



## University of Dundee

### Circulating plasma concentrations of ACE2 in men and women with heart failure and effects of renin-angiotensin-aldosterone-inhibitors

Sama, Iziah E.; Ravera, Alice; Santema, Bernadet T.; van Goor, Harry; ter Maaten, Jozine M.; Cleland, John G. F.

*Published in:*  
European Heart Journal

*DOI:*  
[10.1093/eurheartj/ehaa373](https://doi.org/10.1093/eurheartj/ehaa373)

*Publication date:*  
2020

*Document Version*  
Peer reviewed version

[Link to publication in Discovery Research Portal](#)

#### *Citation for published version (APA):*

Sama, I. E., Ravera, A., Santema, B. T., van Goor, H., ter Maaten, J. M., Cleland, J. G. F., Rienstra, M., Friedrich, A. W., Samani, N. J., Ng, L. L., Dickstein, K., Lang, C. C., Filippatos, G., Anker, S. D., Ponikowski, P., Metra, M., van Veldhuisen, D. J., & Voors, A. A. (2020). Circulating plasma concentrations of ACE2 in men and women with heart failure and effects of renin-angiotensin-aldosterone-inhibitors. *European Heart Journal*, 41(19), 1810-1817. <https://doi.org/10.1093/eurheartj/ehaa373>

#### **General rights**

Copyright and moral rights for the publications made accessible in Discovery Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from Discovery Research Portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain.
- You may freely distribute the URL identifying the publication in the public portal.

#### **Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

1 **Supplemental Table 1:** Baseline characteristics according to quartiles of plasma ACE concentrations (validation cohort)

	Q1[2.60,4.83)	Q2[4.83,5.26)	Q3[5.26,5.79)	Q4[5.79,8.46]	p-value	N
	<i>N</i> =423	<i>N</i> =422	<i>N</i> =425	<i>N</i> =421		
<b>validation Cohort</b>						
ACE2 plasma concentrations (NPX)	4.56 [4.34;4.72]	5.06 [4.95;5.17]	5.50 [5.38;5.63]	6.27 [6.01;6.62]	0.000	1691
Sex:					<0.001	1691
Men	222 (52.5%)	266 (63.0%)	308 (72.5%)	321 (76.2%)		
Women	201 (47.5%)	156 (37.0%)	117 (27.5%)	100 (23.8%)		
Age (years)	74.0 [66.0;80.0]	76.0 [67.0;82.0]	75.0 [67.0;82.0]	75.0 [67.0;82.0]	0.040	1691
Body mass index (kg/m2)	28.4 [24.9;33.3]	27.7 [24.6;32.4]	28.0 [24.2;32.3]	28.1 [24.5;32.7]	0.417	1657

	Q1[2.60,4.83]	Q2[4.83,5.26]	Q3[5.26,5.79]	Q4[5.79,8.46]	p-value	N
	N=423	N=422	N=425	N=421		
Heart rate (beats/minute)	70.0 [60.0;81.0]	71.0 [62.0;84.0]	72.0 [63.0;84.0]	75.0 [64.0;88.0]	<0.001	1653
Systolic blood pressure (mmHg)	125 [111;142]	124 [110;143]	122 [110;139]	121 [107;137]	0.044	1663
Left ventricular ejection fraction	42.0 [35.0;51.0]	40.0 [35.0;50.0]	40.0 [35.0;50.0]	39.0 [30.0;50.0]	0.026	1530
New York Heart Association (NYHA) class:					.	1690
Class I	7 (1.66%)	4 (0.95%)	4 (0.94%)	1 (0.24%)		
Class II	203 (48.1%)	174 (41.2%)	164 (38.6%)	155 (36.8%)		
Class III	173 (41.0%)	178 (42.2%)	197 (46.4%)	204 (48.5%)		
Class IV	39 (9.24%)	66 (15.6%)	60 (14.1%)	61 (14.5%)		

	Q1[2.60,4.83]	Q2[4.83,5.26]	Q3[5.26,5.79]	Q4[5.79,8.46]	p-value	N
	N=423	N=422	N=425	N=421		
History of Atrial fibrillation	163 (38.8%)	179 (42.6%)	188 (44.8%)	214 (51.3%)	0.003	1677
Renal disease	174 (42.0%)	190 (45.6%)	198 (47.0%)	202 (48.4%)	0.283	1669
Diabetes	98 (23.4%)	134 (31.8%)	149 (35.3%)	166 (39.6%)	<0.001	1682
Hypertension	237 (56.2%)	252 (59.9%)	252 (60.0%)	244 (58.0%)	0.635	1684
Chronic obstructive pulmonary disease	73 (17.4%)	78 (18.6%)	79 (18.7%)	77 (18.6%)	0.955	1677
Myocardial infarction	185 (43.8%)	215 (51.2%)	219 (51.7%)	205 (48.7%)	0.090	1687
Ischemic HF aetiology	250 (95.1%)	290 (95.7%)	280 (91.8%)	275 (94.8%)	0.165	1161

	Q1[2.60,4.83]	Q2[4.83,5.26]	Q3[5.26,5.79]	Q4[5.79,8.46]	p-value	N
	N=423	N=422	N=425	N=421		
Coronary artery disease	204 (48.6%)	237 (56.3%)	250 (59.4%)	230 (54.8%)	0.015	1682
Coronary artery by-pass graft	59 (13.9%)	65 (15.4%)	79 (18.6%)	92 (21.9%)	0.012	1689
Percutaneous coronary intervention	70 (16.7%)	87 (20.7%)	74 (17.7%)	81 (19.4%)	0.464	1674
Use of Angiotensin Converting Enzyme (ACE) inhibitor or Angiotensin Receptor Blocker (ARB)	319 (75.4%)	308 (73.0%)	299 (70.4%)	269 (63.9%)	0.002	1691
Beta-blockers	317 (74.9%)	305 (72.3%)	306 (72.0%)	296 (70.3%)	0.508	1691
ACE inhibitors	237 (56.0%)	236 (55.9%)	218 (51.3%)	196 (46.6%)	0.016	1691
ARBs	82 (19.4%)	76 (18.0%)	83 (19.5%)	74 (17.6%)	0.849	1691
Mineralocorticoid Receptor Antagonist (MRA)	114 (27.0%)	142 (33.6%)	144 (33.9%)	145 (34.4%)	0.064	1691
ACE inhibitors and MRA:					0.016	1691

	Q1[2.60,4.83]	Q2[4.83,5.26]	Q3[5.26,5.79]	Q4[5.79,8.46]	p-value	N
	<i>N=423</i>	<i>N=422</i>	<i>N=425</i>	<i>N=421</i>		
ACEi with MRA	71 (16.8%)	93 (22.0%)	84 (19.8%)	74 (17.6%)		
ACEi without MRA	166 (39.2%)	143 (33.9%)	134 (31.5%)	122 (29.0%)		
MRA without ACEi	43 (10.2%)	49 (11.6%)	60 (14.1%)	71 (16.9%)		
no ACEi and no MRA	143 (33.8%)	137 (32.5%)	147 (34.6%)	154 (36.6%)		

1