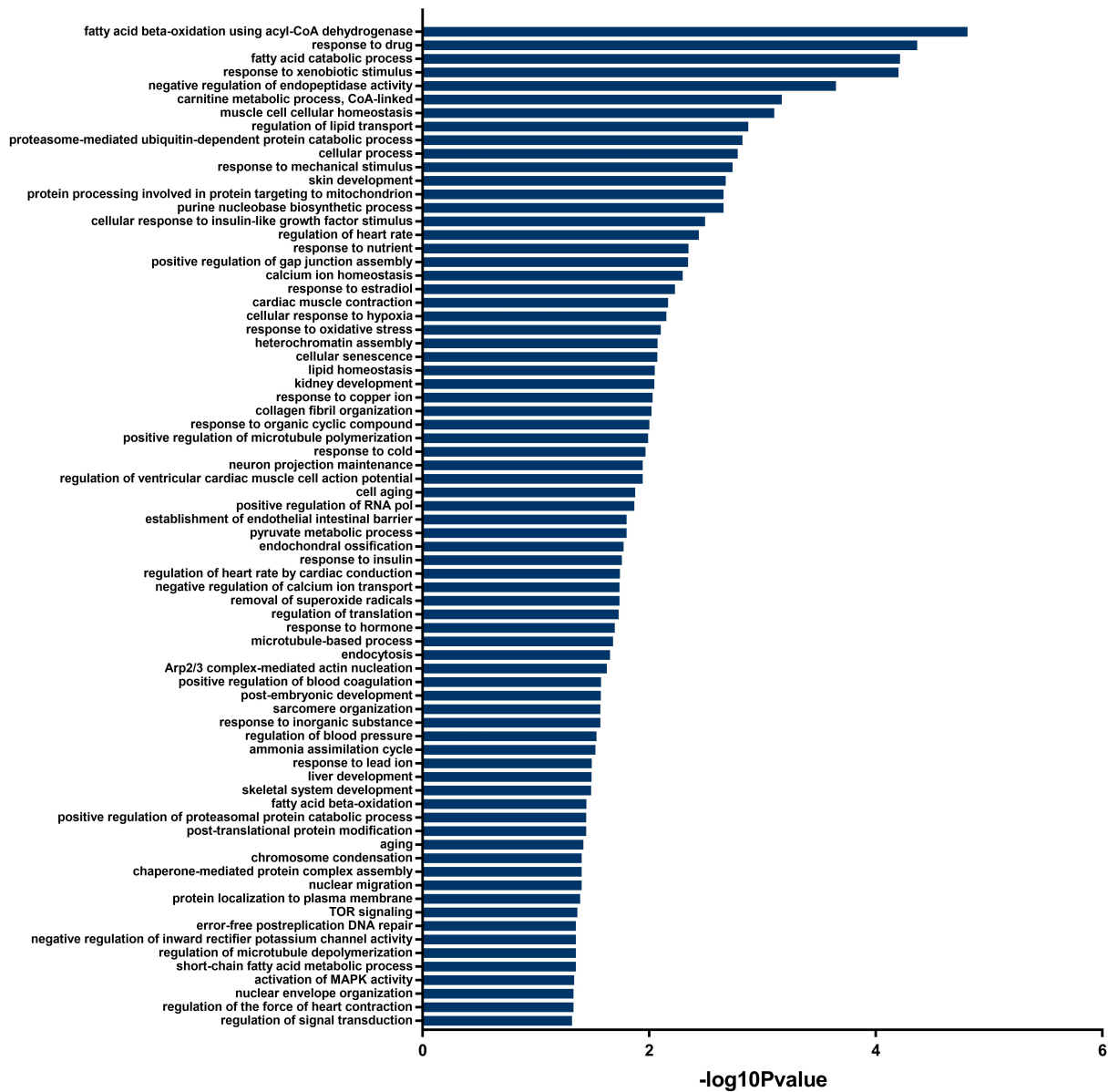


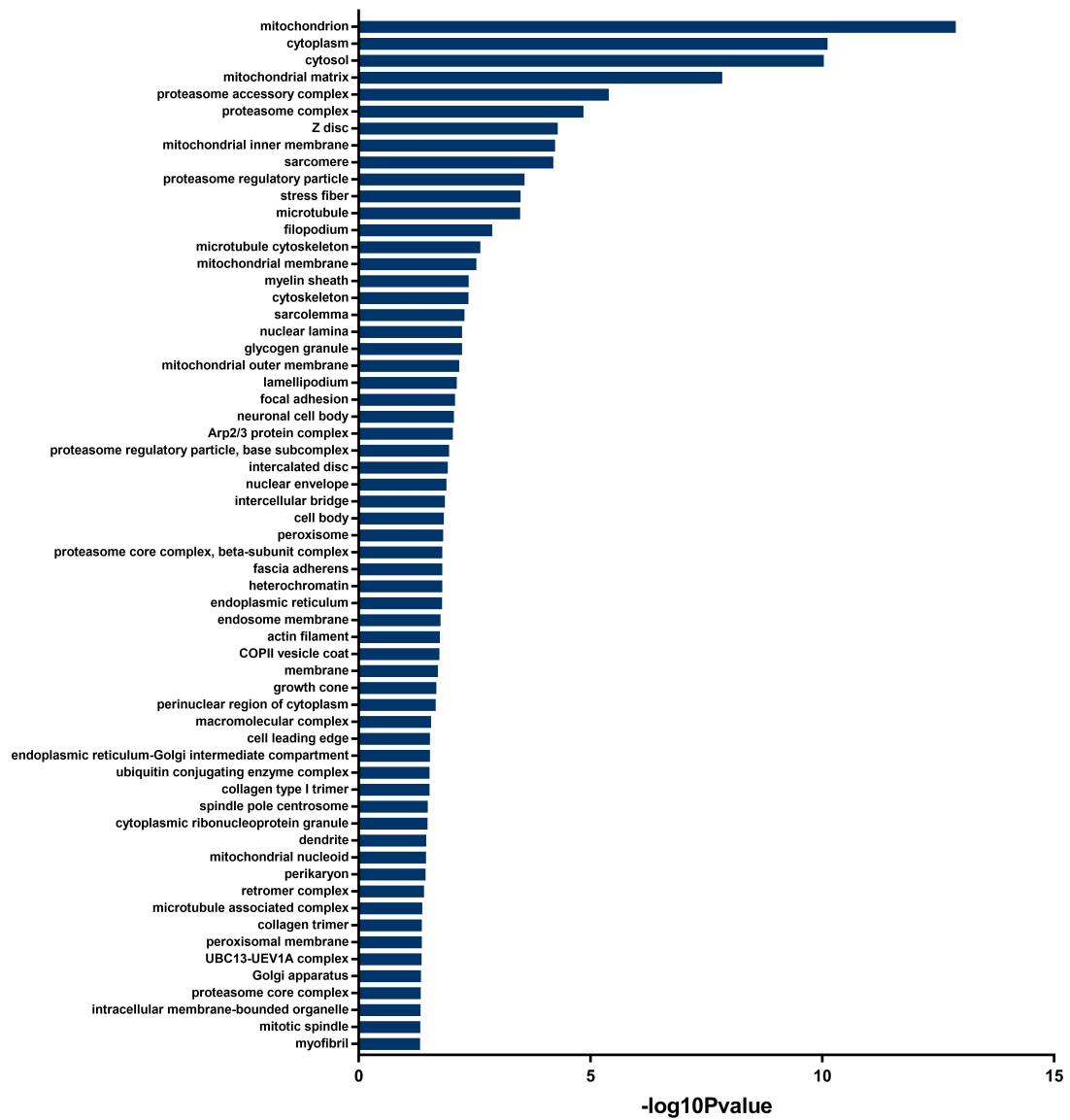
Supplemental figure-1 Quality control validation of protein extraction and MS data.

(1) quality control of protein extraction (SDS-PAGE of coomassie brilliant blue staining), (2) mass spectrometry data validation (peptide length distribution), (3) mass spectrometry data validation (the mass errors distribution).

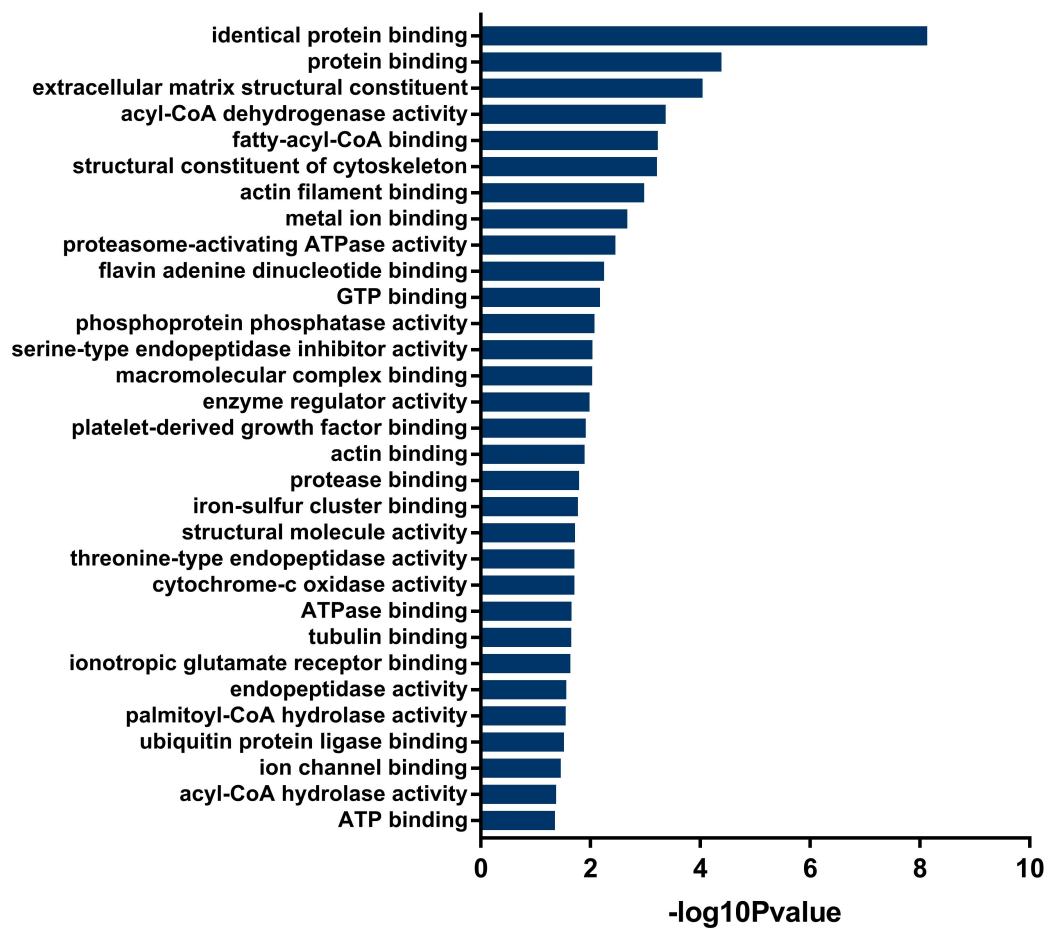
MZG: Marginal zinc-deficient group, NZG: Normal zinc group.



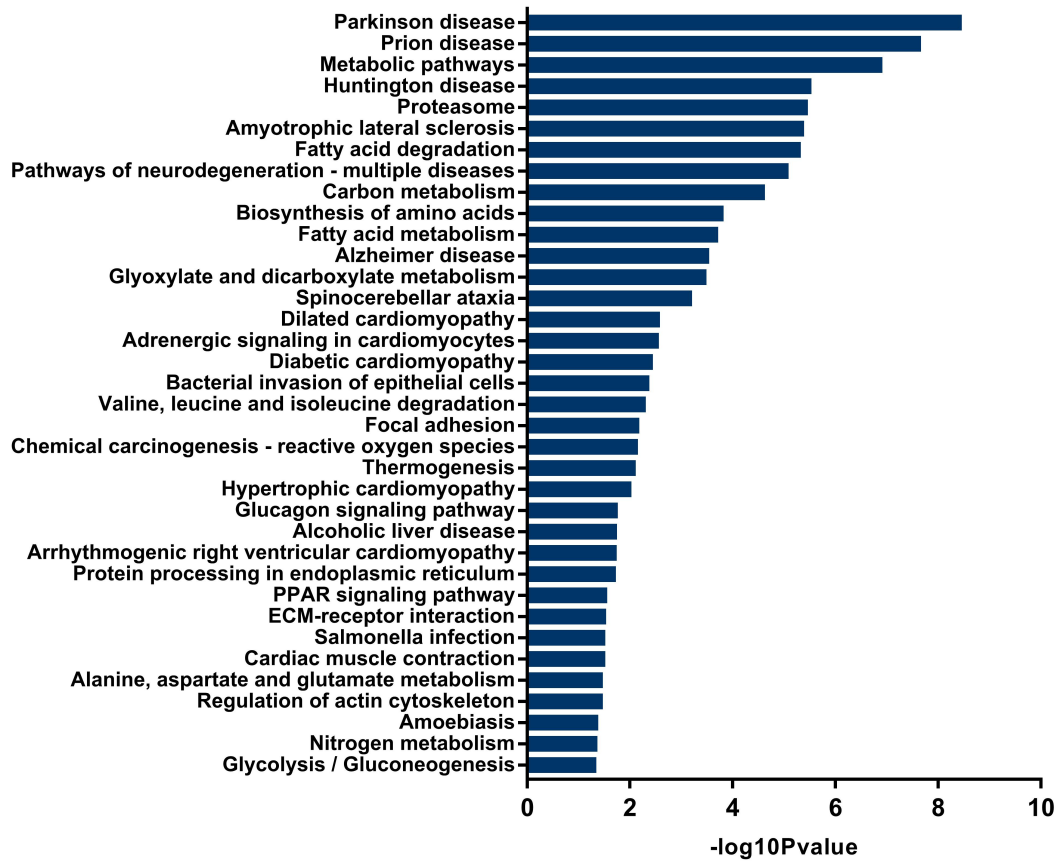
Supplemental figure-2 GO enrichment results (biological processes) of heart proteomics.



Supplemental figure-3 GO enrichment results (cell components) of heart proteomics.



Supplemental figure-4 GO enrichment results (molecular functions) of heart proteomics



Supplemental figure-5 Pathway enrichment results of heart proteomics

Supplemental Table 1. The main component of rats' diet for two groups.

Components	MZG	NZG and PZG
Energy, kcal/kg	3766	3766
Protein (Egg white)calories accounts for, %	17	17
Fat calories account for, %	14	14
Carbohydrate calories account for, %	69	69
protein(Egg white), %	16	16
fat, %	6	6
Carbohydrate, %	66	66
Mineral content (g/kg):		
Calcium carbonate	357	357
Potassium phosphate	196	196
Potassium citrate	70.78	70.78
Potassium sulfate	46.6	46.6
Magnesium oxide	24	24
Sodium chloride	74	74
Cupric carbonate	0.3	0.3
1%Potassium iodate	0.01	0.01
Ferric citrate	6.06	6.06
Manganous carbonate	0.63	0.63
sodium carbonate	0.01025	0.01025
Zinc carbonate	0	1.65
Chromium potassium sulfate	0.275	0.275
ammonium molybdate	0.00795	0.00795
Boric acid	0.0815	0.0815
Sodium fluoride	0.0635	0.0635
Sucrose	222.676	221.026
Total	998.4942	998.4942

Vitamin content:

Vitamin A, IU/g	4.0	4.0
Vitamin D, IU/g	1.0	1.0
Vitamin E, IU/kg	81.6	81.6
Vitamin K, ppm	0.29	0.29
Thiamine, ppm	6.1	6.1
Riboflavin, ppm	6.7	6.7
niacin, ppm	30	30
Pantothenic acid, ppm	16	16
Folic acid, ppm	2.1	2.1
Pyridoxine, ppm	5.8	5.8
Biotin, ppm	0.2	0.2
Vitamin B-12, mcg/kg	29	29
Choline chloride, ppm	1.25	1.25
Ascorbic acid, ppm	0	0

Note: The background zinc concentration in diet is 10 mg/kg. The zinc concentration of MZG diet was 10 mg/kg, and the zinc concentration of NZG and PZG was 30 mg/kg. MZG, marginal zinc-deficient group; NZG, normal zinc group; PZG, paired zinc group.

Supplemental Table 2. Peptides selected for the validation of the proteins.

Accession	Protein Name	Gene Name	Peptides
O35115	Four and a half LIM domains protein 2	Fhl2	ENQNFCVPCYEK
			QYALQCVQCK
F1LS40	Collagen alpha-2 chain	Colla2	GEAGAAGPSGPAGPR
			GPAGPSGPIGK
P59215	Guanine nucleotide-binding protein G(o) subunit alpha	Gnao1	LWGDSGIQECFNR
			IGAADYQPTEQDILR
D3ZCV0	Actinin alpha 2	Actn2	QSILAIQNEVEK
			ETADTDTAEQVIASFR
P01015	Angiotensinogen	Agt	GSYNLQDLLAQAK
			LSTLLGAEANLGK
P07632	Superoxide dismutase [Cu-Zn]	Sod1	GGNEESTK
			LACGVIGIAQ
P02454	Collagen alpha-1 chain	Colla1	GFSGLDGAK
			GSEGPQGVR
P18614	Integrin alpha-1	Itga1	YSSTEEVLVAANK
			SIASEPTEK

Supplemental Table 3. Echocardiographic variables among three groups.

	MZG	NZG	PZG
IVS;d(mm)	1.71±0.12	1.70±0.13	1.71±0.15
IVS;s(mm)	2.35±0.31	2.24±0.29	2.26±0.22
LVID;d(mm)	6.68±0.68	7.34±0.62	7.24±0.73
LVID;s(mm)	3.95±0.48	4.13±0.61	4.00±0.58
LVPW;d(mm)	1.85±0.34	1.78±0.16	1.69±0.26
LVPW;s(mm)	2.62±0.42	2.63±0.28	2.51±0.43
EF(%)	70.57±2.96	73.11±6.84	74.48±5.66
FS(%)	41.02±2.36	45.96±3.95	44.87±5.26
LVM(mg)	817.19±91.37	918.77±76.79	869.94±122.51
LV Vol;d(uL)	232.56±48.87	286.04±55.55	278.46±65.67
LV Vol;s(uL)	69.04±17.71	77.61±25.98	71.49±24.09

Note: MZG, marginal zinc-deficient group; NZG, normal zinc group; PZG, paired zinc group; IVS, interventricular septum; LVID, left ventricular internal diastolic; LVPW, left ventricular posterior wall; EF, ejection fractions; FS, fractional shortening; LVM, left ventricular mass; LV Vol, left ventricular volume; d, diastole; s, systole.

Supplemental Table 4. Quantification of relative area of Masson staining.

	MZG	NZG	PZG
fibrotic area/total area	2.91 ± 2.68	4.27 ± 1.42	2.43 ± 2.44

Note: MZG, marginal zinc-deficient group; NZG, normal zinc group; PZG, paired zinc group.