



HAL
open science

Capacity of curcumin, a polyphenol presenting vasculo-protective properties, to modulate secretion and miRNA and protein profiles of endothelial microparticles

Irèna Krga, Dominique Bayle, Sylvie Mercier, Nicolas Gerard,
Laurent-Emmanuel Monfoulet, Christine Morand, Dragan Milenkovic

► To cite this version:

Irèna Krga, Dominique Bayle, Sylvie Mercier, Nicolas Gerard, Laurent-Emmanuel Monfoulet, et al.. Capacity of curcumin, a polyphenol presenting vasculo-protective properties, to modulate secretion and miRNA and protein profiles of endothelial microparticles. 1. Congrès FSEV French Society of Extracellular Vesicles, Nov 2017, Paris, France. 2017. hal-01736380

HAL Id: hal-01736380

<https://hal.science/hal-01736380>

Submitted on 16 Mar 2018

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial - NoDerivatives 4.0 International License

Capacity of curcumin, a polyphenol presenting vasculo-protective properties, to modulate secretion and miRNA and protein profiles of endothelial microparticles

Irena Krga, Dominique Bayle, Sylvie Mercier Nicolas Gérard, Laurent-Emmanuel Monfoulet, Christine Morand, Dragan Milenkovic

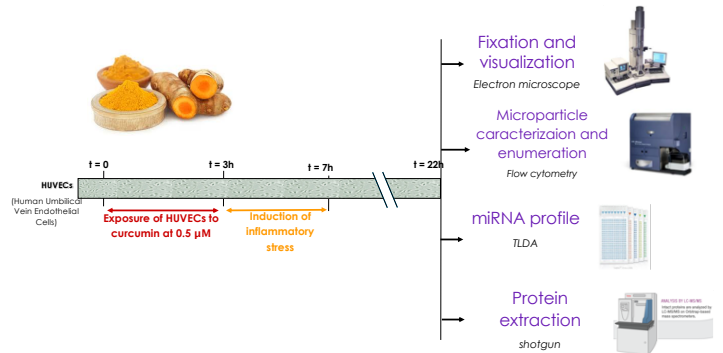
INRA, UMR 1019, Human Nutrition Unit, Centre d'Auvergne-Rhône-Alpes, France;

INTRODUCTION

High levels of endothelial microparticles (EMP) have been observed in patients with cardiovascular diseases and other diseases with endothelial dysfunction. In addition, cardiovascular risk factors, such as diabetes, high blood pressure or dyslipidaemia, are accompanied by elevated plasma levels of EMP. Polyphenols are plant bioactive compounds present in large quantities in most fruits and drinks of plant origin, such as tea, wine or coffee. The work from our group and that of others have shown that polyphenols play an important role in protection of vascular endothelium integrity and functionality.

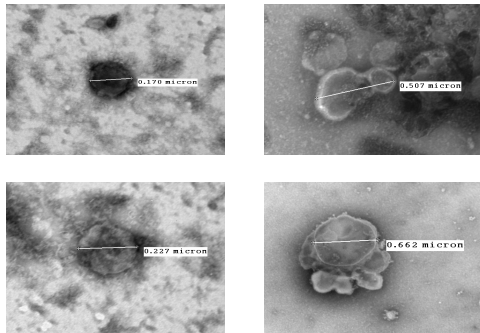
The aim of this study was to evaluate the ability of a polyphenol, curcumin, to modulate the release of EMPs following an inflammatory stress and modify their protein and miRNA profiles.

STUDY DESIGN



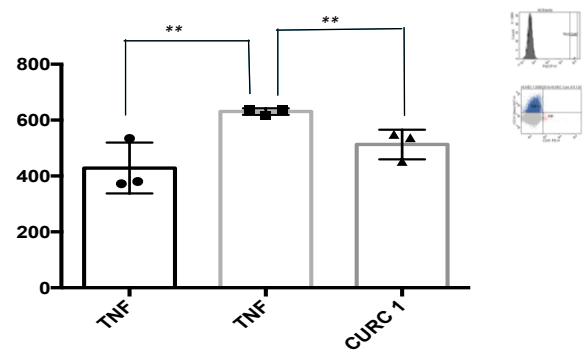
RESULTS

1) Visualization of the microparticles isolated from the culture medium



Electron microscopy revealed microparticles with size ranging from 0.1 to 0.6 micrometer

2) Enumeration of microparticles in culture medium using flow cytometry



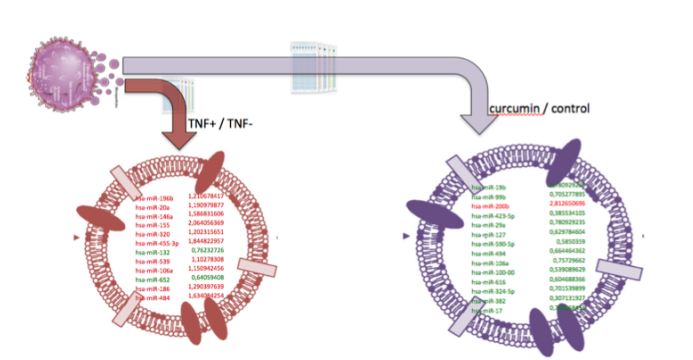
Curcumin decrease the number of microparticles liberated by EC in inflammatory condition

3) Global protein profile of microparticles released by endothelial cells

Accession	Peptides	Score	Access (q*)	Fold	Description	Average Normalized Abundance	
						Base TNF	Base CURC
A1B1.HUMAN	4	146.35	0.95	1.01	Serum albumin OS/Homo sapiens GN448B.FH1.DV2	2.15e+007	2.13e+007
ACTE.HUMAN	5	248.36	0.93	1.41	ACTB, cytoplasmic 1 OS/Homo sapiens GN4ACTB.FH1.DV1	5.73e+005	1.68e+005
IMBA.HUMAN	2	140.13	0.45	1.22	Interleukin-1 beta OS/Homo sapiens GN4IB1.FH1.DV2	4.56e+005	3.75e+005
ITGA1.HUMAN	3	186.37	0.43	1.90	alpha-1 integrin OS/Homo sapiens GN4IT1.FH1.DV1	6.79e+005	6.15e+005
ITGA5.HUMAN	2	92.44	0.44	1.36	alpha-5 integrin OS/Homo sapiens GN4IT5.FH1.DV2	7.27e+004	1.87e+004
ITGA8.HUMAN	2	79.93	0.36	1.36	alpha-2 (beta-1) integrin OS/Homo sapiens GN4IT8.FH1.DV1	1.82e+004	9.29e+004
PAI1.HUMAN	1	62.75	0.39	1.42	Plasminogen activator inhibitor 1 OS/Homo sapiens GN4PAI1.FH1.DV1	1.17e+004	7226.49
SECT1.HUMAN	1	62.23	0.13	1.20	Sequestin domain 1 alpha OS/Homo sapiens GN4SECT1.FH1.DV1	1.42e+004	4.43e+004
ITGAE.HUMAN	1	56.82	0.30	2.14	alpha-5 (beta-1) integrin heavy chain OS/Homo sapiens GN4ITGAE.FH1.DV2	1.56e+005	4.56e+004
ACTH.HUMAN	1	57.27	...	...	alpha-2 (beta-1) glycoprotein OS/Homo sapiens GN4ACTH.FH1.DV1	...	...
IMB1.HUMAN	1	56.94	0.32	2.12	Interleukin-1 beta OS/Homo sapiens GN4IMB1.FH1.DV2	1.09e+005	5.19e+004
CTSL.HUMAN	1	51.14	0.30	1.84	Protein CTSL OS/Homo sapiens GN4CTSL.FH1.DV1	2.32e+004	2.43e+004
TSG1.HUMAN	1	46.37	0.27	1.48	Tumor suppressor candidate 1 OS/Homo sapiens GN4TSG1.FH1.DV1	2.25e+005	3.39e+005
ANKK1.HUMAN	1	45.22	0.46	1.07	Anchored-spondin-III OS/Homo sapiens GN4ANKK1.FH1.DV1	0.23e+004	7.72e+004
OC43.HUMAN	1	40.44	0.23	2.26	OC43 OS/Homo sapiens GN4OC43.FH1.DV1	17.13e+004	3.15e+004
BNIP1.HUMAN	1	39.54	...	...	BCL-2 domain-containing protein 3 OS/Homo sapiens GN4BNIP1.FH1.DV1	...	...
ITGAE2.HUMAN	1	39.34	0.88	1.01	Integrin alpha-5 OS/Homo sapiens GN4ITGAE2.FH1.DV1	2.89e+005	2.86e+005
ITGAE1.HUMAN	1	38.91	0.17	1.72	Trigger transposable element-derived protein 1 OS/Homo sapiens GN4ITGAE1.FH1.DV1	0.79e+004	1.46e+005
ITGAL.HUMAN	1	38.52	0.51	1.76	Lymphocyte function-associated protein 3 OS/Homo sapiens GN4ITGAL.FH1.DV1	5.91e+005	6.37e+005
OC42.HUMAN	1	38.50	...	...	OC42 OS/Homo sapiens GN4OC42.FH1.DV1	...	...
TAFEL1.HUMAN	1	37.56	0.71	1.15	Parafilm C-type lectin domain-containing protein 1 OS/Homo sapiens GN4TAFEL1.FH1.DV1	4.61e+004	7.35e+004
ITGA10.HUMAN	1	37.17	0.52	1.24	Insulin receptor substrate 4 OS/Homo sapiens GN4ITGA10.FH1.DV1	9.72e+004	7.87e+004
ITGAE3.HUMAN	1	37.12	0.68	1.46	Integrin alpha-5 OS/Homo sapiens GN4ITGAE3.FH1.DV2	1.75e+004	3.26e+004
ITGAE4.HUMAN	1	36.54	0.27	2.13	Integrin alpha-4 OS/Homo sapiens GN4ITGAE4.FH1.DV1	0.20e+005	1.59e+005
ITGAE5.HUMAN	1	36.18	0.25	1.42	Long-chain fatty acid-CoA ligase 9 OS/Homo sapiens GN4ITGAE5.FH1.DV1	9.06e+004	5.35e+004
ITGAL2.HUMAN	1	34.85	0.36	1.01	Ligand alpha-3 OS/Homo sapiens GN4ITGAL2.FH1.DV1	1.39e+004	1.32e+004
ITGAL1.HUMAN	1	31.32	0.38	1.22	Integrin alpha-1 OS/Homo sapiens GN4ITGAL1.FH1.DV2	4.79e+004	5.07e+004

Both TNF and pre-exposure to curcumin modify the protein profile in the microparticles released by endothelial cells

4) Global miRNA profile of microparticles released by endothelial cells



TNF modulate miRNA profile of microparticles. Pre-exposure of HUVECs to curcumin counteract the effect of TNF at the miRNA profile of microparticles

CONCLUSION

In conclusion, curcumin can counteract the inflammatory effect of TNF α on the EMPs profile by decreasing their release and modifying their miRNA and protein contents. The proteins, as well as the identified miRNA target genes are involved in the regulation of endothelial cell integrity, particularly the processes regulating monocyte adhesion and their transendothelial migration. We therefore assume that their bioactivity could also be modulated, hypothesis that is currently under evaluation.