

SUPPLEMENTARY TABLES

Supplementary Table 1. Basic information of SNPs associated with heart failure.

SNPs	other_allele	effect_allele	β	SE	P
rs55751848	C	G	-0.0425	0.0089	1.79E-06
rs593467	G	A	-0.0548	0.0118	3.42E-06
rs660240	T	C	0.0611	0.0097	3.00E-10
rs35054810	G	A	0.0725	0.0143	3.98E-07
rs7559452	A	G	0.0468	0.0102	4.47E-06
rs17496249	A	G	-0.0372	0.0079	2.49E-06
rs12477245	C	T	0.1192	0.0236	4.40E-07
rs7369998	G	A	-0.059	0.0126	2.83E-06
rs72844714	C	A	0.0559	0.0121	3.84E-06
rs80087882	G	A	0.0609	0.0125	1.10E-06
rs4376020	T	A	-0.0612	0.0123	6.50E-07
rs9815816	T	C	0.0479	0.0099	1.31E-06
rs10938398	G	A	0.0389	0.008	1.16E-06
rs11722972	T	G	-0.0519	0.0114	5.30E-06
rs2634071	T	C	-0.0923	0.0101	6.33E-20
rs11745324	G	A	-0.0528	0.0095	2.73E-08
rs7766436	C	T	0.04	0.0086	3.30E-06
rs4135240	T	C	-0.0486	0.0084	7.22E-09
rs6922885	T	C	-0.0377	0.008	2.45E-06
rs55949718	C	T	-0.0685	0.0142	1.41E-06
rs1510226	T	C	0.162	0.0285	1.31E-08
rs55730499	C	T	0.1058	0.0157	1.60E-11
rs117925145	A	G	0.1797	0.0391	4.31E-06
rs76117960	T	C	0.0528	0.0113	2.97E-06
rs35005436	T	C	0.0533	0.0116	4.33E-06
rs10952517	T	A	-0.0394	0.0085	3.56E-06
rs73200714	G	A	-0.055	0.0118	3.15E-06
rs2980858	T	C	-0.04	0.0086	3.30E-06
rs7859727	C	T	0.0623	0.0078	1.38E-15
rs600038	T	C	0.0569	0.0096	3.08E-09
rs994980	C	T	0.0375	0.0081	3.66E-06
rs72807031	T	A	-0.0895	0.0181	7.62E-07
rs4746140	G	C	-0.0666	0.0109	9.96E-10
rs10882816	G	T	-0.0447	0.0085	1.45E-07
rs17617337	C	T	-0.0561	0.0095	3.52E-09
rs61733868	T	C	-0.1057	0.0216	9.90E-07
rs186973337	T	A	0.0933	0.0196	1.93E-06
rs4755717	C	G	-0.0379	0.008	2.16E-06
rs10459012	C	A	0.0458	0.0095	1.43E-06
rs12805761	A	T	-0.0672	0.0139	1.33E-06
rs4766578	T	A	-0.0433	0.0079	4.23E-08
rs10846742	G	A	-0.0506	0.0111	5.15E-06
rs8017852	C	A	-0.0554	0.012	3.90E-06
rs10150022	A	G	-0.0419	0.0087	1.46E-06

rs17483686	A	T	0.0489	0.0095	2.64E-07
rs56094641	A	G	0.0454	0.008	1.39E-08
rs578065	T	G	0.0408	0.0082	6.50E-07
rs12940636	T	C	-0.0381	0.0083	4.42E-06
rs8081247	G	A	-0.0487	0.0098	6.72E-07
rs1788761	A	G	-0.0425	0.009	2.33E-06
rs11874705	A	G	0.0469	0.0098	1.70E-06
rs10520390	C	G	-0.0902	0.0187	1.41E-06

Supplementary Table 2. MR results of the effect of heart failure on the cortical structure of functional cerebral areas.

	SA	TH
	Global weighted	
Bankssts	0.6977748	0.9969515
Caudal anterior cingulate	0.1879553	0.9944418
Caudal middle frontal	0.009369889	0.4861102
Cuneus	0.93282	0.3884087
Entorhinal	0.7375308	0.4824811
Frontal pole	0.6806647	0.9700872
Fusiform	0.5006216	0.8486323
Inferior parietal	0.8200912	0.2974922
Inferior temporal	0.9055626	0.1172891
Insula	0.01088126	0.2536509
Isthmus cingulate	0.7616352	0.8956049
Lateral occipital	0.740052	0.6561721
Lateral orbitofrontal	0.5156932	0.1242299
Lingual	0.7964685	0.3125903
Medial orbitofrontal	0.06407264	0.6340118
Middle temporal	0.5498127	0.6994723
Paracentral	0.6369187	0.6598778
Parahippocampal	0.6559629	0.7828665
Pars opercularis	0.8144172	0.6971543
Par orbitalis	0.6418063	0.4258328
Pars triangularis	0.9436559	0.5506617
Pericalcarine	0.9299025	0.4058616
Postcentral	0.6802846	0.8207215
Posterior cingulate	0.9478465	0.3376118
Precentral	0.7710834	0.773043
Precuneus	0.0496107	0.3306158
Rostral anterior cingulate	0.3899105	0.6066478
Rostral middle frontal	0.3578567	0.2814057
Superior frontal	0.66020664	0.5205543
Superior parietal	0.9424974	0.04477682
Superior temporal	0.2498117	0.843193
Supramarginal	0.1505051	0.4930569
Temporal pole	0.09355074	0.6033848
Transverse temporal	0.9531146	0.1976769

Supplementary Table 3. MR pleiotropic analysis of cortical thickness in cerebral functional areas in heart failure patients.

Cerebral cortex	Egger-intercept	SE	P
Bankssts	-0.000151779	0.000882834	0.8643876
Caudal anterior cingulate	0.000487773	0.00104738	0.6440152
Caudal middle frontal	-0.000299749	0.000605053	0.623091
Cuneus	-0.000922428	0.000574205	0.1162442
Entorhinal	-0.002141749	0.001745485	0.22717
Frontal pole	0.000195246	0.001289201	0.8804034
Fusiform	-0.000658134	0.000539236	0.2296064
Inferior parietal	0.000226421	0.0004656	0.6294766
Inferior temporal	-0.0002893	0.000607283	0.6364592
Insula	-0.000799705	0.000735893	0.2838346
Isthmus cingulate	0.000161048	0.000943923	0.865408
Lateral occipital	0.000234886	0.000612812	0.7035848
Lateral orbitofrontal	-0.000424334	0.000596338	0.4809688
Lingual	0.000286671	0.000493235	0.5644465
Medial orbitofrontal	-0.000220342	0.000722794	0.7621033
Middle temporal	0.000546603	0.000566318	0.3403976
Paracentral	-0.000464085	0.000608095	0.4499489
Parahippocampal	-0.000661862	0.001500857	0.6616559
Pars opercularis	-0.00073961	0.000494173	0.1425313
Pars orbitalis	-0.000512167	0.0008384	0.5448189
Pars triangularis	0.000264559	0.000619918	0.671898
Pericalcarine	0.000108325	0.000558845	0.847309
Postcentral	-6.45318E-05	0.000631108	0.9190809
Posterior cingulate	0.000420647	0.000618175	0.5002296
Precentral	6.53192E-05	0.000544684	0.9051611
Precuneus	-0.000272092	0.000417158	0.5180639
Rostral anterior cingulate	-0.000270701	0.000929568	0.7724327
Rostral middle frontal	0.000424245	0.000443086	0.3442245
Superior frontal	-0.000272435	0.000581861	0.6422378
Superior parietal	2.09165E-05	0.000411503	0.9597207
Superior temporal	-0.000939761	0.000581243	0.1139801
Supramarginal	6.47205E-06	0.00040376	0.9872926
Temporal pole	-0.000355457	0.001417925	0.803371
Transverse temporal	-0.000251782	0.000907365	0.7828721

Supplementary Table 4. MR pleiotropic analysis of cortical surface area of cerebral functional area in heart failure.

Cerebral cortex	Egger-intercept	SE	P
Bankssts	-0.5550066	0.6080988	0.3670126
Caudal anterior cingulate	-1.047564	0.6136488	0.09575322
Caudal middle frontal	-1.608463	1.42652	0.2664022
Cuneus	0.03487043	0.8842244	0.9687438
Entorhinal	-0.1806707	0.3692631	0.6273886
Frontal pole	-0.1204245	0.189236	0.5282514
Fusiform	-1.631361	1.515063	0.2882028
Inferior parietal	2.67364	2.543369	0.2996279
Inferior temporal	-0.6900998	1.686612	0.684658
Insula	1.182193	0.8740075	0.1839702
Isthmus cingulate	-0.4546133	0.8927734	0.613471
Lateral occipital	0.3568113	2.634551	0.8929643
Lateral orbitofrontal	0.03948283	1.03887	0.9698771
Lingual	0.2514821	1.712191	0.8839855
Medial orbitofrontal	0.4619694	0.703708	0.5153712
Middle temporal	-0.2951111	1.265819	0.8168732
Paracentral	0.04591706	0.8976835	0.9594666
Parahippocampal	0.5518967	0.394956	0.1702041
Pars opercularis	-0.3101397	1.105776	0.7805976
Pars orbitalis	-0.3421035	0.321653	0.2940605
Pars triangularis	-0.7926667	0.8503531	0.356988
Pericalcarine	-0.04470478	1.03377	0.9657274
Postcentral	-0.9813764	1.542445	0.5283318
Posterior cingulate	-0.68538	0.9402103	0.4703785
Precentral	-2.642603	2.116006	0.2191595
Precuneus	1.577018	1.865732	0.4031248
Rostral anterior cingulate	-0.5860225	0.6358936	0.3624173
Rostral middle frontal	-2.219558	2.060125	0.2879254
Superior frontal	5.515524	2.069316	0.01112991
Superior parietal	1.161043	2.1021	0.5838773
Superior temporal	-1.075803	1.45459	0.4639763
Supramarginal	0.5605873	1.683823	0.7409738
Temporal pole	-0.2244677	0.2469013	0.3688609
Transverse temporal	-0.1623271	0.3284371	0.6239085

Supplementary Table 5. MR sensitivity analysis of cortical thickness in cerebral functional areas in heart failure patients.

Cerebral cortex	Method	Cochran's Q	P
Bankssts	MR-Egger	75.7908	0.00037696
	Inverse variance weighted	75.84828	0.000533208
Caudal anterior cingulate	MR-Egger	33.69524	0.7101431
	Inverse variance weighted	33.91213	0.7398873
Caudal middle frontal	MR-Egger	56.01457	0.03798923
	Inverse variance weighted	56.36708	0.04463329
Cuneus	MR-Egger	35.3256	0.6382164
	Inverse variance weighted	37.90626	0.5648783
Entorhinal	MR-Egger	45.01153	0.2347797
	Inverse variance weighted	46.74919	0.2149053
Frontal pole	MR-Egger	51.17802	0.09164378
	Inverse variance weighted	51.20812	0.11026081
Fusiform	MR-Egger	33.8945	0.7015977
	Inverse variance weighted	35.3841	0.6779649
Inferior parietal	MR-Egger	54.50738	0.05060953
	Inverse variance weighted	54.8379	0.05916865
Inferior temporal	MR-Egger	37.05187	0.559015
	Inverse variance weighted	37.27881	0.593428
Insula	MR-Egger	54.74393	0.04841658
	Inverse variance weighted	56.40161	0.04434429
Isthmus cingulate	MR-Egger	43.8885	0.272001
	Inverse variance weighted	43.92134	0.3089267
Lateral occipital	MR-Egger	66.80433	0.003656039
	Inverse variance weighted	67.05598	0.004675132
Lateral orbitofrontal	MR-Egger	37.63968	0.5319041
	Inverse variance weighted	38.14601	0.5539554
Lingual	MR-Egger	25.74057	0.9492973
	Inverse variance weighted	26.07837	0.9562573
Medial orbitofrontal	MR-Egger	43.73081	0.2775087
	Inverse variance weighted	43.83502	0.3121266
Middle temporal	MR-Egger	35.21808	0.643078
	Inverse variance weighted	36.14967	0.644267
Paracentral	MR-Egger	43.53853	0.2843121
	Inverse variance weighted	44.18875	0.2991325
Parahippocampal	MR-Egger	44.23944	0.2599963
	Inverse variance weighted	44.46003	0.2893824
Pars opercularis	MR-Egger	40.94209	0.3852885
	Inverse variance weighted	43.29363	0.3326096
Pars orbitalis	MR-Egger	46.3846	0.1940741
	Inverse variance weighted	46.82844	0.2125827
Pars triangularis	MR-Egger	54.73514	0.04849656
	Inverse variance weighted	54.99075	0.05755383
Pericalcarine	MR-Egger	40.9379	0.3854638

	Inverse variance weighted	40.97734	0.4274514
Postcentral	MR-Egger	72.35742	0.000925439
	Inverse variance weighted	72.37682	0.001294442
Posterior cingulate	MR-Egger	39.18783	0.4614509
	Inverse variance weighted	39.65309	0.4857295
Precentral	MR-Egger	47.12074	0.1744296
	Inverse variance weighted	47.13811	0.2036735
Precuneus	MR-Egger	39.60568	0.4428657
	Inverse variance weighted	40.03772	0.4685824
Rostral anterior cingulate	MR-Egger	33.30739	0.7265343
	Inverse variance weighted	33.39219	0.760587
Rostral middle frontal	MR-Egger	31.84448	0.7849585
	Inverse variance weighted	32.76124	0.7847206
Superior frontal	MR-Egger	62.21916	0.01047296
	Inverse variance weighted	62.5689	0.0127607
Superior parietal	MR-Egger	38.93501	0.4728037
	Inverse variance weighted	38.9376	0.5179703
Superior temporal	MR-Egger	41.86421	0.3475959
	Inverse variance weighted	44.67028	0.2819567
Supramarginal	MR-Egger	33.2165	0.7303263
	Inverse variance weighted	33.21675	0.7674103
Temporal pole	MR-Egger	39.35957	0.4537835
	Inverse variance weighted	39.423	0.4960549
Transverse temporal	MR-Egger	29.46499	0.86554
	Inverse variance weighted	29.54199	0.8875942

Supplementary Table 6. MR sensitivity analysis of cortical surface area of cerebral functional area in heart failure patients.

Cerebral cortex	Method	Cochran's Q	P
Bankssts	MR-Egger	43.45859	0.2871696
	Inverse variance weighted	44.38683	0.2919947
Caudal anterior cingulate	MR-Egger	55.62494	0.04095567
	Inverse variance weighted	59.78143	0.02287035
Caudal middle frontal	MR-Egger	43.39232	0.2895516
	Inverse variance weighted	44.80686	0.2771945
Cuneus	MR-Egger	50.20767	0.1077826
	Inverse variance weighted	50.20967	0.1292751
Entorhinal	MR-Egger	50.44128	0.1037027
	Inverse variance weighted	50.75089	0.1186733
Frontal pole	MR-Egger	59.94121	0.01713385
	Inverse variance weighted	60.56363	0.01948027
Fusiform	MR-Egger	53.95883	0.05602575
	Inverse variance weighted	55.56295	0.05183819
Inferior parietal	MR-Egger	52.14915	0.07752271
	Inverse variance weighted	53.62679	0.07337278

Inferior temporal	MR-Egger	52.0202	0.07928585
	Inverse variance weighted	52.24359	0.09296391
Insula	MR-Egger	28.86444	0.8826167
	Inverse variance weighted	30.694	0.8549859
Isthmus cingulate	MR-Egger	89.33176	8.04E-06
	Inverse variance weighted	89.92571	1.05E-05
Lateral occipital	MR-Egger	71.9915	0.00101626
	Inverse variance weighted	72.02536	0.001413118
Lateral orbitofrontal	MR-Egger	47.4027	0.1673007
	Inverse variance weighted	47.40452	0.1962198
Lingual	MR-Egger	46.89388	0.1803229
	Inverse variance weighted	46.91982	0.2099263
Medial orbitofrontal	MR-Egger	39.32461	0.4553414
	Inverse variance weighted	39.75916	0.4809858
Middle temporal	MR-Egger	39.46136	0.4492581
	Inverse variance weighted	39.51635	0.4918601
Paracentral	MR-Egger	53.83827	0.05728037
	Inverse variance weighted	53.84188	0.07065973
Parahippocampal	MR-Egger	34.00666	0.6967528
	Inverse variance weighted	35.95928	0.6527204
Pars opercularis	MR-Egger	58.4168	0.02353054
	Inverse variance weighted	58.53463	0.02937326
Pars orbitalis	MR-Egger	39.98337	0.4262844
	Inverse variance weighted	41.14309	0.4203288
Pars triangularis	MR-Egger	40.17411	0.417997
	Inverse variance weighted	41.0692	0.4234989
Pericalcarine	MR-Egger	38.9605	0.4716557
	Inverse variance weighted	38.96237	0.516848
Postcentral	MR-Egger	43.23858	0.2951222
	Inverse variance weighted	43.68739	0.3176415
Posterior cingulate	MR-Egger	98.71798	4.41E-07
	Inverse variance weighted	100.06305	4.70E-07
Precentral	MR-Egger	58.99376	0.0208929
	Inverse variance weighted	61.353	0.01652484
Precuneus	MR-Egger	62.79128	0.009224499
	Inverse variance weighted	63.94157	0.009463078
Rostral anterior cingulate	MR-Egger	63.72689	0.00747466
	Inverse variance weighted	65.11466	0.007286857
Rostral middle frontal	MR-Egger	30.68133	0.8268206
	Inverse variance weighted	31.8421	0.8177259
Superior frontal	MR-Egger	38.32725	0.5003717
	Inverse variance weighted	45.43153	0.2560455
Superior parietal	MR-Egger	36.7003	0.5752397
	Inverse variance weighted	37.00544	0.6058215
Superior temporal	MR-Egger	55.883	0.03896919
	Inverse variance weighted	56.66679	0.04217886

Supramarginal	MR-Egger	31.81319	0.786142
	Inverse variance weighted	31.92403	0.8148943
Temporal pole	MR-Egger	39.5041	0.4473617
	Inverse variance weighted	40.34132	0.4551645
Transverse temporal	MR-Egger	61.30767	0.01278561
	Inverse variance weighted	61.69167	0.01538625
