Table S1. Hyperlipidemia diagnose rules which formulated by China Adult Dyslipidemia Prevention Guide

formulate joint committee and American National Cholesterol Education Program.

Hierarchy	TC	LDL	HDL	TG
Proper Range	<5.18 mmol/L(200mg/dl)	<3.37mmol/L(130mg/dl)	≥1.04mmol/L(40mg/dl)	<1.70mmol/L(150mg/dl)
Verge Level	5.18~6.19mmol/L(200~239mg/dl)	3.37~4.12mmol/L(130~159mg/dl)	-	1.70~2.25mmol/L(150~199mg/dl)
Increase	≥6.22mmol/L(240mg/dl)	≥4.14mmol/L(160mg/dl)	≥1.55mmol/L(60mg/dl)	≥2.26mmol/L(200mg/dl)
Decrease	-	-	<1.04mmol/L(40mg/dl)	-

Table S2. The basic information of hyperlipidemia patient

NO.	Gender	Age	Diagnosis
1	Female	64	1.Hyperlipidemia 2.Coronary atherosclerotic cardiopathy 3.Unstable angina pectoris 4.Hypertension(extremely high-risk groups)
2	Female	80	1. Hyperlipidemia
			2.Hypertension(extremely high-risk groups)
			3.Chronic renal insufficiency
			4. Coronary atherosclerotic cardiopathy
3	Female	67	1. Hyperlipidemia
			2.Hypertension(extremely high-risk groups)
			3. Coronary atherosclerotic cardiopathy
4	Female	78	1. Hyperlipidemia
			2.Coronary atherosclerotic cardiopathy 3.Unstable angina
			4.Hypertension(extremely high-risk groups)
			5. Arrhythmia and Atrial fibrillation
5	Male	61	1. Hyperlipidemia
			2. Atrial flutter
			3. Hypertension(high-risk groups)
			4.Chronic renal insufficiency
6	Male	69	1. Hyperlipidemia
			2. Arrhythmia and Atrial fibrillation
			3.Bronchial asthma
			4. Coronary atherosclerotic cardiopathy
			5.Hyperuricemia
7	Female	48	1. Hyperlipidemia
			2.Coronary atherosclerotic cardiopathy
			3. Hypertension(extremely high-risk groups)
			4. Arrhythmia and Atrial fibrillation
8	Male	77	1. Hyperlipidemia
			2. Coronary atherosclerotic cardiopathy
9	Male	69	1. Hyperlipidemia
			2. Arrhythmia and Atrial fibrillation
			3.Bronchial asthma
			4.Hyperuricemia
10	Male	80	1. Hyperlipidemia
			2.Coronary atherosclerotic cardiopathy
			3.Hypertension(extremely high-risk groups)
			4. Chronic cardiac failure
11	Female	68	1. Hyperlipidemia
			2.Coronary atherosclerotic cardiopathy
			3.Hypertension(extremely high-risk groups)
			4.Type 2 Diabetes
			5. Acute pancreatitis
12	Female	73	1. Hyperlipidemia
			2.Coronary atherosclerotic cardiopathy
			3.Hypertension(extremely high-risk groups)
			4.Type 2 Diabetes

			5. Cardiac failure
13	Female	77	1. Hyperlipidemia
			2. Coronary atherosclerotic cardiopathy
14	Male	80	1. Hyperlipidemia
			2.Hypertension(extremely high-risk groups)
15	Male	60	1. Hyperlipidemia
			2.Coronary atherosclerotic cardiopathy
			3.Hypertension(extremely high-risk groups)
			4. Arrhythmia and Atrial fibrillation
16	Female	69	1. Hyperlipidemia
			2.Hypertension(extremely high-risk groups)
			3. Coronary atherosclerotic cardiopathy
			4.Chronic renal insufficiency
17	Male	65	1. Hyperlipidemia
			2.Type 2 Diabetes
			3. Coronary atherosclerotic cardiopathy
18	Female	75	1. Hyperlipidemia
			2.Arrhythmia Atrial premature beats
			3.Fleshy cardiomyopathy
			4.Hypertension(extremely high-risk groups)
			5.Type 2 Diabetes
			6. Coronary atherosclerotic cardiopathy
19	Male	77	1. Hyperlipidemia
			2.Arrhythmia and Atrial fibrillation
			3.Hypoproteinemia
			4. Coronary atherosclerotic cardiopathy
			5.Hyperuricemia
20	Female	66	1. Hyperlipidemia
			2.Arrhythmia
			3.Hypertension
			4. Coronary atherosclerotic cardiopathy
			5.Type 2 Diabetes
21	Female	74	1. Hyperlipidemia
			2.Hypertension(extremely high-risk groups)
			3. Coronary atherosclerotic cardiopathy
			4.Chronic renal insufficiency
22	Female	77	1. Hyperlipidemia
			2.Coronary atherosclerotic cardiopathy
			3. Hypertension(high-risk groups)
			4.Cervical spondylosis
23	Male	71	Hyperlipidemia
24	Female	80	1. Hyperlipidemia
			2.Hypertension(extremely high-risk groups)
			3.Type 2 Diabetes
			4. Coronary atherosclerotic cardiopathy
			5.Arrhythmia and Atrial fibrillation
25	Female	56	1. Hyperlipidemia
			2.Chronic renal insufficiency
			3.Hypertension(extremely high-risk groups)

26	Male	79	1. Hyperlipidemia
			2. Coronary atherosclerotic
27	Male	80	1. Hyperlipidemia
			2.Type 2 Diabetes
			3.Arrhythmia and Atrial fibrillation
			4. Coronary atherosclerotic cardiopathy
28	Female	79	1. Hyperlipidemia
			2.Arrhythmia and Atrial fibrillation
			3.Hypertension(extremely high-risk groups)
			4. Coronary atherosclerotic cardiopathy
29	Female	78	1. Hyperlipidemia
			2.Hypertension(extremely high-risk groups)
			3. Coronary atherosclerotic cardiopathy
			4.Type 2 Diabetes
30	Female	59	1. Hyperlipidemia
			2.Hypertension
			3.Diabetes
			4. Coronary heart disease
31	Female	55	1. Hyperlipidemia
			2.Hypertension
			3. Coronary heart disease
32	Female	79	1. Hyperlipidemia
			2.Hypertension
			3.Diabetes
			4. Coronary heart disease
33	Male	60	1. Hyperlipidemia
			2.Hypertension
			3.Diabetes
			4. Coronary heart disease
34	Female	45	1.Coronary heart disease
			2.Hyperlipidemia
35	Male	62	1. Hyperlipidemia
			2. Coronary heart disease
36	Female	52	1. Hyperlipidemia
			2.Unstable angina
			3. Coronary heart disease
37	Male	66	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups)
			3. Coronary heart disease
38	Female	64	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups)
			3. Coronary heart disease
39	Female	61	1. Hyperlipidemia
			2.Unstable angina
			3.Hypertension（extremely high-risk groups）
			4. Coronary heart disease
40	Female	58	1. Hyperlipidemia
			2. Coronary heart disease

41	Male	57	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups)
			3. Coronary heart disease
			4.Fatty liver
42	Female	73	1. Hyperlipidemia
			2. Coronary heart disease
43	Male	65	1.Coronary heart disease
			2.Type 2 Diabetes
			3.Hyperlipidemia
44	Female	57	1. Hyperlipidemia
			2. Coronary heart disease
45	Male	59	1. Hyperlipidemia
			2. Coronary heart disease
			3.Fatty liver
			4.Hypertension (extremely high-risk groups)
46	Female	51	1. Hyperlipidemia
			2.Arrhythmia
			3.Sinus bradycardia
			4. Coronary heart disease
			5.Type 2 Diabetes
47	Female	69	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups)
			3.Type 2 Diabetes
			4. Coronary heart disease
48	Female	78	1. Hyperlipidemia
			2.Unstable angina
			3.Hypertension (extremely high-risk groups)
			4. Coronary heart disease
49	Male	61	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups）)
			3. Coronary heart disease
50	Female	61	1. Hyperlipidemia
			2. Coronary heart disease
51	Female	51	1. Hyperlipidemia
			2.unstable angina pectoris
			3. Coronary heart disease
			4.Cervical spondylosis
52	Female	74	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups）)
			3. Coronary heart disease
53	Male	71	1. Hyperlipidemia
			2. Coronary heart disease
54	Female	52	1. Hyperlipidemia
			2.Arrhythmia
			3.Sinus bradycardia
			4. Coronary heart disease
			5.Fatty liver
55	Female	56	1. Hyperlipidemia

			2.Hypertension (extremely high-risk groups)）
			3. Coronary heart disease
56	Female	74	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups)）
			3. Coronary heart disease
57	Male	61	1. Hyperlipidemia
			2. Coronary heart disease
58	Male	77	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups)）
			3. Coronary heart disease
59	Male	72	1. Hyperlipidemia
			2.Arrhythmia
			3.Hypertension (extremely high-risk groups)）
			4. Coronary heart disease
			5.Hyperuricemia
60	Female	53	1. Hyperlipidemia
			2.unstable angina pectoris
			3.Arrhythmia
			4.Hypertension (extremely high-risk groups)）
			5. Coronary heart disease
61	Female	58	1. Hyperlipidemia
			2.Type 2 Diabetes
			3. Coronary heart disease
62	Female	70	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups)）
			3.Type 2 Diabetes
			4. Coronary heart disease
63	Female	76	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups)）
			3. Coronary heart disease
			4.Type 2 Diabetes
64	Male	65	1. Hyperlipidemia
			2.Hypertension
			3.Diabetes
			4. Coronary heart disease
65	Female	42	1. Hyperlipidemia
			2. Coronary heart disease
66	Female	51	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups)）
			3.Type 2 Diabetes
			4. Coronary heart disease
67	Male	61	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups)）
			3.Type 2 Diabetes
			4. Coronary heart disease
68	Male	79	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups)）
			3. Coronary heart disease

69	Male	44	1. Hyperlipidemia
			2. Coronary heart disease
			3.Cervical spondylosis
70	Female	68	1. Hyperlipidemia
			2. Coronary heart disease
			3.unstable angina pectoris
71	Female	79	1. Hyperlipidemia
			2.Hypertension (extremely high-risk groups)）

Table S3. UPLC-MS identification of potential serum biomarkers in hyperlipidemia patients.

NO.	Metabolite name	Rt	m/z	Molecular Formula	mDa	[M+H]/[M-H]	Trend
1	1-(sn-glycero-3-phospho)-1d-myo-inositol	0.47	333.0588	C9H19O11P	0.0	[M-H]⁻	↑**
2	Gamma-Glutamyl-beta-cyanoalanine	0.51	242.0804	C9H13N3O5	1.0	[M-H]⁻	↑**
3	Uric acid	0.65	167.0220	C5H4N4O3	-0.2	[M-H]⁻	↑**
4	Beta-D-Galactose	1.02	179.0573	C6H12O6	0.4	[M-H]⁻	↑**
5	Acetyl-N-formyl-5-methoxykynurenamine	1.25	263.1044	C13H16N2O4	-1.0	[M-H]⁻	↑**
6	P-Cresol	1.42	107.0501	C7H8O	0.0	[M-H]⁻	↑**
7	Azelaic acid	1.68	187.0976	C9H16O4	0.2	[M-H]⁻	↑**
8	4-Hydroxybenzaldehyde	1.78	121.0297	C7H6O2	1.2	[M-H]⁻	↓**
9	Testosterone sulfate	2.27	367.1609	C19H28O5S	-0.4	[M-H]⁻	↓**
10	N-[(3a,5b,7a)-3-Hydroxy-24-oxo-7-(sulfooxy)cholan-24-yl]-glycine	2.3	528.2661	C26H43NO8S	0.9	[M-H]⁻	↑**
11	2-Phenylethanol glucuronide	2.32	299.1160	C14H18O7	-2.5	[M+H]⁺	↑**
12	Murocholic acid	3.41	391.2861	C24H40O4	-1.0	[M-H]⁻	↑**
13	Sphingosine 1-phosphate	3.47	378.2409	C18H38NO5P	0.1	[M-H]⁻	↑**
14	LysoPC(14:0)	3.53	468.3124	C22H46NO7P	0.3	[M+H]⁺	↓**
15	LysoPC(18:3(6Z,9Z,12Z))	3.57	518.3284	C26H48NO7P	1.0	[M+H]⁺	↑**
16	LysoPC(20:5(5Z,8Z,11Z,14Z,17Z))	3.58	542.3283	C28H48NO7P	0.7	[M+H]⁺	↑**
17	LysoPC(18:3(9Z,12Z,15Z))	3.65	518.3283	C26H48NO7P	0.1	[M+H]⁺	↑**
18	LysoPC(16:1(9Z))	3.74	494.3285	C24H48NO7P	0.9	[M+H]⁺	↑**
19	LysoPC(22:6(4Z,7Z,10Z,13Z,16Z,19Z))	3.98	568.3453	C30H50NO7P	0.2	[M+H]⁺	↑**
20	14,15-Epoxy-5,8,11-eicosatrienoic acid	4.41	319.2292	C20H32O3	0.0	[M-H]⁻	↑**
21	LysoPC(20:3(5Z,8Z,11Z))	4.42	546.3605	C28H52NO7P	1.5	[M+H]⁺	↑**
22	LysoPC(16:0)	4.48	496.3446	C24H50NO7P	0.3	[M+H]⁺	↑**
23	LysoPC(18:1(11Z))	4.54	522.3605	C26H52NO7P	0.4	[M+H]⁺	↓**
24	LysoPC(22:5(7Z,10Z,13Z,16Z,19Z))	4.54	570.3620	C30H52NO7P	0.4	[M+H]⁺	↑**
25	LysoPC(P-16:0)	4.8	480.3472	C24H50NO6P	0.0	[M+H]⁺	↓**
26	LysoPC(22:4(7Z,10Z,13Z,16Z))	4.89	572.3764	C30H54NO7P	-0.1	[M+H]⁺	↑**
27	LysoPC(15:0)	5.96	482.3274	C23H48NO7P	0.0	[M+H]⁺	↑**
28	LysoPC(18:0)	6.03	524.3758	C26H54NO7P	0.8	[M+H]⁺	↑**
29	LysoPC(P-18:0)	6.46	508.3801	C26H54NO6P	-0.1	[M+H]⁺	↑**
30	Linoleic acid	7.29	279.2345	C18H32O2	-0.7	[M-H]⁻	↑**
31	Maslinic acid	7.92	471.3484	C30H48O4	-1.5	[M-H]⁻	↓**
32	PC(18:0/20:5(5Z,8Z,11Z,14Z,17Z))	8.12	808.5867	C46H82NO8P	0.0	[M+H]⁺	↑**
33	Oleic acid	8.12	281.2499	C18H34O2	-0.3	[M-H]⁻	↑**
34	SM(d18:0/16:1(9Z))	8.28	703.5788	C39H79N2O6P	-5.0	[M+H]⁺	↑**
35	PC(18:0/18:4(6Z,9Z,12Z,15Z))	8.52	782.5739	C44H80NO8P	0.1	[M+H]⁺	↑**
36	Chenodeoxycholic acid	8.75	393.2999	C24H40O4	-0.8	[M+H]⁺	↑**
37	PE(14:1(9Z)/14:1(9Z))	8.75	632.4344	C33H62NO8P	-1.1	[M+H]⁺	↑**

(**: P<0.01)