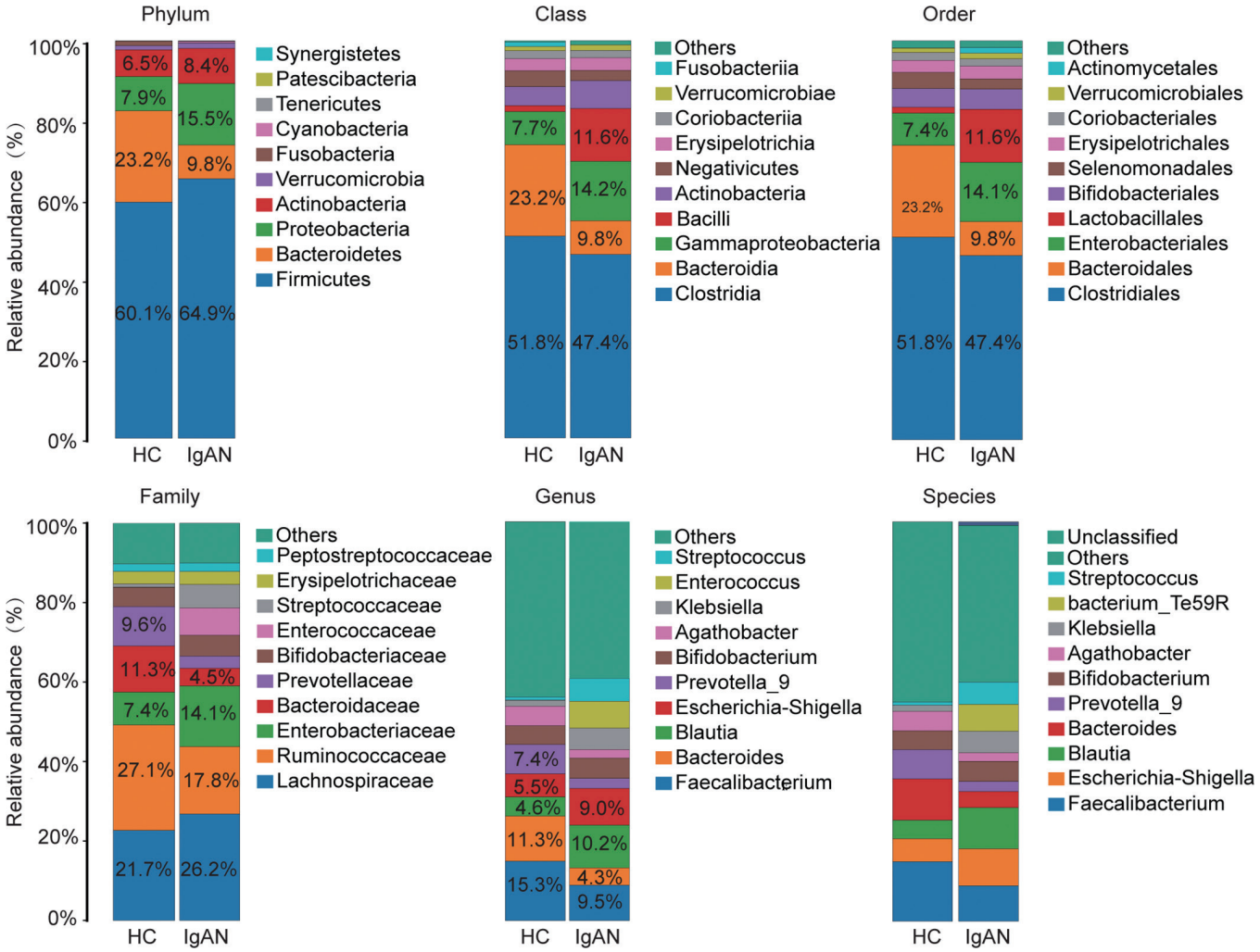

Figure S1 Relative abundance analysis of gut microbiota. Change in relative abundance (%) of bacteria in fecal samples from immunoglobulin A nephropathy (IgAN) and healthy control (HC) groups at different levels of biologic classification (phylum, class, order, family, genus, species).

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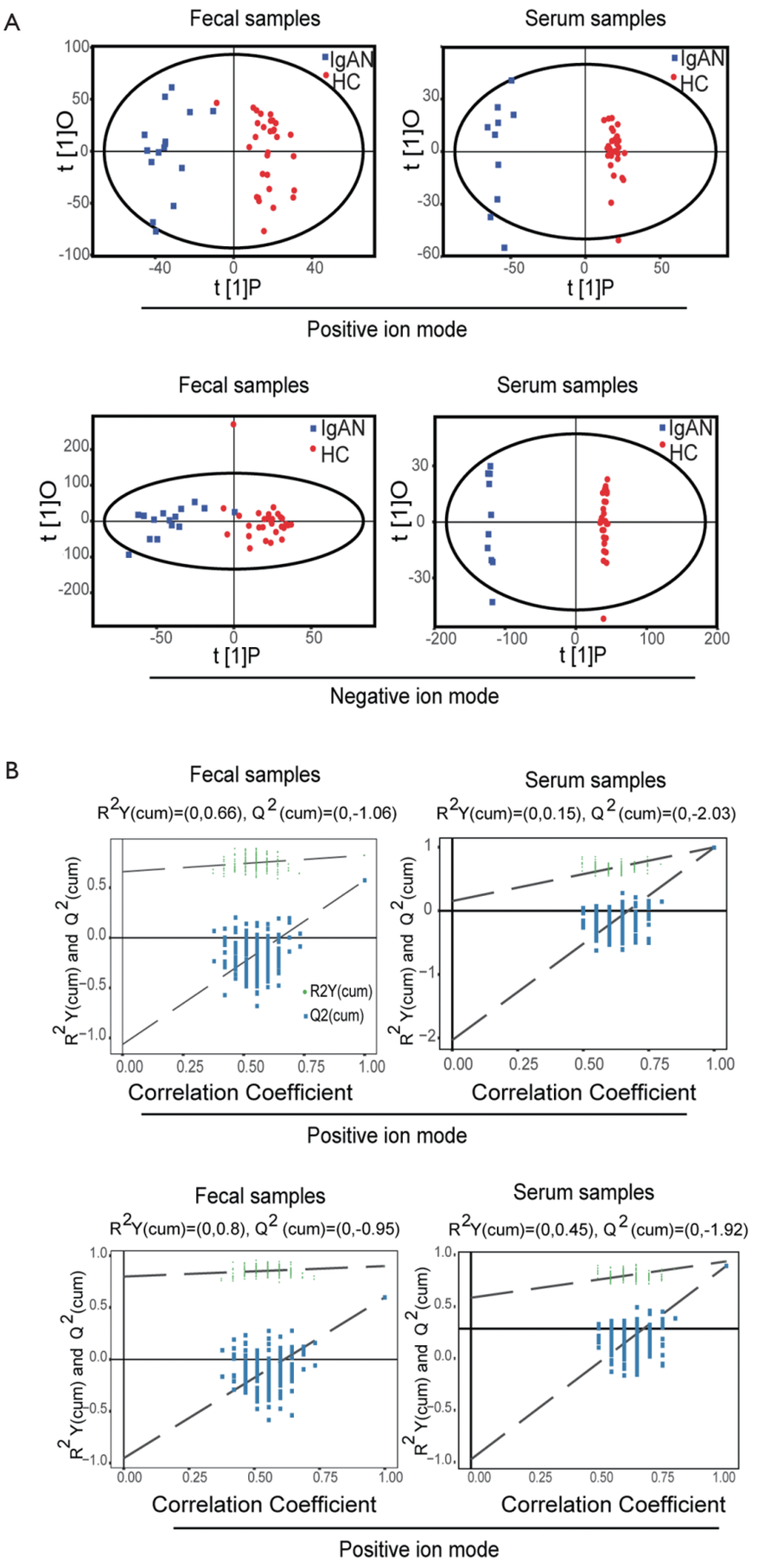

Figure S2 Differences in metabolic profile between healthy controls (HCs) and immunoglobulin A nephropathy (IgAN) patients. Orthogonal projections to latent structures-discriminant analysis (OPLS-DA) score plots (A) and permutation tests of OPLS-DA models (B) for fecal and serum samples from HC and IgAN groups. To assess the robustness and predictive ability of the OPLS-DA model, 200 permutations were conducted, and R2 and Q2 intercept values were obtained. R2 indicates how well the variation of each variable is explained. Q2 intercept value represents the robustness of the model, the risk of overfitting, and the reliability of the model, with lower values indicating better models. Results indicate that the model was robust without overfitting.

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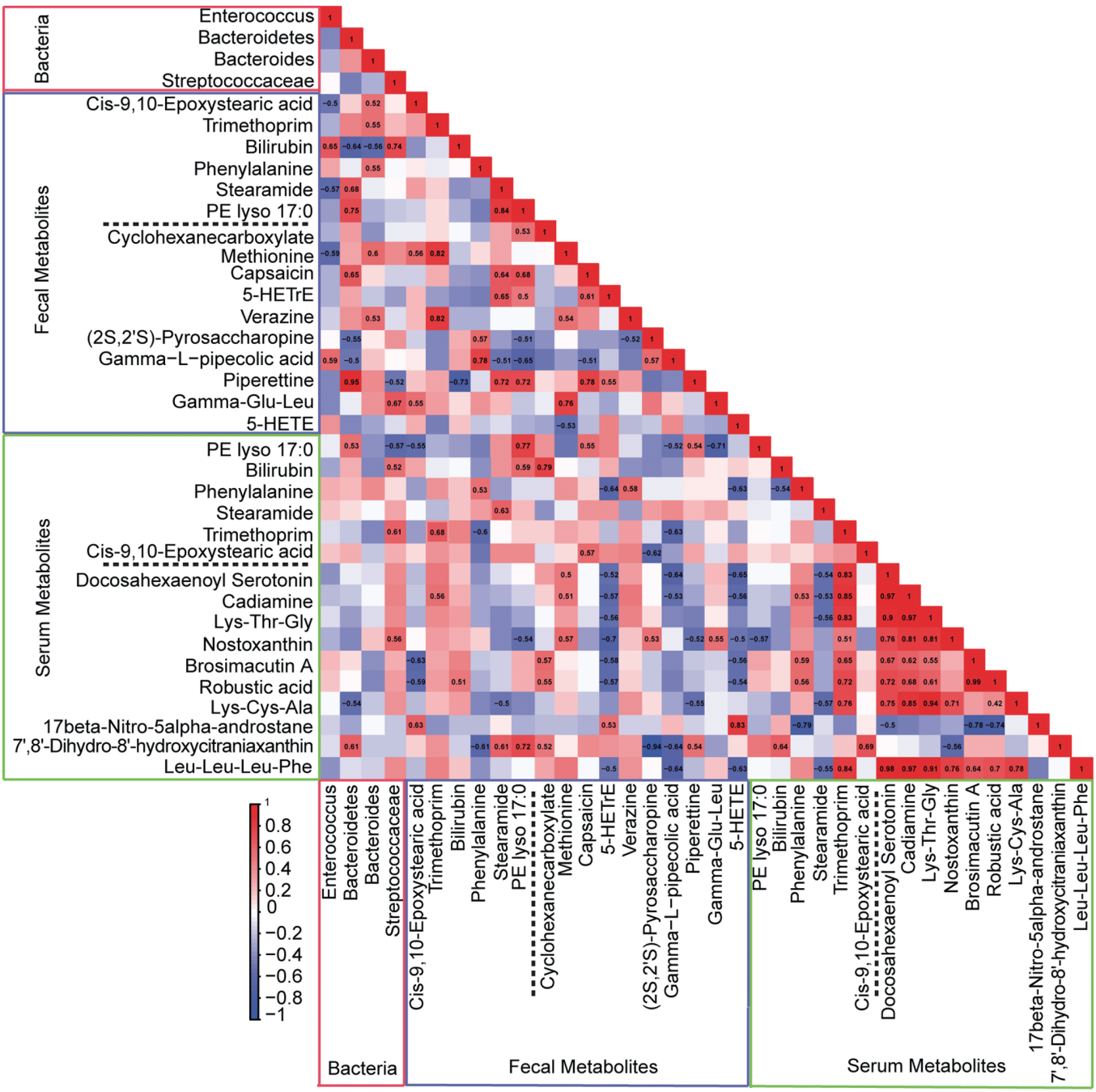

Figure S3 Correlation between fecal microbes, fecal metabolites, and serum metabolites in immunoglobulin A nephropathy patients. Correlation coefficients |r|>0.5 and P<0.05 are marked with numbers and considered significant correlations. r, Pearson correlation coefficient.

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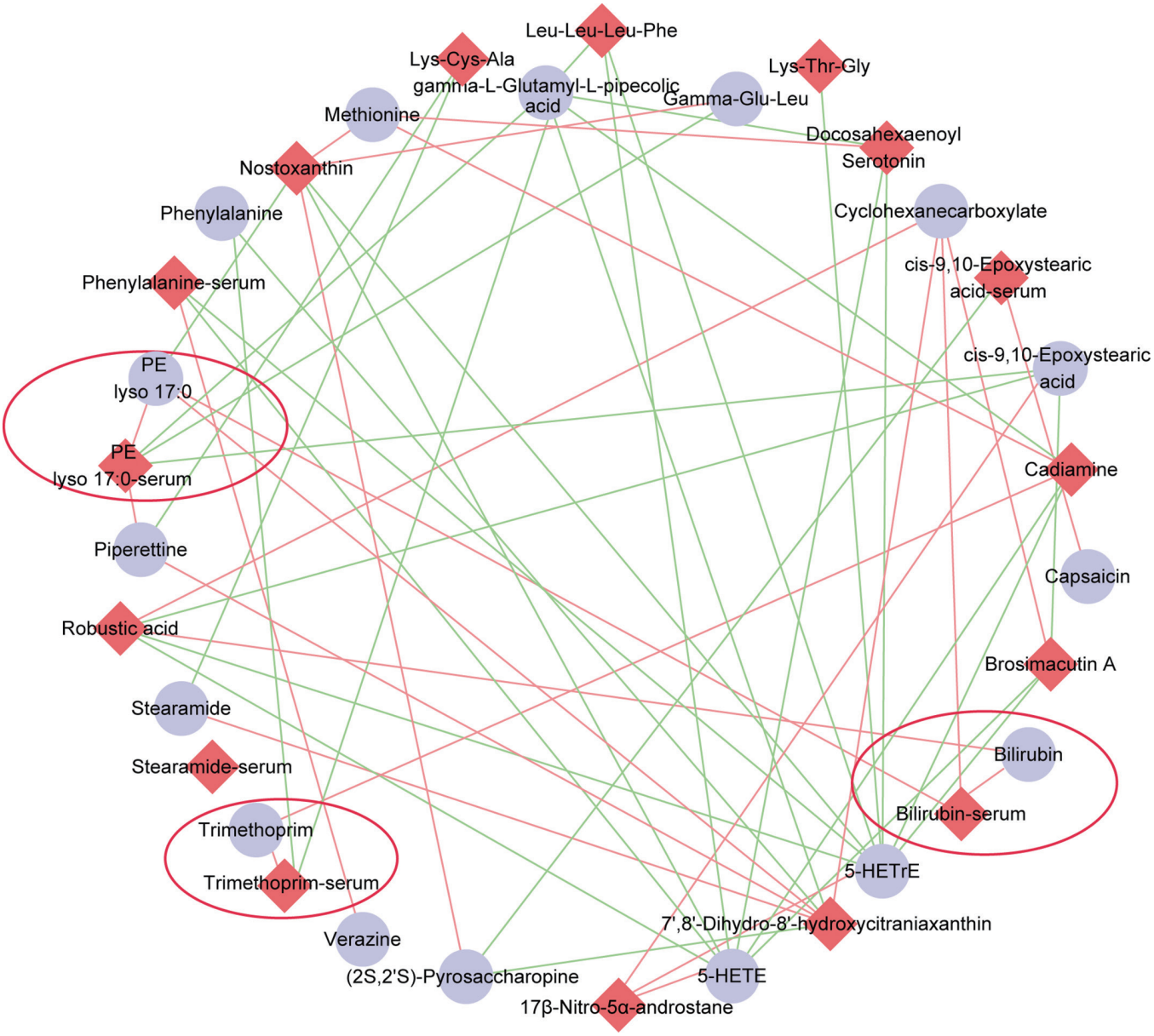

Figure S4 Correlation between fecal metabolites and serum metabolites in immunoglobulin A nephropathy patients (|r|>0.5). The rhombus represents serum metabolites, and the circles represent fecal metabolites. Green lines indicate negative correlations, and red lines represent positive correlations. r, Pearson correlation coefficient.

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Table S1 Clinical characteristics of healthy controls and immunoglobulin A nephropathy patients

	Healthy control group n=30	IgAN group n=15
Gender (male/female)	20/10	7/8
Age (years)	44.1±1.91	38.64±2.91
BMI (kg/m^2)	24.54±0.78	21.89±0.72
Systolic pressure	125.6±4.335	118.9±3.241
24h proteinuria	NA	1.94±0.44
ALT(U/L)	24.55±2.08	14±1.64
AST(U/L)	22.2±0.92	19.36±1.25
Serum albumin(g/L)	44.76±0.56	33.41±2.29***
FBG (mmol/l)	5.379±0.13	5.027±0.17
Urea nitrogen(mmol/l)	4.78±0.23	6.16±0.97
Creatinine(umol/l)	75.43±3.24	168.7±61.26*
Uric acid(umol/l)	339.5±15.65	435.5±37.07**
cholesterol(mmol/l)	4.56±0.15	5.56±0.66
Triglyceridemmol/l	1.51±0.24	1.3±0.14
HDL (mmol/l)	1.46±0.05	1.16±0.12
LDL (mmol/l)	2.47±0.11	3.21±0.38

BMI, Body Mass Index; ALT, alanine transaminase; AST, aspartate amino transferase; FBG, fasting blood glucose; HDL, high density lipoprotein; LDL, low density lipoprotein; NA, not available. *, P<0.05; **, P<0.01; ***, P<0.001

Table S2 Histological characteristics of immunoglobulin A nephropathy patients

Patients	Glomerular number	Endocapillary proliferation	Segmental sclerosis	Mesangial hypercellularity	Tubular atrophy	Crescent	Interstitial fibrosis	Inflammatory infiltration	IgG	IgA	IgM	C1q	C3	Oxford classification
No.1	30	√	√	>50%	35%	5%	+	++	–	+++	+	–	+	M1S1E1T1C1
No.2	37	√	√	>50%	65%	2%	++	+++	–	+++	-	–	–	M1S1E1T2C1
No.3	23	√	×	<50%	10%	0%	+	+	+	+++	+	–	–	M0S0E1T0C0
No.4	16	√	×	>50%	20%	0%	++	+++	–	+++	–	–	++	M1S0E1T0C0
No.5	19	×	×	<50%	10%	0%	–	+	–	+++	–	–	–	M0S0E0T0C0
No.6	15	×	√	>50%	30%	0%	++	++	–	+++	–	–	–	M1S1E0T1C0
No.7	10	×	×	<50%	10%	0%	++	++	–	++	–	–	–	M0S0E0T0C0
No.8	18	×	√	<50%	20%	0%	+	+	+	++	–	–	–	M0S1E0T0C0
No.9	22	√	×	>50%	60%	6%	++	++	–	++	+	–	–	M1S0E1T2C1
No.10	15	√	×	<50%	10%	0%	+	+	–	+++	+	–	++	M0S0E1T0C0
No.11	20	×	√	<50%	5%	0%	+	+	–	+++	–	–	++	M0S1E0T0C0
No.12	26	×	√	>50%	40%	0%	+	+	–	+++	–	–	–	M1S1E0T1C0
No.13	14	√	√	<50%	36%	0%	++	++	+	+++	–	–	++	M0S1E1T1C0
No.14	15	×	√	>50%	28%	0%	++	+	–	++	–	–	++	M1S1E0T1C0
No.15	27	√	×	<50%	18%	0%	+	+	+	+++	–	–	+	M0S0E1T0C0

(–), Negative result; (+), varying degrees.

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Table S3 Differential metabolites in the fecal samples of the healthy control and immunoglobulin A nephropathy groups

MS2 name	Log FC	Classification	Ionization mode
Evoxanthidine	–2.24	Acridines	POS
O-propanoyl-carnitine	–1.91	Acylcarnitine	POS
1,7-Dimethyluric acid	–2.72	Alkaloid	POS
Capsaicin	–4.75	Alkaloid	POS
Cassaine	–3.17	Alkaloid	POS
Codeine	–1.96	Alkaloid	POS
Piperettine	–4.63	Alkaloid	POS
Verazine	–3.86	Alkaloid	POS
Suloctidil	–2.35	Amines	NEG
Methionine	1.67	Amino acid	POS
L-Methionine	0.93	Amino acid	NEG
Lysine	0.88	Amino acid	NEG
Phenylalanine	1.19	Amino acid	NEG
Rebamipide	–2.33	Amino acid	POS
trans-S-(1-Propenyl)-L-cysteine	–2.98	Amino acid derivative	POS
Trimethoprim	1.83	Aminopyrimidine	POS
Isoxaben	–1.68	Benzazole	POS
Raclopride	–3.02	Benzazole	POS
3-Indolepropionic acid	–1.36	Benzazole	NEG
Boviquinone 4	–1.10	Benzoquinone	POS
beta-L-Fucose 1-phosphate	–3.45	Carbohydrate	NEG
Bufalin	–2.66	Carbohydrate	NEG
D-Glucuronic acid	1.09	Carbohydrate	NEG
Xanthosine	0.71	Carbohydrate	NEG
(2S,2'S)-Pyrosaccharopine	4.33	Carbohydrate	POS
THTC	1.26	Carboxylic Acids	POS
3,4-Dimethoxycinnamic acid	–4.70	Carboxylic Acids	NEG
3-Phenylpropionic acid	–2.46	Carboxylic Acids	NEG
alpha-CMBHC	–1.16	Carboxylic Acids	NEG
Mycophenolic acid	–1.14	Carboxylic Acids	NEG
Norleucine	1.07	Carboxylic Acids	NEG
Sebacic acid	–1.11	Carboxylic Acids	NEG
Urocanate	1.24	Carboxylic Acids	NEG
Aspidofractine	–1.40	Carboxylic Acids	POS
3,6-Dioxo-5beta-cholan-24-oic Acid	–2.98	Cholic Acids	POS
3-Oxo-5beta-chola-7,9(11)-dien-24-oic Acid	–3.02	Cholic Acids	POS
3b-Hydroxy-5-cholenoic acid	–1.63	Cholic Acids	NEG
Dronedarone	–1.65	Cytochrome	NEG
Deoxycholate	–0.69	Eoxycholic acid	NEG
Ursodeoxycholic acid	–1.07	Eoxycholic acid	POS
Erythronolactone	0.53	Esters	NEG
delta-Tridecalactone	–2.74	Esters	POS
(3b,24x)-Cycloartane-3-oxo-24,25-diol	3.65	Fatty Alcohols	POS
13-Tetradecene-1,3-diyne-6,7-diol	–0.81	Fatty Alcohols	POS
Falcarindiol	–0.83	Fatty Alcohols	POS
15-HETE-DA	–0.97	Fatty amides	POS
N-docosanoyl taurine	–2.67	Fatty amides	POS
N-oleoyl phenylalanine	–2.02	Fatty amides	POS
Palmitoleamide	–2.63	Fatty amides	POS
Stearamide	–1.66	Fatty amides	POS
(4Z,7Z,10Z,13Z,16Z,19Z)-Docosahexaenoic acid ethyl ester	–1.10	Fatty esters	POS
4E-Decenyl acetate	–2.36	Fatty esters	POS
Stearidonic Acid ethyl ester	–2.17	Fatty esters	POS
29-Norcycloartane-3,24-dione	–1.35	Flavonoids	POS
1-Hydroxy-2-(9Z,12Z-octadecadienoyl)-sn-glycero-3-phosphoethanolamine	–1.50	Phospholipid	NEG
PE(18:1(9Z)/0:0)	–0.79	Phospholipid	NEG
Phosphatidylethanolamine lyso 17:0	0.98	Phospholipid	NEG
PE(O-16:0/0:0)	–1.08	Phospholipid	POS
Enterolactone	–1.50	Hydrocarbon	NEG
Maslinic Acid	–1.45	Hydrocarbon	NEG
5-(1-hydroxypropan-2-yl)isolongifolane	–2.71	Hydrocarbon	POS
5-propylideneisolongifolane	–2.77	Hydrocarbon	POS
Cassaidine	–1.15	Hydrocarbon	POS
2-(5,8-Tetradecadienyl)cyclobutanone	–1.80	Ketosteroid	POS
3-keto Petromyzonol	–0.78	Ketosteroid	POS
12,13-DiHOME	–1.46	Long-chain fatty acid	NEG
15S-HEPE	–1.75	Long-chain fatty acid	NEG
16R-HETE	–1.05	Long-chain fatty acid	NEG
17-Octadecynoic Acid	–2.24	Long-chain fatty acid	NEG
2,3-dinor Thromboxane B1	–1.03	Long-chain fatty acid	NEG
3-hydroxy-tetradecanoic acid	–1.33	Long-chain fatty acid	NEG
5-HETE	–2.69	Long-chain fatty acid	NEG
5-HETrE	–4.67	Long-chain fatty acid	NEG
9,10-DiHOME	–1.19	Long-chain fatty acid	NEG
9R,10S-EpOME	–1.88	Long-chain fatty acid	NEG
alpha-ESA	–2.00	Long-chain fatty acid	NEG
Arachidonic Acid	–1.00	Long-chain fatty acid	NEG
cis-9,10-Epoxystearic acid	–1.82	Long-chain fatty acid	NEG
DL-2-hydroxy stearic acid	–2.33	Long-chain fatty acid	NEG
Eicosapentaenoic Acid	–1.41	Long-chain fatty acid	NEG
Oleic acid	–0.93	Long-chain fatty acid	NEG
Palmitoleic acid	–1.69	Long-chain fatty acid	NEG
11beta-PGF2alpha	–2.56	Long-chain fatty acid	POS
12(R)-HEPE	–2.08	Long-chain fatty acid	POS
17-phenyl trinor PGF2alpha cyclohexyl amide	–1.13	Long-chain fatty acid	POS
9,10-epoxy-11-hydroxy-12-octadecenoic acid	–1.70	Long-chain fatty acid	POS
Myristoleic acid	–2.74	Long-chain fatty acid	POS
13,14-dehydro-15-cyclohexyl Carbaprostacyclin	–1.19	Long-chain fatty acid	NEG
15(R)-Iloprost	–1.62	Long-chain fatty acid	NEG
16,16-dimethyl-PGA1	–0.35	Long-chain fatty acid	NEG
FAHFA 36:1	–1.68	Long-chain fatty acid	NEG
14,15-EE-8(Z)-E	–2.30	Other	NEG
1,2-Dihydroxytacrine	–1.39	Other	POS
Cadabicilone	–1.69	Other	POS
Schidigeragenin B	–1.17	Other	POS
Potassium bis(2-hydroxyethyl)dithiocarbamate	–1.19	Other	POS
6-Hydroxymethyletoricoxib	–1.32	Oxidoreductase	POS
Isoquinoline N-oxide	–0.89	Oxynitride	NEG
Gamma-Glu-Leu	1.77	Peptide	NEG
Met-Met-Pro	–1.81	Peptide	POS
Trp-Val-Val	–2.35	Peptide	POS
Ile-Gly-Ile	1.41	Peptide	POS
Leu-Ser-Asn-His	–1.04	Peptide	POS
Lys-Gly-Leu	2.45	Peptide	POS
Met-Tyr-Arg	1.57	Peptide	POS
Thr-Phe	0.89	Peptide	POS
Tyr-OEt	–1.54	Peptide	POS
Val-Asn-Ile	1.44	Peptide	POS
Val-Ser-Val	1.26	Peptide	POS
Acetyl-DL-Valine	–2.59	Peptide	POS
LPA(0:0/16:0)	–2.98	Phosphatidic acids	POS
PE(18:2(9Z,12Z)/0:0)	–2.20	Phosphatidic acids	POS
PC(14:0/O-1:0)	–1.53	Phosphocholine	POS
Bilirubin	0.97	Pigment	POS
Mesobilirubinogen	1.57	Pigment	POS
gamma-L-Glutamyl-L-pipecolic acid	5.09	Pipecolic acid	POS
PGG2	–2.60	Prostanoid	NEG
19(R)-hydroxy PGF2alpha	–1.70	Prostanoid	POS
PGH1	–1.82	Prostanoid	POS
Adenine	–0.64	Purines	NEG
Valganciclovir	–2.07	Purines	NEG
D-erythro-Sphingosine C-20	–1.46	Sphingosine	POS
3alpha,12alpha-Dihydroxy-5beta-pregnan-20-one diacetate	–0.94	Steroid	POS
6-keto Testosterone Enanthate	–1.18	Steroid	POS
Quercetin Pentamethyl Ether	–1.68	Steroid	POS
(22E)-3alpha,12alpha-Dihydroxy-5beta-chol-22-en-24-oic Acid	–1.15	Sterol Lipids	POS
25-Hydroxy[26,27-methyl]vitamin D3 3beta-(1,2-epoxypropyl)ether	–1.27	Sterol Lipids	POS
7,12-Dioxo-5beta-cholan-24-oic Acid	–0.85	Sterol Lipids	POS
Crassin acetate	2.25	Terpene	POS
1alpha,25-dihydroxy-8(14)a-homovitamin D3	–1.88	Vitamins	POS

A total of 131 differential metabolites were identified, including 78 metabolites in positive ion mode and 53 metabolites in negative ion mode. The following screening criteria were set: VIP >1 and P<0.05. Compared to the HC group, a total of 110 metabolites were lower and 21 metabolites were higher in the IgAN group. We also classified each metabolite based on its chemical properties. HC, healthy control; IgAN, immunoglobulin A nephropathy; Log FC, Log fold change; POS, positive ion mode; NEG, negative ion mode.

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Table S4 Differential metabolites in the serum samples of the healthy control and immunoglobulin A nephropathy groups

MS2 name	Log FC	Classification	Ionization mode
Pseudopelletierine	8.31	Alkaloids	POS
Gabapentin	7.26	Amines	POS
Cadiamine	11.97	Amines	POS
Selenohomocysteine	1.86	Amino acid zwitterion	POS
Tryptophan	0.46	Amino acid	NEG
D-Glu	0.43	Amino acid	NEG
Arginine	0.45	Amino acid	NEG
Phenylalanine	0.30	Amino acid	NEG
7',8'-Dihydro-8'-hydroxycitraniaxanthin	–9.21	Benzopyrans	POS
Pseudouridine	–0.49	Carbohydrate	NEG
L-(+)-Gulose	0.35	Carbohydrate	NEG
L-Erythrulose	0.22	Carbohydrate	NEG
D-Lactic acid	–0.39	Carboxylic acid	NEG
Pyroglutamic acid	–0.35	Carboxylic acid	NEG
Pyruvic acid	–0.32	Carboxylic acid	NEG
PSOROMIC ACID	0.08	Carboxylic acid	NEG
Thiofanox	–8.89	Carboxylic acid	POS
3-Phenoxybenzoic acid	–0.25	Carboxylic acid	NEG
Glycocholic Acid	–5.12	Cholic Acids	POS
Deoxycholic acid	–1.75	Eoxycholic acid	NEG
Isohyodeoxycholic acid	–1.65	Eoxycholic acid	NEG
4-Methoxycinnamoyloleanolic acid methyl ester	–4.59	Esters	POS
Oleamide	–6.30	Fatty amide	POS
Stearamide	–5.13	Fatty amide	POS
dodecanamide	–0.63	Fatty amide	POS
C-6 NBD-dihydro-Ceramide	–7.20	Fatty amide	POS
2-(4-Morpholinyl)benzothiazole	–7.74	Flavonoids	POS
N-docosahexaenoyl GABA	–1.54	Flavonoids	POS
PE(16:1(5Z)/16:1(5Z))	–8.49	Glycerophospholipid	POS
Irbesartan	–1.29	Hydrocarbon	NEG
Confertifoline	–2.31	Hydrocarbon	NEG
2-tetracosanamidoethanesulfonic acid	–2.01	Hydrocarbon	NEG
(-)-Perillic acid	–2.37	Hydrocarbon	NEG
Sclerosporin	–1.11	Hydrocarbon	POS
Dihydrovaltrate	–5.41	Hydrocarbon	POS
Nostoxanthin	–9.30	Hydrocarbon	POS
Robustic acid	10.69	Hydroxy compound	POS
Docosahexaenoyl Serotonin	12.13	Indoles	POS
Sunitinib	–0.84	Indoles	NEG
3,4-Dehydro-6-hydroxymellein	–0.46	Lactones	POS
13-HpODE	–0.58	Lipid Peroxides	NEG
9-HETE	–1.58	Long-chain fatty acid	NEG
13-HODE	–1.27	Long-chain fatty acid	NEG
12-OPDA	0.53	Long-chain fatty acid	NEG
Palmitic amide	–5.16	Long-chain fatty acid	POS
Oleoyl Ethyl Amide	–4.04	Long-chain fatty acid	POS
Isolauric acid	–0.60	Medium-chain fatty acid	NEG
Lauric acid	–0.17	Medium-chain fatty acid	NEG
Undecanoic acid	–0.09	Medium-chain fatty acid	NEG
Decanoic acid	–0.45	Medium-chain fatty acid	NEG
cis-9,10-Epoxystearic acid	–0.88	Medium-chain fatty acid	NEG
cis-5-dodecenoic acid	–0.96	Medium-chain fatty acid	NEG
Dihydrojasmonic Acid	–0.14	Medium-chain fatty acid	NEG
Myristic Acid Alkyne	–1.47	Medium-chain fatty acid	NEG
Trimethoprim	3.77	Miazines	POS
Dodecylbenzenesulfonic acid	–0.24	Organic acid	NEG
Lys-Thr-Gly	10.44	Peptide	POS
Lys-Cys-Ala	11.69	Peptide	POS
Leu-Val-Lys-Arg	–2.73	Peptide	POS
Brosimacutin A	13.22	Peptide	POS
Leu-Leu-Phe	13.53	Peptide	POS
Leu-Pro-Leu-Lys	–8.09	Peptide	POS
Acylated phloroglucinol	9.13	Phenols	NEG
Phenolphthalein	–0.11	Phenols	NEG
4-Hexylresorcinol	–2.03	Phenols	NEG
PC(18:2(9Z,12Z)/12:0)	–7.01	Phosphocholine	POS
PC(0:0/14:0)	–8.09	Phosphocholine	POS
PC(P-19:1(12Z)/0:0)	–9.20	Phosphocholine	POS
Phosphatidylethanolamine lyso 16:0	0.60	Phospholipids	NEG
Phosphatidylethanolamine lyso 17:0	0.72	Phospholipids	NEG
Phosphatidylinositol 16:0-18:2	0.62	Phospholipids	NEG
Bilirubin	1.41	Pigment	POS
6-(Methylthio)purine	–0.38	Purines	NEG
N-Methyl-2-pyrrolidinone	4.58	Pyrrolidinones	POS
Isokobusone	–0.33	Steroid	NEG
3-beta-hydroxyandrost-5-en-17-one sulfate	–0.99	Steroid	NEG
NORETHINDRONE ACETATE	–0.71	Steroid	NEG
17beta-Nitro-5alpha-androstane	–11.29	Steroid	POS
17-[(Benzylamino)methyl]estra-1,3,5(10)-triene-3,17beta-diol	9.21	Steroid	POS
(23R)-23,25-dihydroxyvitamin D3	–0.59	Vitamin	NEG

Eighty differential metabolites were identified, including 43 metabolites in positive ion mode and 37 metabolites in negative ion mode. The following screening criteria were set: VIP >1 and P<0.05. Compared to the HC group, a total of 56 metabolites were lower and 24 metabolites were higher in the IgAN group. HC, healthy control; IgAN, immunoglobulin A nephropathy; Log FC, Log fold change; POS, positive ion mode; NEG, negative ion mode.

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Table S5 Correlation between intestinal microbes and metabolites in immunoglobulin A nephropathy patients

Bacteria	Fecal metabolites	Serum metabolites
Enterococcus	Cis-9,10-Epoxystearic acid	
	Bilirubin	
	Stearamide	
	Methionine	
	Gamma-L-Glutamyl-L-pepecolic acid	
Bacteroidetes	Bilirubin	7',8'-Dihydro-8'-hydroxycitraniaxanthin
	Stearamide	Lys-Cys-Ala
	PE lyso 17:0	PE lyso 17:0
	Capsaicin	
	(2S,2'S)-Pyrosaccharopine	
	Gamma-L-Glutamyl-L-pepecolic acid	
	Piperettine	
Bacteroides	Cis-9,10-Epoxystearic acid	
	Trimethoprim	
	Bilirubin	
	Phenylalanine	
	Methionine	
	Verazine	
Streptococcaceae	Bilirubin	Bilirubin
	Piperettine	PE lyso 17:0
	Gamma-Glu-Leu	Trimethoprim
		Nostoxanthin

http://dx.doi.org/10.21037/atm-20-2506

Table S6 Correlation between intestinal microbes and metabolites in immunoglobulin A nephropathy patients

Bacteria	$Pro_{/24h}$<1.5g/L	$Pro_{/24h}$>1.5g/L	eGFR<90 mL/min/1.73 $^{m}2$	eGFR>90 mL/min/1.73 m^2
Streptococcus	1901±927.8	3454±2058	4259±1984	613.4±158
Bacteroides	1891±1060	2131±831.1	2298±810.5	1624±1075
Enterococcus	75±45.16	31.88±6.45	55.29±26.36	33.6±7.78
fecal metabolite				
gamma-L-Glutamyl-L-pipecolic acid	56.7±28.78	121.8±70.71	64.18±23.41	147.4±113.5
(2S,2'S)-Pyrosaccharopine	2.27±0.86	6.94±2.46	3.54±1.2	7.46±3.76
11beta-PGF2alpha	0.28±0.17	0.4±0.26	0.26±0.13	0.578±0.41
PGG2	0.2±0.14	0.3±0.17	0.3±0.17	0.19±0.09
Cyclohexanecarboxylate	0.36±0.27	0.28±0.17	0.28±0.18	0.37±0.27
5-HETE	0.37±0.18	0.11±0.03	0.28±0.12	0.12±0.04
Verazine	0.05±0.03	0.06±0.04	0.04±0.02	0.09±0.06
Piperettine	0.01±0.01	0.03±0.01	0.02±0.01	0.03±0.02
5-HETrE	0.11±0.06	0.10±0.05	0.09±0.04	0.13±0.09
Capsaicin	0.02±0.02	0.19±0.11	0.06±0.02	0.22±0.19
Serum metabolite				
Leu-Leu-Phe	2.42±0.49	2.77±0.28	2.52±0.34	2.84±0.35
Brosimacutin A	0.14±0.04	0.16±0.02	0.14±0.03	0.18±0.02
Docosahexaenoyl Serotonin	0.07±0.01	0.08±0.01	0.07±0.01	0.08±0.01
Cadiamine	3.58±0.65	3.73±0.34	3.63±0.43	3.74±0.44
Lys-Cys-Ala	0.05±0.01	0.04±0.01	0.04±0.01	0.04±0.01
Robustic acid	0.05±0.02	0.06±0.01	0.05±0.01	0.06±0.01
Lys-Thr-Gly	0.45±0.06	0.45±0.04	0.45±0.04	0.46±0.06
17beta-Nitro-5alpha-androstane	0.02±0.01	0.015±0.01	0.018±0.01	0.02±0.01
Nostoxanthin	0.016±0.01	0.017±0.01	0.018±0.01	0.02±0.01
7',8'-Dihydro-8'-hydroxycitraniaxanthin	0.012±0.01	0.013±0.01	0.015±0.01	0.018±0.01

$Pro_{/24h}$: 24-hours proteinuria; eGFR: estimated Glomerular Filtration Rate. No data achieved statistical significance.

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Table S7 Correlation between the Oxford classification of immunoglobulin A nephropathy and the top 10 fecal and serum metabolites

Bacteria	The Oxford Classification of IgA nephropathy							
	M0 (n=8)	M1 (n=7)	S0 (n=7)	S1 (n=8)	E0 (n=7)	E1 (n=8)	T0 (n=8)	>T0 (n=7)
Streptococcus	3440±1931	2843±1413	1524±526.1	2104±1821	2859±1572	2847±2559	2802±1581	3037±2471
Bacteroides	1793±717.5	3393±937.9	1435±1127	2416±767	1207±577.6	1834±231.2	1570±729.4	3601±806.9
Enterococcus	61.71±25.14	43.7±12.77	83.25±42.3	57.65±25.1	46.25±16.3	34.32±19.54	53.45±13.67	27.33±13.78
Fecal metabolite								
Gamma-L-Glutamyl-L -pipecolic acid	47.25±19.9	165.3±145.4	75.4±29.66	104.2±64.45	104.7±64.53	65.55±35.4	44.76±18.47	200.4±137.7
(2S,2'S)-Pyrosaccharopine	3.86±1.21	6.32±5.13	4.85± 0.96	5.0±2.41	5.68±2.27	3.6±2.05	3.69±1.12	8.08±4.92
11beta-PGF2alpha	0.37±0.27	0.36±0.25	0.24±0.11	0.24±0.11	0.45±0.24	0.09±0.02	0.44±0.25	0.11±0.03
PGG2	0.23±0.11	0.41±0.35	0.28±0.17	0.25±0.16	0.22±0.1	0.4±0.35	0.21±0.1	0.42±0.34
Cyclohexanecarboxylate	0.31±0.16	0.44±0.42	0.13±0.06	0.41±0.22	0.44±0.22	0.08±0.05	0.44±0.22	0.08±0.05
5-HETE	0.22±0.08	0.06±0.02	0.4374±0.2	0.10±0.03**	0.18±0.07	0.1±0.06	0.18±0.07	0.1±0.06
Verazine	0.08±0.04	0.02±0.01	0.08±0.07	0.04±0.02	0.08±0.04	0.01±0.01	0.07±0.04	0.03±0.01
Piperettine	0.02±0.01	0.02±0.01	0.02±0.02	0.02±0.01	0.02±0.01	0.02±0.01	0.02±0.01	0.02±0.01
5-HETrE	0.09±0.05	0.09±0.03	0.19±0.1	0.04±0.02*	0.1± 0.05	0.05±0.02	0.09±0.05	0.07±0.02
Capsaicin	0.15±0.12	0.08±0.04	0.2±0.19	0.07±0.02	0.15±0.1	0.07±0.05	0.14±0.11	0.08±0.04
Serum metabolite								
Leu-Leu-Phe	2.87±0.25	1.95±0.1	2.39±0.36	2.83±0.31	2.77±0.28	2.72±0.68	2.77±0.28	2.72±0.68
Brosimacutin A	0.08±0.03	0.18±0.01*	0.14±0.03	0.17±0.02	0.17±0.01	0.14±0.04	0.18±0.01	0.14±0.04
Docosahexaenoyl Serotonin	0.08±0.01	0.06±0.01	0.07±0.01	0.08±0.01	0.08±0.01	0.08± 0.02	0.08±0.01	0.08±0.02
Cadiamine	3.96±0.31	2.82±0.13	3.36±0.4	4.0±0.43	3.78±0.31	3.89±0.95	3.78±0.31	3.89±0.95
Lys-Cys-Ala	0.04±0.01	0.05±0.01	0.04±0.01	0.04±0.01	0.05±0.01	0.04±0.01	0.05±0.03	0.04±0.01
Robustic acid	0.03±0.02	0.06±0.01*	0.05±0.01	0.06±0.01	0.06±0.01	0.05± 0.02	0.06±0.01	0.05±0.02
Lys-Thr-Gly	0.37±0.01	0.48±0.03	0.44±0.05	0.47±0.05	0.47±0.04	0.46±0.1	0.47±0.04	0.46±0.1

E, endocapillary proliferation; M, mesangial hypercellularity; S, segmental sclerosis; T, tubular atrophy and interstitial fibrosis. *, P<0.05; **, P<0.01.

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