

P. Porto-Figueira<sup>1</sup>, J.A. Figueira<sup>1</sup>, Jorge A. M. Pereira<sup>1</sup>, Andrew Minett<sup>2</sup>, Peter Dawes<sup>2</sup>, José S. Câmara<sup>1,3\*</sup>

<sup>1</sup>CQM/UMa – Centro de Química da Madeira, Campus Universitário da Penteada, 9000-390 Funchal, <sup>3</sup>Centro de Competências de Ciências Exactas e da Engenharia, Universidade da Madeira, Campus Universitário da Penteada, 9000-390, Funchal, Portugal, <sup>2</sup>EPREP Pty Ltd, Ringwood, Victoria, AUSTRALIA, \* jsc@ uma.pt

## INTRODUCTION

- Polyphenols are widespread constituents of several foods matrices, including fruits, juices and beverages, as tea and wine, being partially responsible for their overall organoleptic properties.
- Despite their wide distribution, the health effects of dietary polyphenols have come to the attention of nutritionists only in recent years.
- Growing epidemiologic evidences link polyphenols to protective effects against several highly prevalent human diseases (as oncologic, cardiovascular and neurodegenerative diseases).
- The objective of this study was to evaluate the performance of an innovative analytical approach,  $\mu$ -SPE, to isolate phenolics compounds from teas.
- $\mu$ -SPE is a simple and fast extraction procedure using small particle sorbents (3  $\mu$ m or less, 20 x smaller than SPE particles), enabling a more efficient separation of the target analytes from interfering matrix.

## EXPERIMENTAL

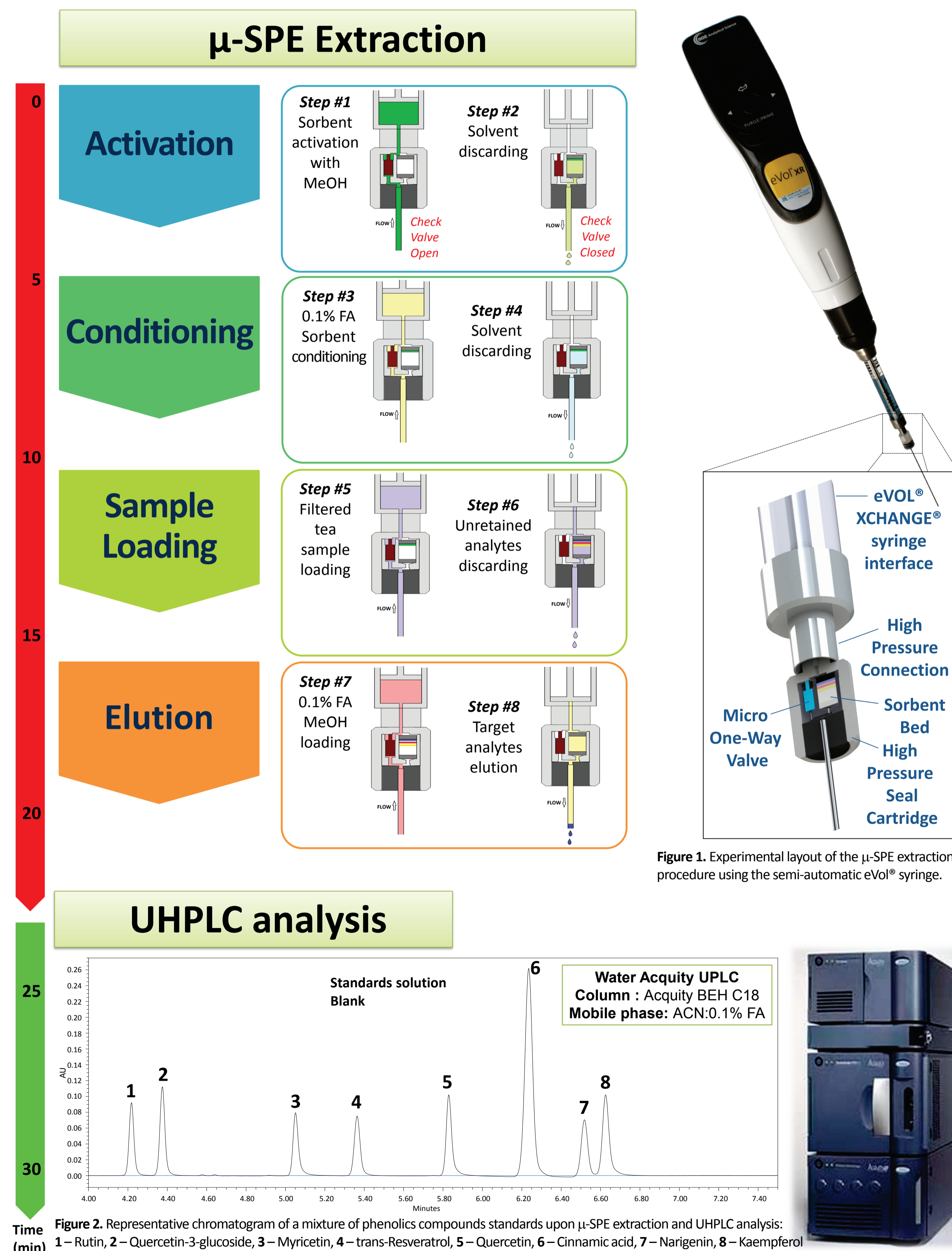


Figure 2. Representative chromatogram of a mixture of phenolics compounds standards upon  $\mu$ -SPE extraction and UHPLC analysis: 1 – Rutin, 2 – Quercetin-3-glucoside, 3 – Myricetin, 4 – trans-Resveratrol, 5 – Quercetin, 6 – Cinnamic acid, 7 – Narigenin, 8 – Kaempferol

## μ-SPE Optimization

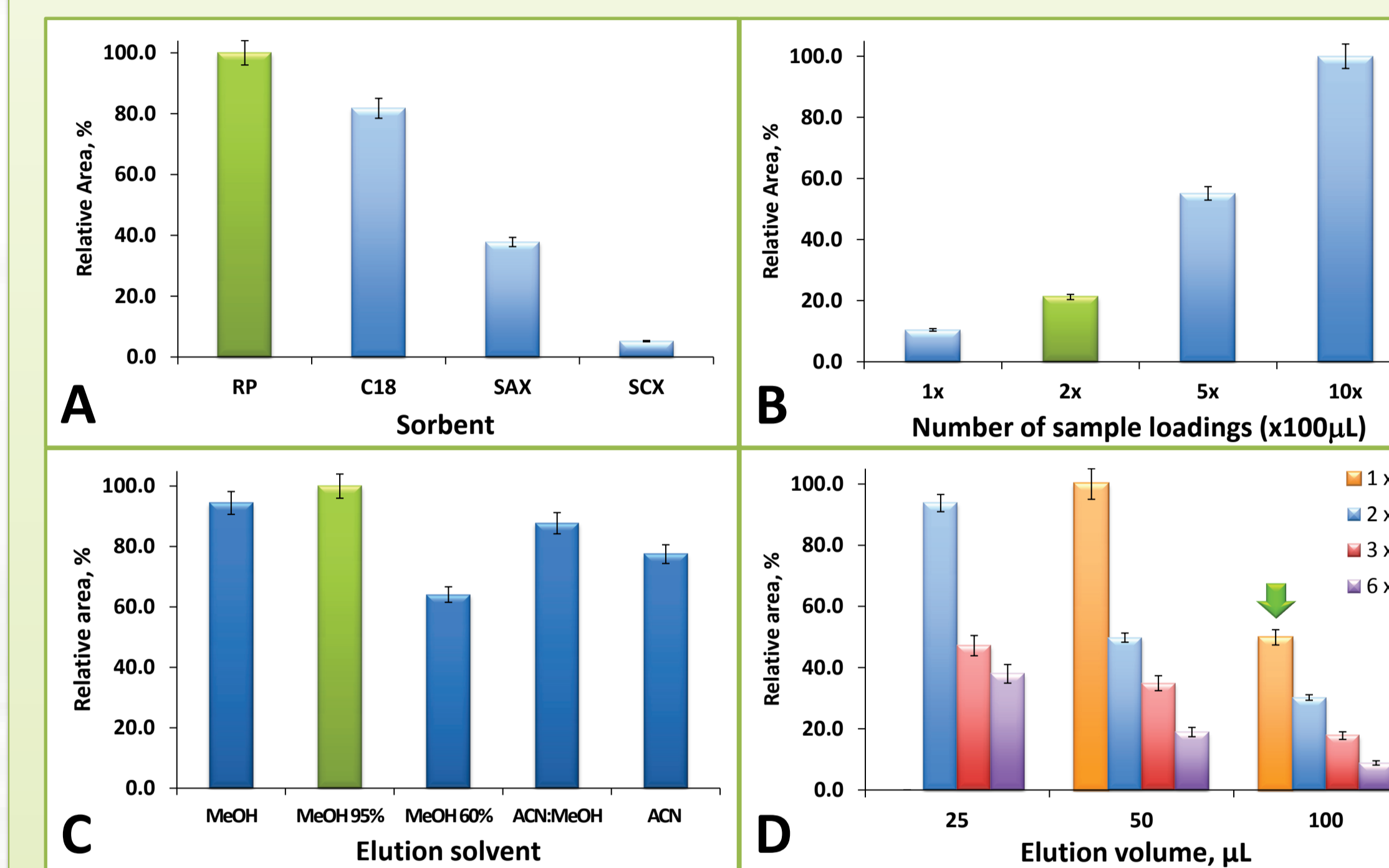


Figure 3. Optimization of the best  $\mu$ -SPE experimental conditions: selection of the best sorbent (A), optimal sample loading condition (B) best elution solvent (C) and respective optimal volume (D) (selected conditions indicated in green).

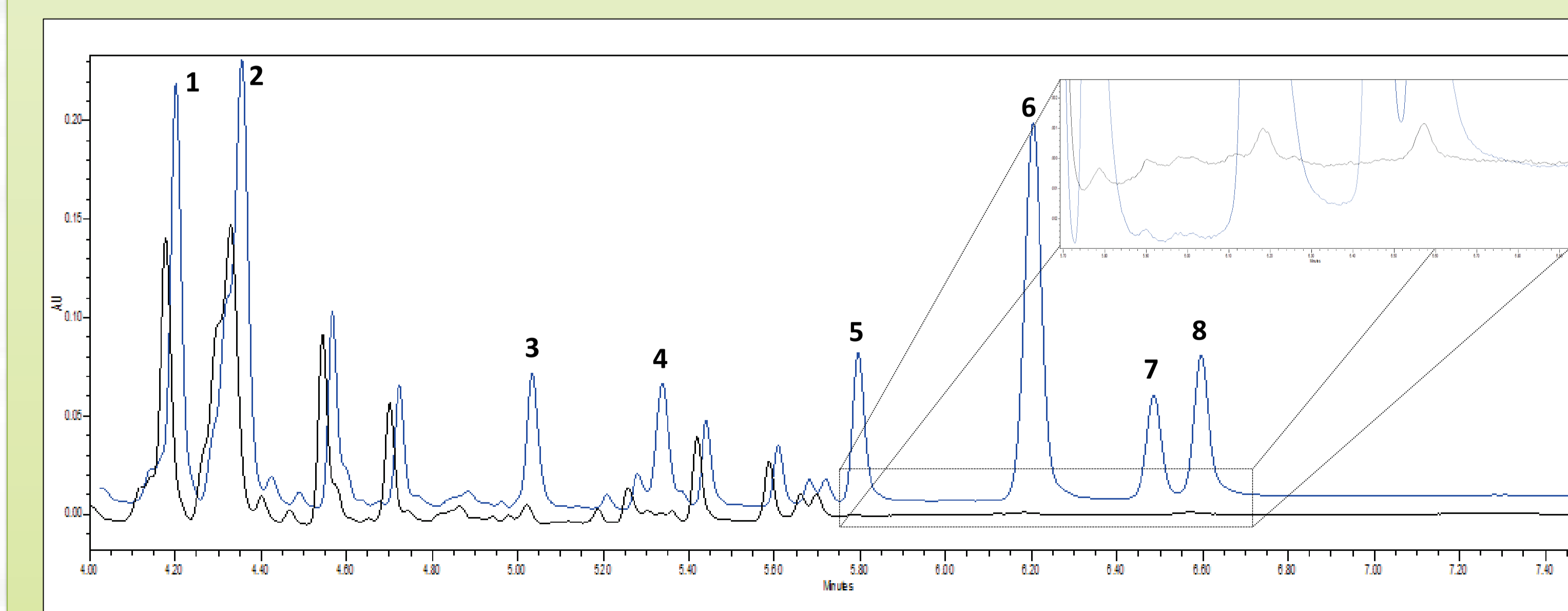


Figure 4. Representative chromatogram of real tea samples upon  $\mu$ -SPE extraction and UHPLC analysis: 1 – Rutin, 2 – Quercetin-3-glucoside, 3 – Myricetin, 4 – trans-Resveratrol, 5 – Quercetin, 6 – Cinnamic acid, 7 – Narigenin, 8 – Kaempferol.

## ACKNOWLEDGEMENTS

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## RESULTS

### Validation of $\mu$ -SPE/UHPLC-PDA analysis

**Table 1.** Validation parameters for the  $\mu$ -SPE/UHPLC-PDA analysis of the selected phenolics compounds: RT – retention time; LDR – linear dynamic range; Max abs – Maximum absorbance values obtained with PDA detection; R<sup>2</sup> – correlation coefficient; LOD – limits of detection; LOQ – limits of quantification; ME – Matrix effect; RSD – relative standard deviation.

#	Phenolic Compound	RT	$\lambda_{max}$	LDR ( $\mu$ g/mL)	R <sup>2</sup>	LOD ( $\mu$ g/mL)	LOQ ( $\mu$ g/mL)	ME (%)	Recovery (%)	Precision (% RSD)	
										Intraday (n=12)	Interday (n=36)
1	Rutin	4.237	270	0.9983	0.0168	0.0509	105.84	98.0	0.37	1.09	
2	Quercetin-3-glucoside	4.394	270	0.9983	0.0048	0.0144	97.55	96.9	0.49	0.92	
3	Myricetin	5.079	370	0.9973	0.0043	0.0132	94.98	95.6	0.51	0.84	
4	trans-Resveratrol	5.386	307	0.9979	0.0042	0.0128	96.88	98.6	0.32	0.66	
5	Quercetin	5.844	270	0.9981	0.0040	0.0122	98.05	93.3	0.42	1.07	
6	Cinnamic acid	6.251	270	0.9977	0.0078	0.0235	95.74	94.6	0.46	1.69	
7	Narigenin	6.539	370	0.9976	0.0035	0.0106	94.40	100.7	0.23	1.71	
8	Kaempferol	6.656	370	0.9968	0.0047	0.0142	98.18	97.6	0.48	1.20	

### Tea analysis

**Table 2.** Occurrence of the selected phenolics compounds in the teas analyzed.

Phenolic Compound	Concentration ( $\mu$ g/mL)		
	Tea 1	Tea 2	Tea 3
Rutin	1.10	13.58	16.34
Quercetin-3-glucoside	0.66	17.71	9.24
Myricetin	0.21	0.26	0.14
trans-Resveratrol	0.80	-	-
Quercetin	0.06	0.05	0.08
Cinnamic acid	-	0.03	-
Narigenin	-	-	-
Kaempferol	0.12	0.03	0.07

## CONCLUSIONS

- ✓  $\mu$ -SPE was optimized for the extraction of 8 selected phenolics compounds from teas, being 100  $\mu$ L of filtered tea sample, loaded twice through the RP sorbent and elution with 100  $\mu$ L of MeOH 95% the best conditions.
- ✓  $\mu$ -SPE/UPLC-PDA analysis retrieved excellent analytical performance: good LODs and LOQs, good selectivity, linearity ( $r^2 > 0.99$ ) and recovery ( $> 93\%$ ); good intraday and inter-day precisions (RSD  $< 5\%$ ) and negligent matrix effect.
- ✓ The methodology developed is fast and semi-automatic, involving minimal sample pretreatment and solvent usage, while allowing the rapid and simultaneous determination of 8 phenolics compounds in teas with high sensitivity.
- ✓ The abundance of the selected phenolics compounds in teas encompass a broad range of concentrations, being rutin and quercetin-3-glucoside the most abundant.

## REFERENCE

Porto-Figueira *et al.* submitted to Journal of Chromatography A