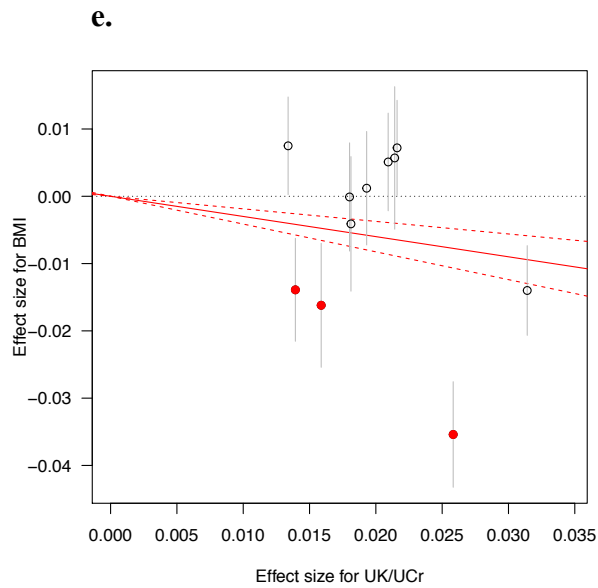




Effects of genetic variants on urinary sodium to creatinine ratio (UNa/UCr) and risk of a. systolic blood pressure in UK Biobank (SBP UKB); b. systolic blood pressure from International Consortium of Blood Pressure (SBP ICBP); c. diastolic blood pressure in UK Biobank (DBP UKB); d. diastolic blood pressure from International Consortium of Blood Pressure (DBP ICBP); e. body mass index (BMI); f. waist-to-hip ratio (WHR). Variants showing significant heterogeneity are highlighted in red.

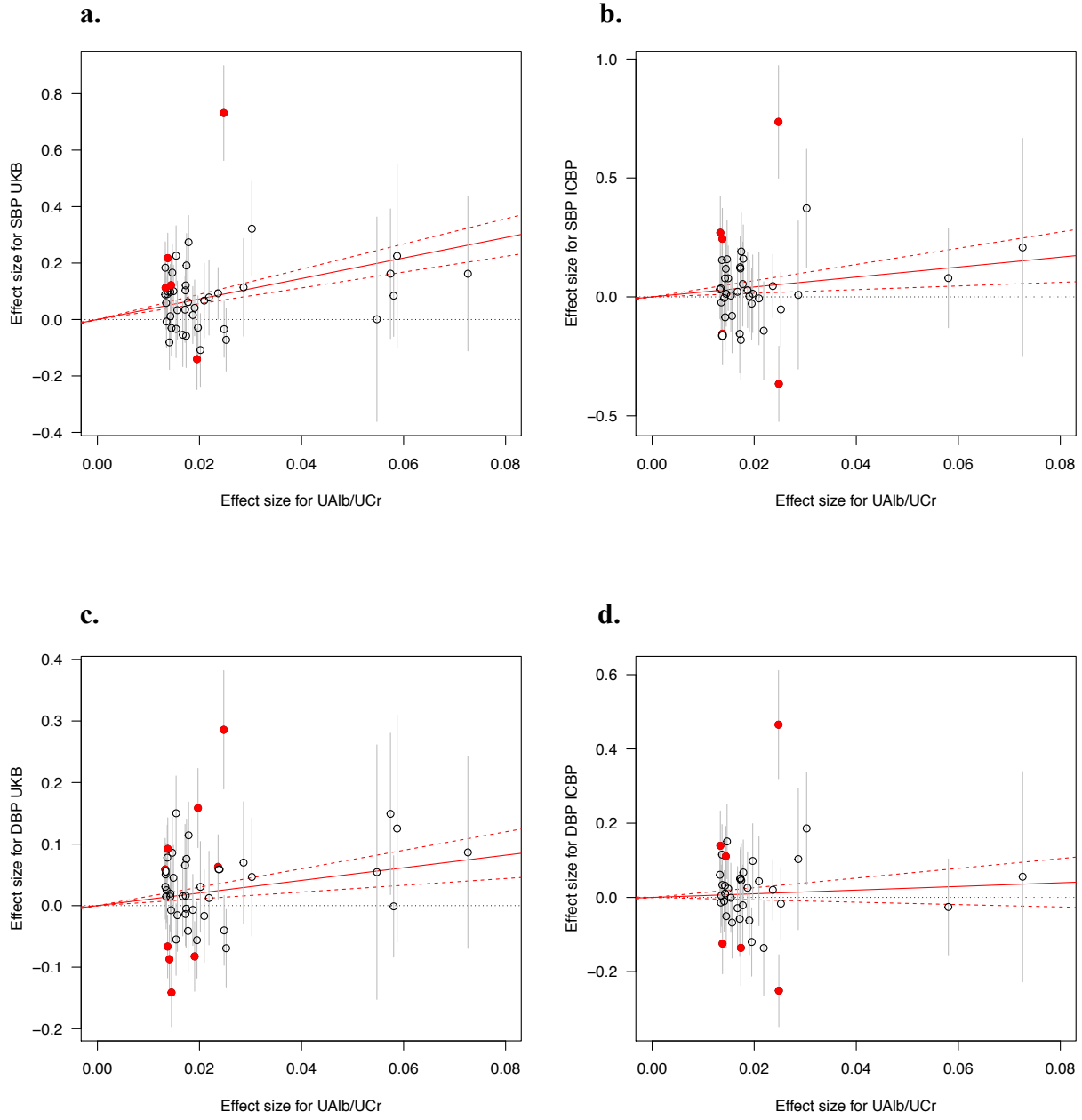
Figure S7.

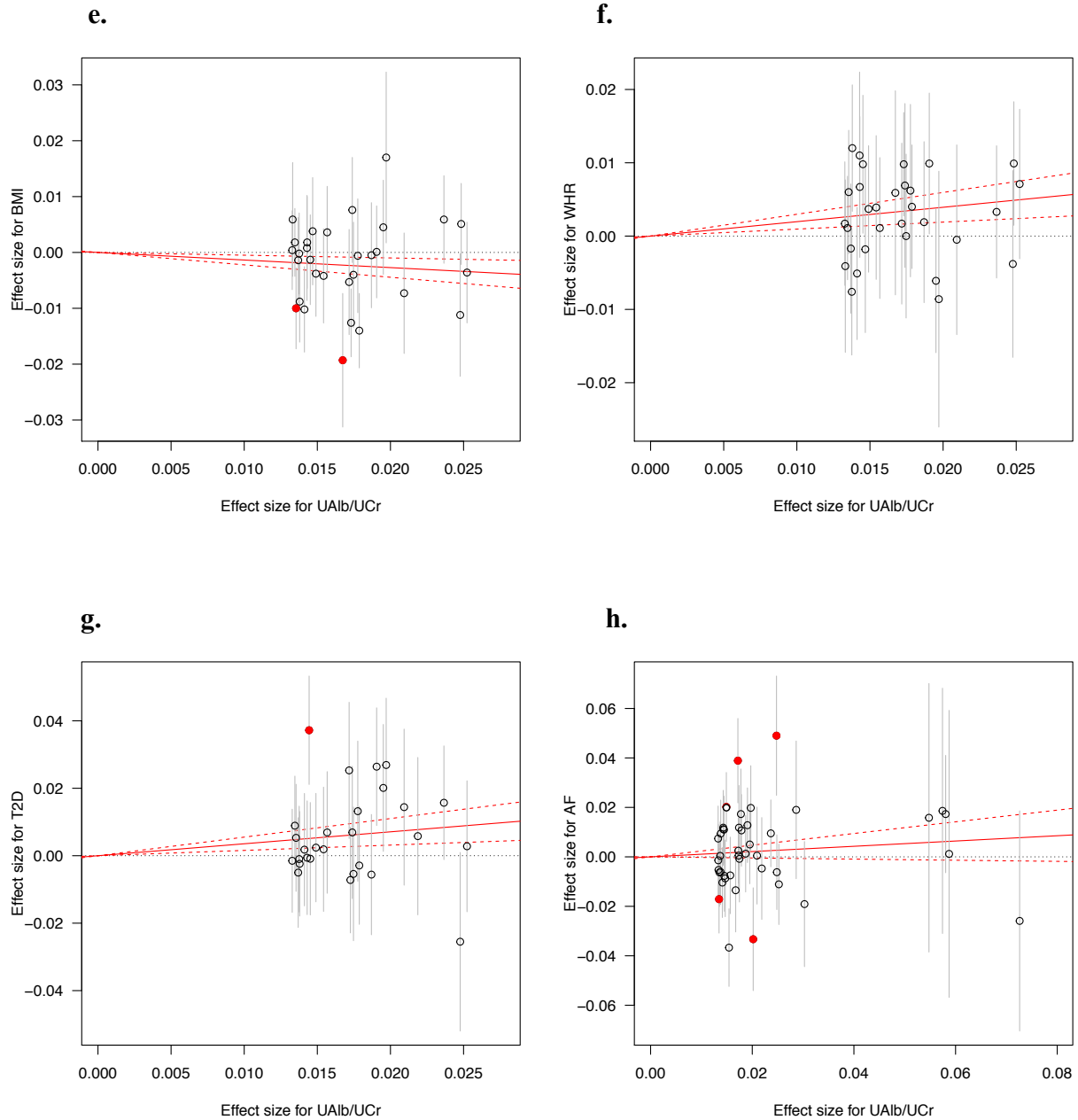




Effects of genetic variants on urinary potassium to creatinine ratio (UK/UCr) and risk of a. systolic blood pressure in UK Biobank (SBP UKB); b. systolic blood pressure from International Consortium of Blood Pressure (SBP ICBP); c. diastolic blood pressure in UK Biobank (DBP UKB); d. diastolic blood pressure from International Consortium of Blood Pressure (DBP ICBP); e. body mass index (BMI); f. waist-to-hip ratio (WHR). Variants showing significant heterogeneity are highlighted in red.

Figure S8.





Effects of genetic variants on urinary albumin to creatinine ratio (UAlb/UCr) and risk of a. systolic blood pressure in UK Biobank (SBP UKB); b. systolic blood pressure from International Consortium of Blood Pressure (SBP ICBP); c. diastolic blood pressure in UK Biobank (DBP UKB); d. diastolic blood pressure from International Consortium of Blood Pressure (DBP ICBP); e. body mass index (BMI); f. waist-to-hip ratio (WHR); g. type 2 diabetes (T2D); h. atrial fibrillation (AF). Variants showing significant heterogeneity are highlighted in red.