

Simultaneous detection and quantification of angiotensin 1-7, 1-8, 1-9 and 1-10

by LC-MS/MS in human plasma

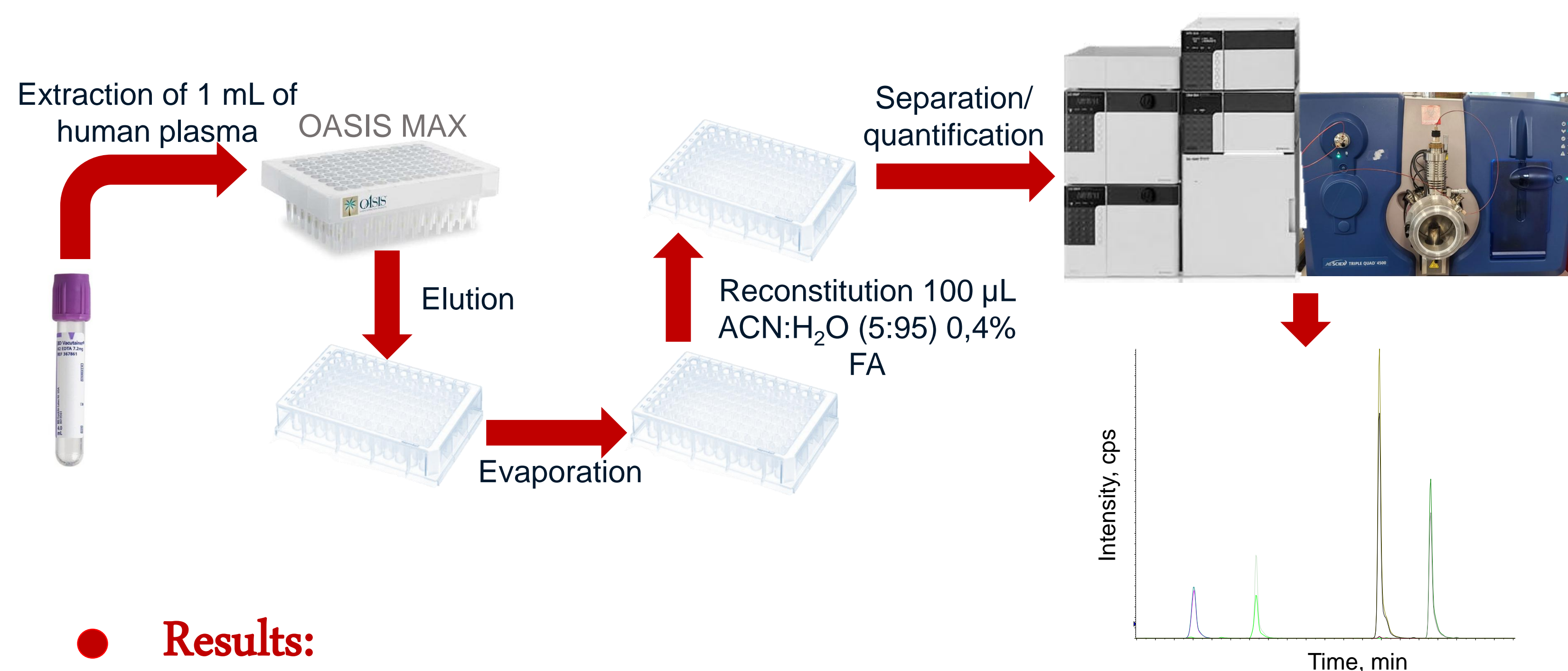
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● Introduction:

The renin-angiotensin-aldosterone system (RAAS) is a proteolytic cascade involving multiple enzymes and vasoactive peptides (1). Dysregulation of this cascade may lead to cardiovascular pathologies and kidney injuries (2). Angiotensin-converting enzyme 2 (ACE2) counterbalances the detrimental effects by cleaving Ang 1-8 and Ang 1-10 into Ang 1-7 and Ang 1-9 respectively (3). Recent studies showed that ACE2 is used by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) as a cellular entry receptor. The development of a quantitative method for these angiotensins is particularly interesting to study the peptide profile in the context of prognosis/follow-up of patients (3).

● Materials and Methods:



Column	Luna Omega [®] C18 100Å core-shell column 100 x 2,1 mm, 1.6 µm - Phenomenex
Mobile phases	A: H ₂ O + 0,4% FA B: ACN + 0,4% FA
Signal mode	Electrospray – Positive
Gradient	

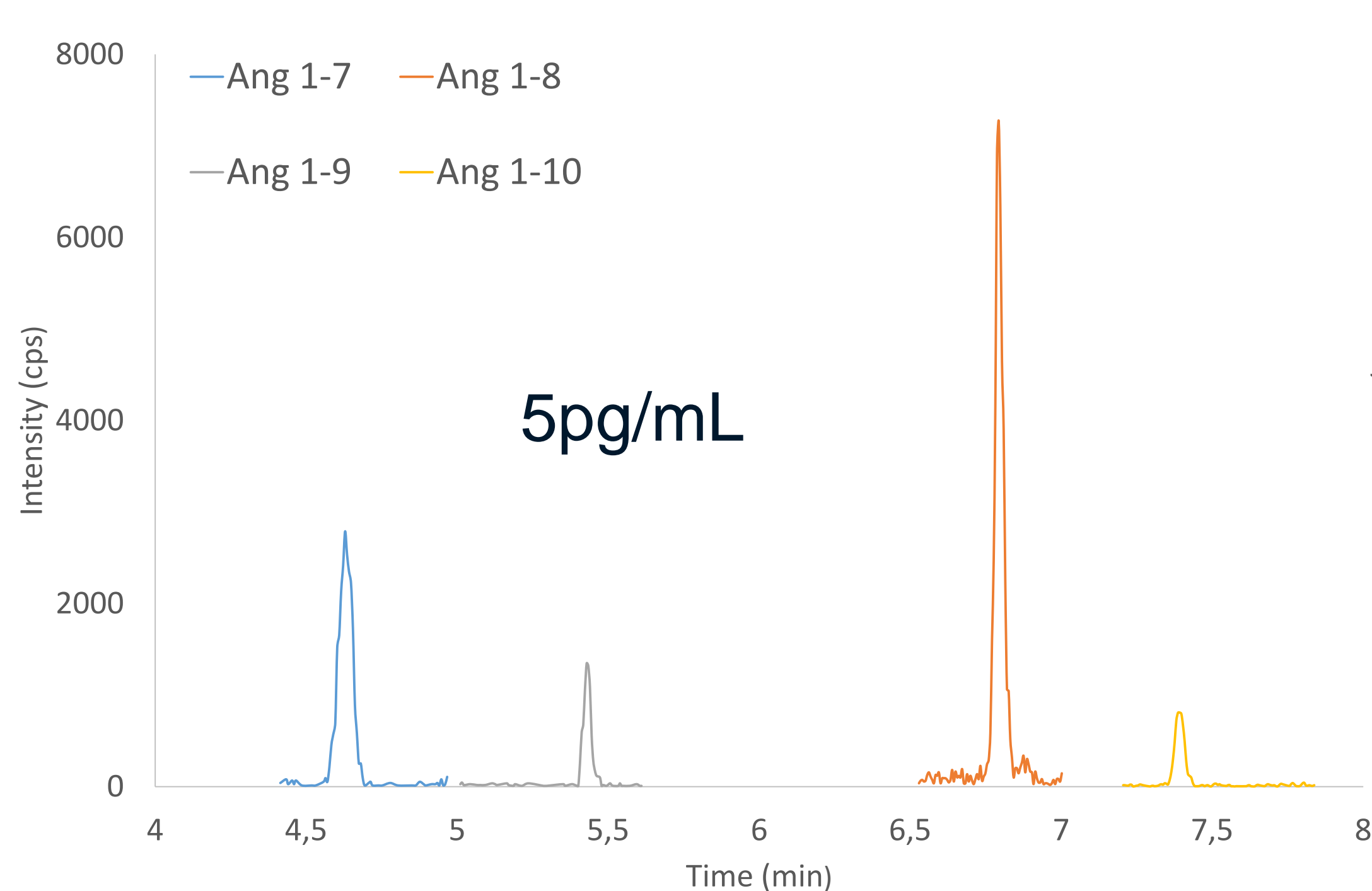
● Results:

Q1 Scan – MRM – Post column flow injection

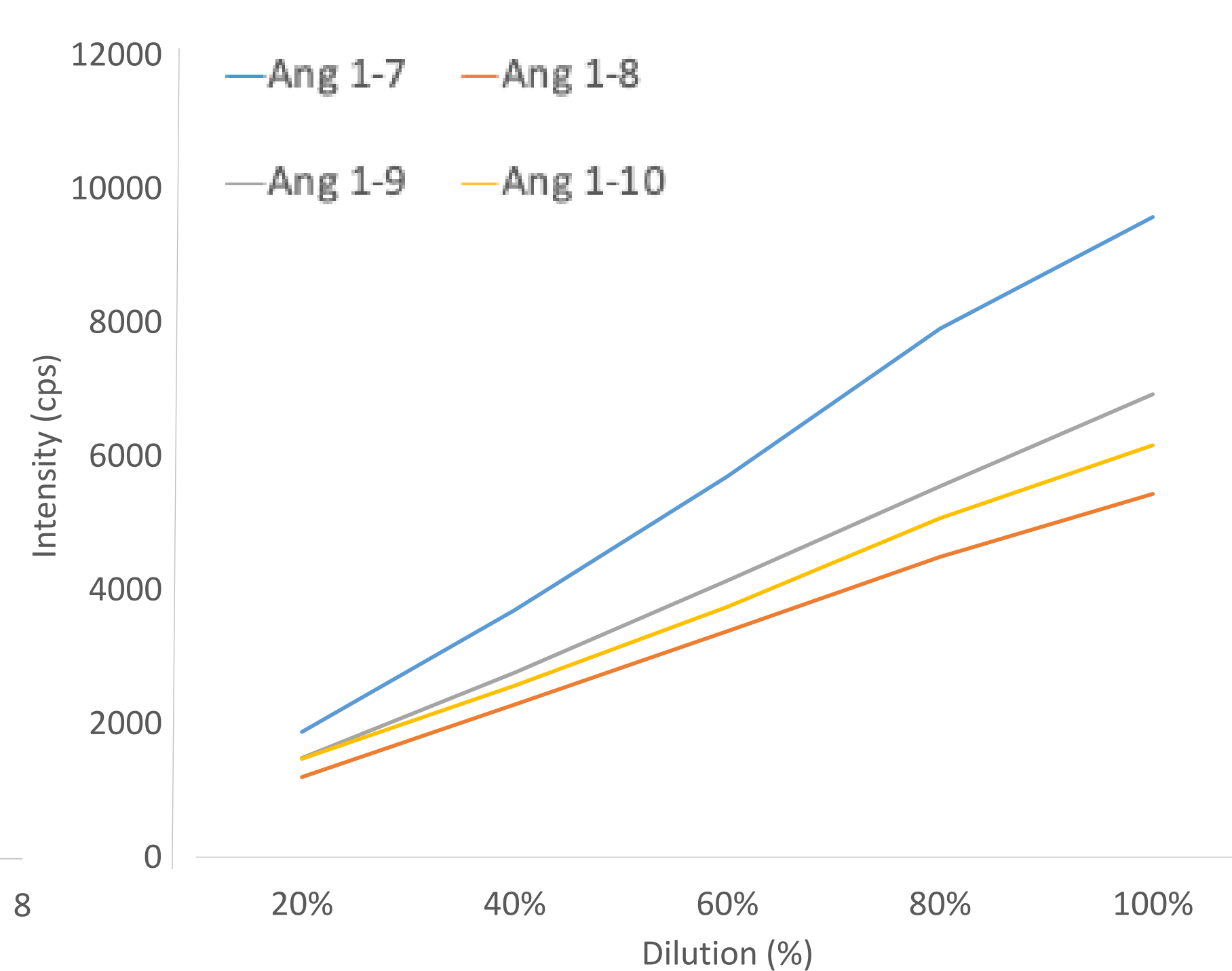
Compounds parameters	Source parameters
DP: 55V	CUR: 40psi
EP: 10V	CAD: Medium
CXP: 10V	IS: 5000eV
	T°: 650°C
	GS: 60psi

	Amino acid sequence	m/z Q1	m/z Q3	Collision energy (V)	Fragment type
Ang 1-10	DRVYIHPFHL	433,1	619,3	23	a5
Ang 1-9	DRVYIHPFH	395,4	647,5	16	b5
Ang 1-8	DRVYIHPF	524,1	263,2	26	y2
Ang 1-7	DRVYIHP	450,4	647,5	20	b5

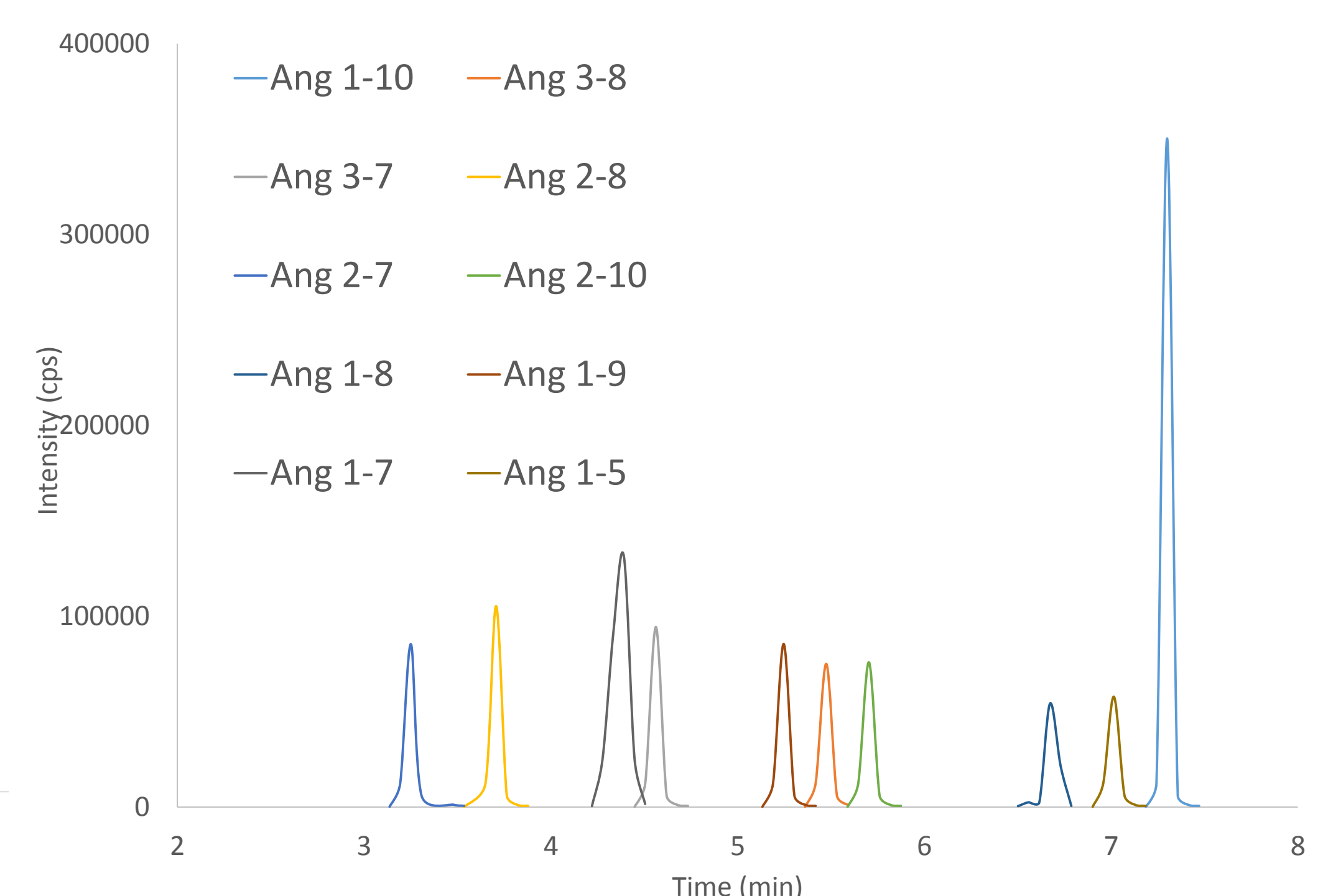
Lower Limit of quantification



Dilution linearity



Selectivity



● Conclusion:

Our LC-MS/MS method to determine Ang 1-7, 1-8, 1-9 and 1-10 plasma concentrations has successfully completed the preverification steps recommended by the Clinical and Laboratory Standards Institute (CLSI) guidelines. It will be fully validated and allow us to explore the prognosis/follow-up of patients with COVID-19 and cardiovascular pathologies.

References:

1. Van Rooyen JM, Poglitsch M, Huisman HW, Mels CMC, Kruger R, Malan L et al. Quantification of systemic renin-angiotensin system peptides of hypertensive black and white African men established from the RAS-Fingerprint[®]. JRAAS-2016; 17(4): 1-7.
2. Tikellis C, Bernardi S, Burns WC – Angiotensin-converting enzyme 2 is a key modulator of the renin-angiotensin system in cardiovascular and renal disease. Current opinion in nephrology and hypertension 2011; 20:62-68.
3. Silhol F, Sarlon G, Deharo JC, Vaïsse B – Downregulation of ACE2 induces overstimulation of the renin-angiotensin system in COVID-19: should we block the renin-angiotensin system? Hypertension Research 2020; 43:854-856.