





表 1 入组患者基本资料  
Tab. 1 Characteristics of the patients at baseline

Characteristic	CHD ( <i>n</i> = 170)
Sex	
Male	121 (71.2)
Female	49 (28.8)
Age/a	62.00 (56.00, 72.25)
Weight/kg	70.00 (64.00, 77.00)
Height/cm	168.00 (160.25, 172.00)
BMI/(kg · m <sup>-2</sup> )	25.43 ± 3.22
SYNTAX score	10.00 (6.50, 15.00)
Clinical history	
Hypertension	118 (69.4)
Diabetes	82 (48.2)
Never smoked	62 (36.5)
Hyperlipidemia	153 (90.0)
Diagnosis	
Angina pectoris	110 (64.7)
Acute myocardial infarction	60 (35.3)
Vital signs	
Systolic BP/mmHg <sup>Δ</sup>	129.02 ± 21.74
Diastolic BP/mmHg <sup>Δ</sup>	75.00 (66.00, 81.00)
Heart rate/min <sup>-1</sup>	71.00 (64.00, 80.00)
Laboratory parameters	
Hemoglobin/(g · L <sup>-1</sup> )	139.89 ± 17.40
Total protein/(g · L <sup>-1</sup> )	64.05 ± 4.64
Albumin/(g · L <sup>-1</sup> )	40.08 ± 2.83
Glucose/(mmol/L)	5.00 (4.40, 6.41)
HbA1c/%	6.10 (5.60, 7.10)
SCr/(μmol · L <sup>-1</sup> )	65.95 (57.78, 77.05)
BUN/(mmol · L <sup>-1</sup> )	5.60 (4.70, 6.70)
eGFR/(mL · min <sup>-1</sup> · 1.73m <sup>-2</sup> )	96.05 (84.68, 105.07)
Urine red blood cells	41/167 (24.6)
Urine white blood cells	35/167 (21.0)
Urine protein	18/167 (10.8)
Urine glucose	25/167 (15.0)
sRAGE/(μg · L <sup>-1</sup> )	1.81 ± 0.62

<sup>Δ</sup>1 mmHg = 0.133 kPa; **CHD**: coronary atherosclerotic heart disease; **BMI**: body mass index; **SYNTAX**: Synergy between Percutaneous Coronary Intervention with TAXUS and Cardiac Surgery; **BP**: blood pressure; **HbA1c**: glycosylated hemoglobin A1c; **SCr**: serum creatinine; **BUN**: blood urea nitrogen; **eGFR**: estimated glomerular filtration rate; **sRAGE**: soluble receptor for advanced glycation end products.

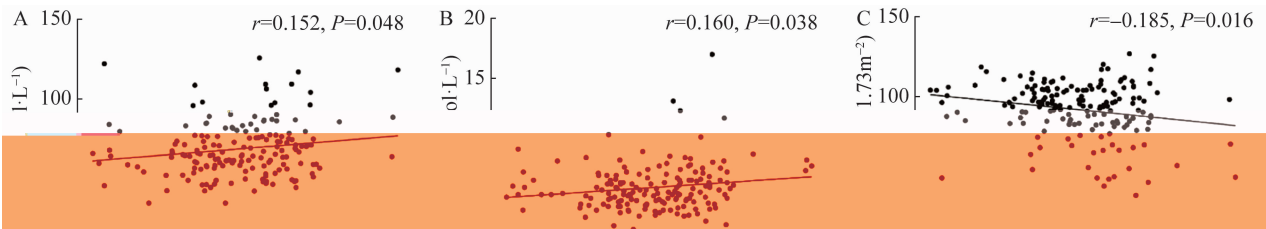


图 1 冠心病患者中 sRAGE 与 SCr、BUN、eGFR 的相关性分析

Fig. 1 Correlation between sRAGE and SCr, BUN, and eGFR in CHD patients

**A**: SCr; **B**: BUN; **C**: eGFR; **sRAGE**: soluble receptor for advanced glycation end products; **CHD**: coronary atherosclerotic heart disease; **SCr**: serum creatinine; **BUN**: blood urea nitrogen; **eGFR**: estimated glomerular filtration rate.

## 2.4 肾功能下降组与肾功能正常组 sRAGE 和肾功能水平比较

与肾功能正常组相比, 肾功能下降组血浆 sRAGE、SCr、BUN 浓度更高, 尿潜血阳性比例更高, eGFR 更低, 差异有统计学意义 ( $P < 0.05$ )。与肾功能正常组相比, 肾功能下降组尿白细胞阳性比例更高, 尿蛋白、尿糖阳性比例更低, 差异无统计学意义 ( $P > 0.05$ ), 详见表 2。

## 2.5 冠心病患者肾功能下降的单因素分析

以肾功能下降作为因变量进行单因素 Logistic 回归分析, 性别、年龄、年龄  $> 55$  岁、体质量、身高、SYNTAX 评分、舒张压、血红蛋白、白蛋白、SCr、BUN 和 sRAGE 为冠心病患者肾功能下降的关联指标 ( $P < 0.05$ ), 详见表 3。

## 2.6 冠心病患者肾功能下降的多因素分析

以 sRAGE、SCr、性别、是否年龄  $> 55$  岁、血红蛋白、白蛋白为自变量, 肾功能下降作为因变量进行多因素 Logistic 回归分析, sRAGE ( $OR = 2.954$ , 95%  $CI$ : 1.030 ~ 8.474,  $P = 0.044$ )、SCr ( $OR = 1.303$ , 95%  $CI$ : 1.185 ~ 1.433,  $P < 0.001$ )、男性 ( $OR = 0.011$ , 95%  $CI$ : 0.001 ~ 0.104,  $P < 0.001$ ) 和年龄  $> 55$  岁 ( $OR = 12.279$ , 95%  $CI$ : 1.511 ~ 99.793,  $P = 0.019$ ) 为冠心病患者肾功能下降的关联指标, 详见表 4。

## 3 讨论

在本研究冠心病患者中, sRAGE 与肌酐、尿素氮水平呈正相关关系, 与 eGFR 呈负相关关系。单因素及多因素分析结果表明 sRAGE 是冠心病患者肾功能下降的关联指标, 提示 sRAGE 可能参与并提示冠心病伴发肾功能下降。

表2 肾功能正常组及肾功能下降组患者临床特征比较

Tab. 2 Clinical characteristics of CHD patients with normal or decreased renal function at baseline [n(%), M(P<sub>25</sub>, P<sub>75</sub>),  $\bar{x} \pm s$ ]

Characteristic	Normal renal function (n = 109)	Decreased renal function (n = 61)	Statistics( <i>t</i> , <i>z</i> , $\chi^2$ )	<i>P</i>
Sex				
Male	84(77.1)	37(60.7)	5.133	0.023
Age/a	58.00(53.00, 63.50)	74.00(65.00, 78.50)	-7.921	<0.001
>55	72(66.7)	57(93.4)	16.030	<0.001
≤55				
Weight/kg	70.00(65.00, 80.00)	68.00(60.00, 75.00)	-2.425	0.015
Height/cm	170.00(163.00, 173.00)	164.50(156.00, 170.00)	-3.507	<0.001
BMI/(kg · m <sup>-2</sup> )	25.59 ± 3.42	25.13 ± 2.84	0.840	0.402
SYNTAX score	9.00(6.25, 14.00)	12.00(6.75, 18.00)	-1.728	0.084
Clinical history				
Hypertension	71(65.1)	47(77.0)	2.614	0.106
Diabetes	51(46.8)	31(50.8)	0.254	0.614
Never smoked	35(32.1)	27(44.3)	2.493	0.114
Hyperlipidemia	99(90.8)	54(88.5)	0.230	0.613
Diagnosis				
Angina pectoris	68(62.4)	42(68.9)	0.716	0.397
Acute myocardial infarction	41(37.6)	19(31.1)	0.716	0.397
Vital signs				
Systolic BP/mmHg <sup>△</sup>	126.96 ± 21.30	132.70 ± 22.21	-1.660	0.099
Diastolic BP/mmHg <sup>△</sup>	77.00(70.00, 83.00)	71.00(61.50, 78.00)	-2.913	0.004
Heart rate/min <sup>-1</sup>	71.00(64.00, 80.00)	71.00(64.50, 76.00)	-0.997	0.319
Laboratory parameters				
Hemoglobin/(g · L <sup>-1</sup> )	144.91 ± 15.97	130.93 ± 16.31	5.430	<0.001
Total protein/(g · L <sup>-1</sup> )	63.20(61.03, 67.40)	64.25(61.18, 67.15)	-0.084	0.933
Albumin/(g · L <sup>-1</sup> )	40.48 ± 2.85	39.36 ± 2.65	2.505	0.013
Glucose/(mmol/L)	5.18(4.46, 6.87)	4.89(4.23, 6.02)	-1.629	0.103
HbA1c/%	6.00(5.50, 7.10)	6.10(5.60, 7.30)	-0.548	0.584
SCr/(μmol · L <sup>-1</sup> )	61.08 ± 10.63	82.16 ± 17.83	-8.432	<0.001
BUN/(mmol · L <sup>-1</sup> )	5.30(4.50, 6.20)	6.55(5.30, 7.78)	-4.548	<0.001
eGFR/(mL · min <sup>-1</sup> · 1.73m <sup>-2</sup> )	102.12(96.75, 107.70)	80.56(67.38, 85.58)	-10.800	<0.001
Urine red blood cells	21/107(19.6)	20/60(33.3)	3.899	0.048
Urine white blood cells	20/107(18.7)	15/60(25.0)	0.924	0.337
Urine protein	12/107(11.2)	6/60(10.0)	0.059	0.808
Urine glucose	19/107(17.8)	6/60(10.0)	1.817	0.178
sRAGE/(μg · L <sup>-1</sup> )	1.70 ± 0.60	2.00 ± 0.61	-3.057	0.003

<sup>△</sup> 1 mmHg = 0.133 kPa; **CHD**: coronary atherosclerotic heart disease; **BMI**: body mass index; **SYNTAX**: Synergy between Percutaneous Coronary Intervention with TAXUS and Cardiac Surgery; **BP**: blood pressure; **HbA1c**: glycosylated hemoglobin A1c; **SCr**: serum creatinine; **BUN**: blood urea nitrogen; **eGFR**: estimated glomerular filtration rate; **sRAGE**: soluble receptor for advanced glycation end products.

表3 冠心病患者肾功能下降的单因素 Logistic 回归分析

Tab. 3 Univariate Logistic regression analysis of CHD patients with decreased renal function

Characteristic	$\beta$	SE	Wald	OR	95% CI	<i>P</i>
Sex						
Male	-0.779	0.347	5.033	0.459	0.232 - 0.906	0.025
Female				1	Reference	
Age/a	0.176	0.027	43.925	1.192	1.132 - 1.256	<0.001
>55	1.991	0.555	12.851	7.323	2.466 - 21.749	<0.001
≤55				1	Reference	
Weight	-0.047	0.017	7.728	0.954	0.923 - 0.986	0.005
Height	-0.086	0.023	13.409	0.918	0.876 - 0.961	<0.001
BMI	-0.043	0.052	0.709	0.957	0.865 - 1.059	0.400
SYNTAX score	0.042	0.020	4.611	1.043	1.004 - 1.084	0.032
Clinical history						
Hypertension						
Positive	0.586	0.365	2.580	1.797	0.879 - 3.673	0.108
Negative				1	Reference	
Diabetes						

续表3

Characteristic	$\beta$	SE	Wald	OR	95% CI	P
Positive	0.161	0.320	0.254	1.175	0.628 – 2.201	0.614
Negative				1	Reference	
Smoking history						
Positive	0.518	0.329	2.474	1.679	0.880 – 3.202	0.116
Negative				1	Reference	
Hyperlipidemia						
Positive	-0.249	0.521	0.229	0.779	0.281 – 2.164	0.632
Negative				1	Reference	
Diagnosis						
Angina pectoris	0.287	0.340	0.714	1.333	0.685 – 2.595	0.398
Acute myocardial infarction				1	Reference	
Vital signs						
Systolic BP	0.012	0.008	2.698	1.012	0.998 – 1.028	0.100
Diastolic BP	-0.033	0.013	6.002	0.968	0.942 – 0.993	0.014
Heart rate	-0.021	0.015	2.039	0.979	0.952 – 1.008	0.153
Laboratory parameters						
Hemoglobin	-0.055	0.012	21.470	0.946	0.925 – 0.969	<0.001
Total protein	-0.014	0.035	0.151	0.987	0.921 – 1.056	0.698
Albumin	-0.147	0.061	5.849	0.863	0.766 – 0.973	0.016
Glucose	-0.076	0.076	1.011	0.927	0.799 – 1.075	0.315
HbA1c	0.000	0.118	0.000	1.000	0.793 – 1.261	0.999
SCr	0.119	0.019	37.418	1.126	1.084 – 1.170	<0.001
BUN	0.510	0.120	18.125	1.665	1.317 – 2.105	<0.001
eGFR	-19.076	431.759	0.002	0.000	0.000	0.965
Urine red blood cells						
Positive	0.717	0.366	3.826	2.048	0.999 – 4.199	0.050
Negative				1	Reference	
Urine white blood cells						
Positive	0.372	0.388	0.918	1.450	0.678 – 3.101	0.338
Negative				1	Reference	
Urine protein						
Positive	-0.128	0.528	0.059	0.880	0.312 – 2.477	0.808
Negative				1	Reference	
Urine glucose						
Positive	-0.664	0.499	1.771	0.515	0.193 – 1.369	0.183
Negative				1	Reference	
sRAGE	0.843	0.291	8.404	2.323	1.314 – 4.107	0.004

**CHD**: coronary atherosclerotic heart disease; **BMI**: body mass index; **SYNTAX**: Synergy between Percutaneous Coronary Intervention with TAXUS and Cardiac Surgery; **BP**: blood pressure; **HbA1c**: glycosylated hemoglobin A1c; **SCr**: serum creatinine; **BUN**: blood urea nitrogen; **eGFR**: estimated glomerular filtration rate; **sRAGE**: soluble receptor for advanced glycation end products.

表4 冠心病患者肾功能下降的多因素 Logistic 回归分析

Tab. 4 Multivariate Logistic regression analysis of CHD patients with decreased renal function

Characteristic	$\beta$	SE	Wald	OR	95% CI	P
Constant	-9.585	6.922	1.917	-	-	0.166
sRAGE	1.083	0.538	4.058	2.954	1.030 – 8.474	0.044
SCr	0.265	0.048	29.832	1.303	1.185 – 1.433	<0.001
Sex						
Male	-4.525	1.153	15.411	0.011	0.001 – 0.104	<0.001
Female				1	Reference	
Age/a						
>55	2.508	1.069	5.504	12.279	1.511 – 99.793	0.019
≤55				1	Reference	
Hemoglobin	-0.033	0.023	2.048	0.967	0.924 – 1.012	0.152
Albumin	-0.142	0.140	1.028	0.867	0.659 – 1.142	0.311

**CHD**: coronary atherosclerotic heart disease; **sRAGE**: soluble receptor for advanced glycation end products; **SCr**: serum creatinine.

多项研