Interazioni con farmaci e Se

Poche note e descritte

Anticoagulanti

Effetti di somma allo iodio sulla tiroide

Assunzione insieme a vitamina C può causare diminuito assorbimento di selenio

Sinergia fra vitamina E e Selenio per le azioni antiossidanti

Ministero della Salute

DIREZIONE GENERALE PER L'IGIENE E LA SICUREZZA DEGLI ALIMENTI E LA NUTRIZIONE

UFFICIO 4

Apporti giornalieri di vitamine e minerali ammessi negli integratori alimentari

Revisione aprile 2019

VITAMINE	UNITA' DI MISURA	APPORTO MASSIMO	DISPOSIZIONI
vitamina A - (totale Retinolo Equivalenti)	µg	1200	
vitamina A - Beta carotene come unica fonte	mg	7,5 (µg 1250 RE)	
vitamina D	µg	50	
vitamina E	mg	60	
vitamina K	µg	200	
vitamina C	mg	1000	
tiamina (vitamina B1)	mg	25	
riboflavina (vitamina B2)	mg	25	
niacina	mg	54	
vitamina B6	mg	10	
acido folico	µg	400	
vitamina B12	µg	1000	
biotina	µg	450	
acido pantotenico	mg	18	

VITAMIN C (ASCORBIC ACID)

Oregon State University
Linus Pauling Institute

MAIN FUNCTIONS

- Antioxidant defense
- Enhances immune function
- Needed to make collagen, carnitine, and the neurotransmitters serotonin and norepinephrine

DAILY RECOMMENDATION

400 mg

All Adults

GOOD SOURCES

Fruit

- Kiwifruit, 1 medium-sized, 90 mg
- Strawberries (whole), 1 cup, 85 mg

Vegetables

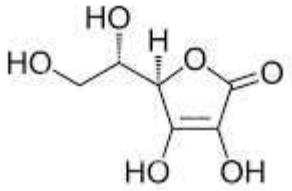
broccoli • kale • tomatoes

- Sweet Red Pepper, ½ cup chopped, 95 mg

mg = milligrams

SPECIAL NOTES

- Heat destroys vitamin C. Try to eat fresh foods and cook by steaming, microwaving, or stir-frying.
- Vitamin C in food is identical to vitamin C in supplements.
- The Daily Recommendation listed is specific to the LPI based on extensive review of the scientific evidence. The Institute of Medicine's Recommended Dietary Allowance (RDA) is 90 mg/day for men and 75 mg/day for women.



Vitamin C
Ascorbic acid

$C_6H_8O_6$

Assorbimento dipende dalla quantità

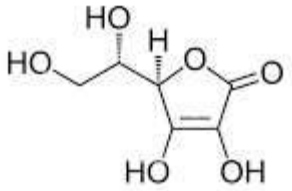
30 mg assorbita nel tenue e negli enetrociti

Fra 30 e 180 viene assorbita fra il 70-90%

L’assorbimento di dosi più elevate avviene se il dosaggio è suddiviso

in più somministrazioni

Forme a rilascio prolungato aiutano una maggiore assorbimento



Vitamin C
Ascorbic acid

$C_6H_8O_6$

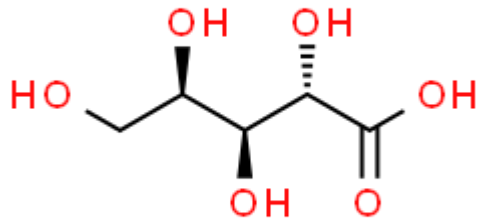
Forme salificate (calcio, potassio, etc) sono meno acide, da tenere in considerazione il catione somministrato

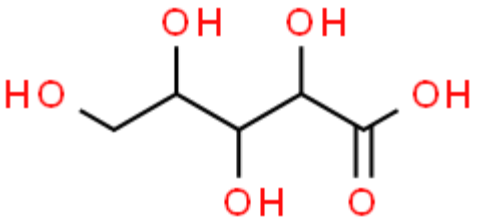
Forme miscelate di acido ascorbico e sodio ascorbato (vitamina C tamponata)

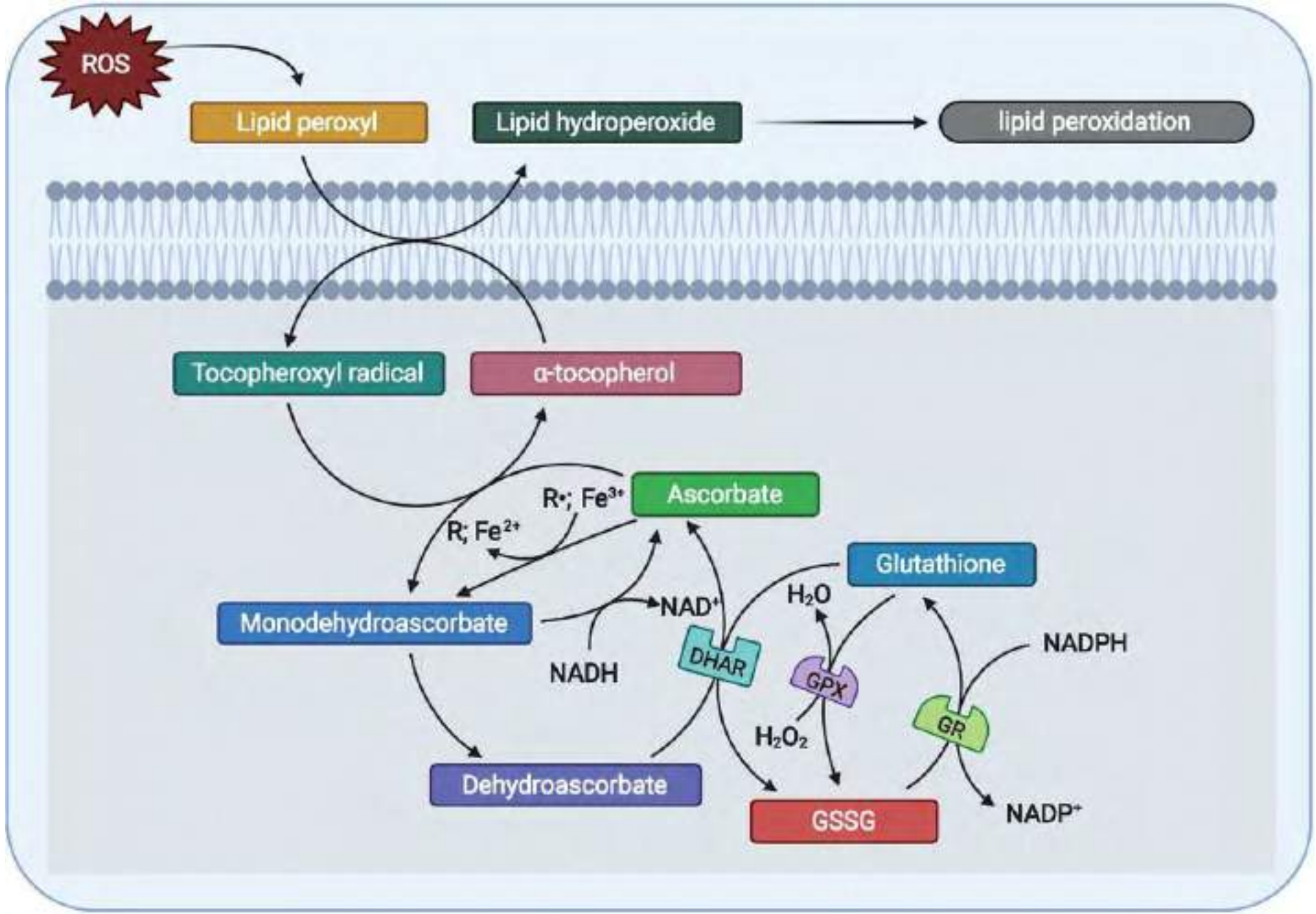
Forme associate a bioflavonoidi (teorie di Szent-Gyorgy)

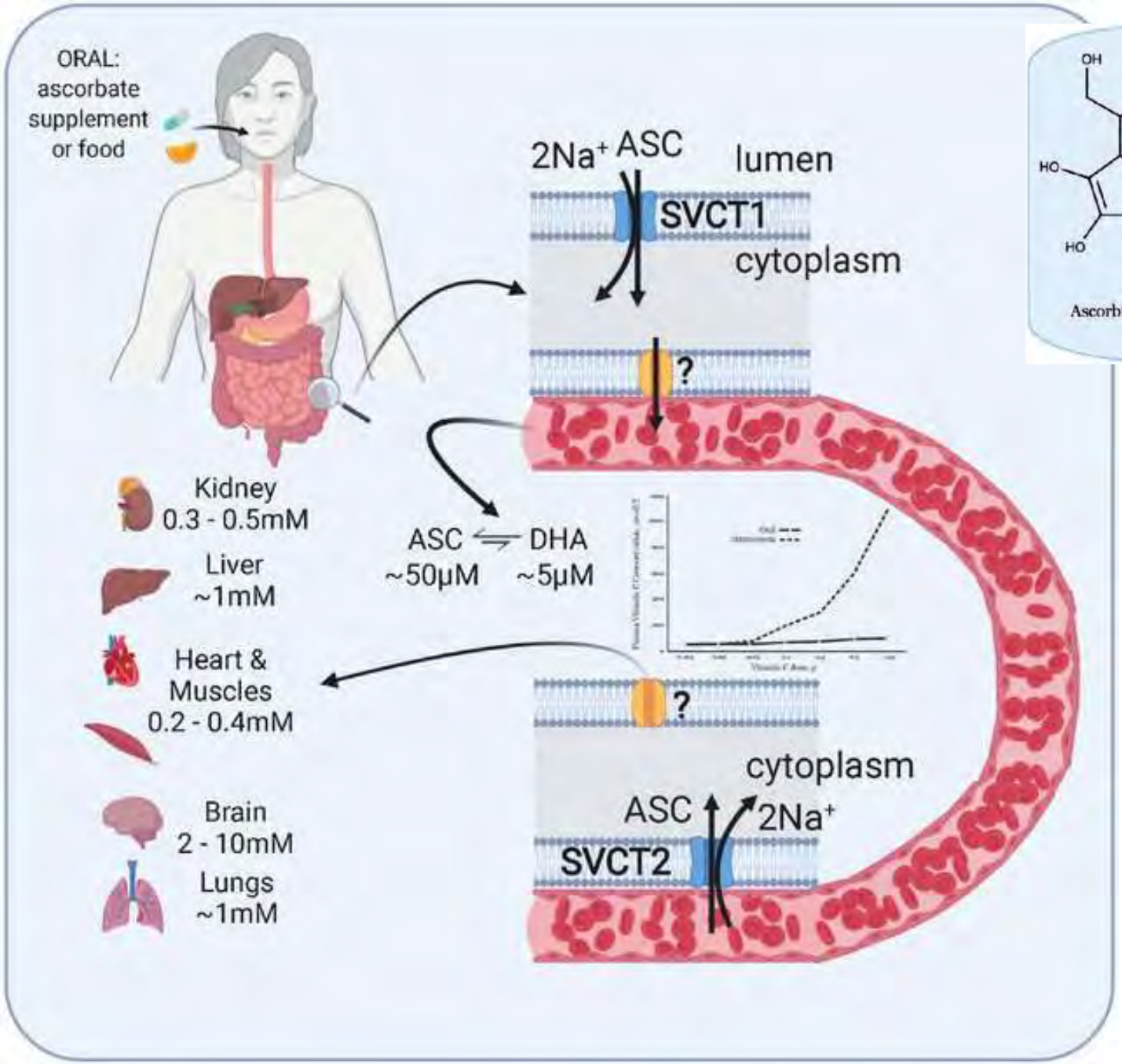
Forme brevettate

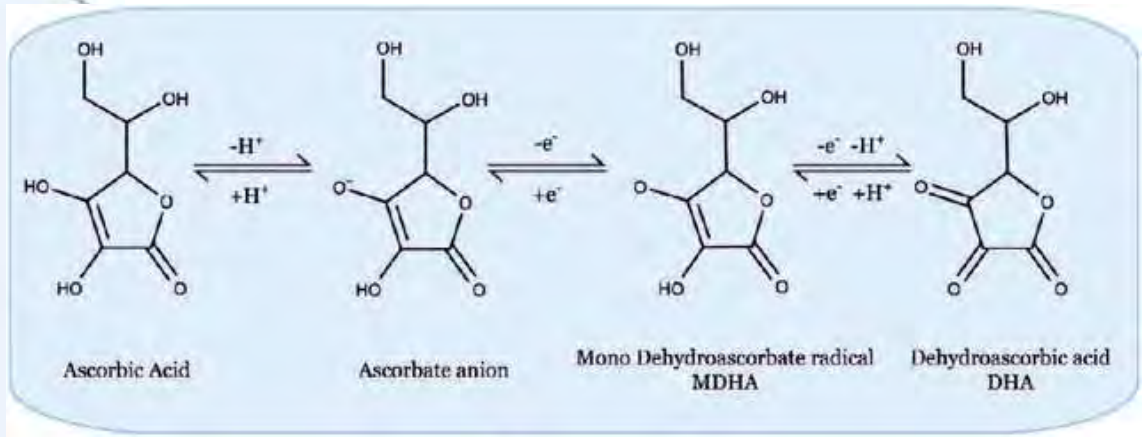
Ester-C® formata da calcio ascorbato, acido deidroascorbico calcio threonato e i derivati salificati xilonato e lixonato è una forma studiata per dare un rilascio lento ed essere non acida. Non è da confondere con esteri con acidi grassi.



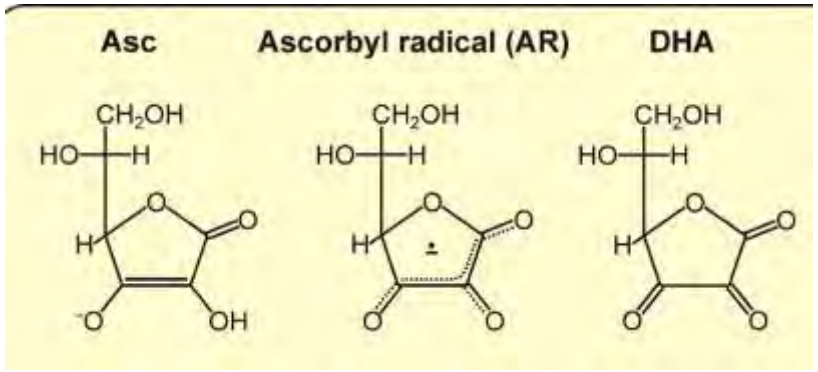



ROS
Lipid peroxyl
Lipid hydroperoxide
lipid peroxidation
Tocopheroxyl radical
α-tocopherol
R•; Fe3+
R; Fe2+
Ascorbate
Glutathione
Monodehydroascorbate
NAD+
NADH
DHAR
H2O
GPX
H2O2
NADPH
GR
Dehydroascorbate
GSSG
NADP+





Nutrients **2013**, *5*, 2860-2879; doi:10.3390/nu5082860



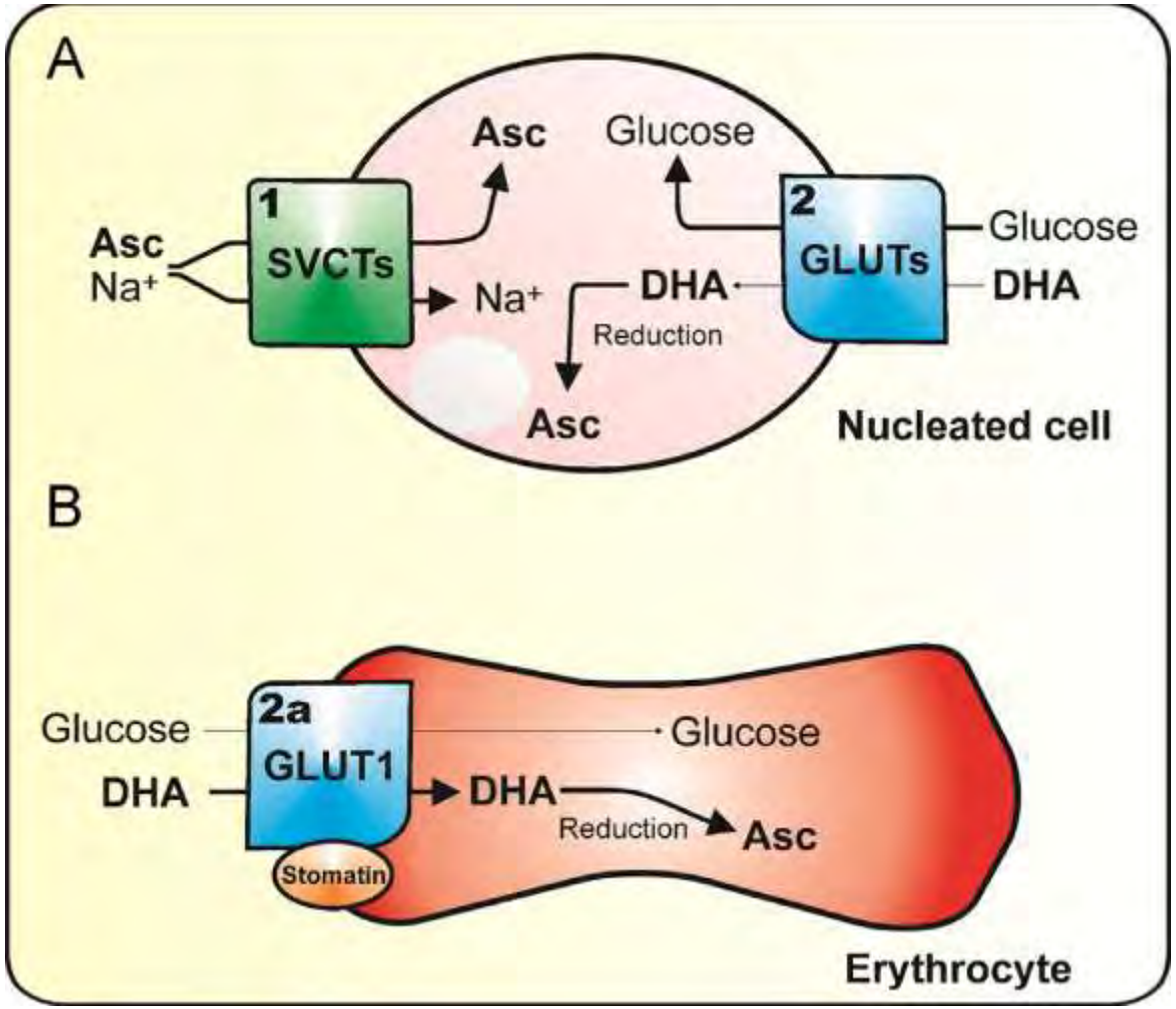


Fig. 2. Routes of ascorbate import in mammalian cells. (A) Two main pathways exist for Asc import into mammalian cells. The Asc pathway (1) imports Asc in a sodium-dependent manner via SVCTs (i.e., SVCTs 1 and 2) in many nucleated cells. The DHA pathway (2) imports DHA via GLUTs (i.e., GLUTs 1, 3, and 4) in a sodium-independent manner. (B) In erythrocytes from Asc auxotrophs (e.g., humans) the association of the integral plasma membrane protein stomatin (band 7.2b) with GLUT1 changes the import preference from D-glucose to L-DHA uptake, resulting in DHA transport that is not competitively inhibited by physiological glucose concentrations. In the case of DHA import, intracellular DHA is rapidly reduced to Asc by a variety of enzymatic and nonenzymatic reductive mechanisms that rely on NADPH and GSH as sources of reducing equivalents. Adapted from Lane and Lawen, [78].

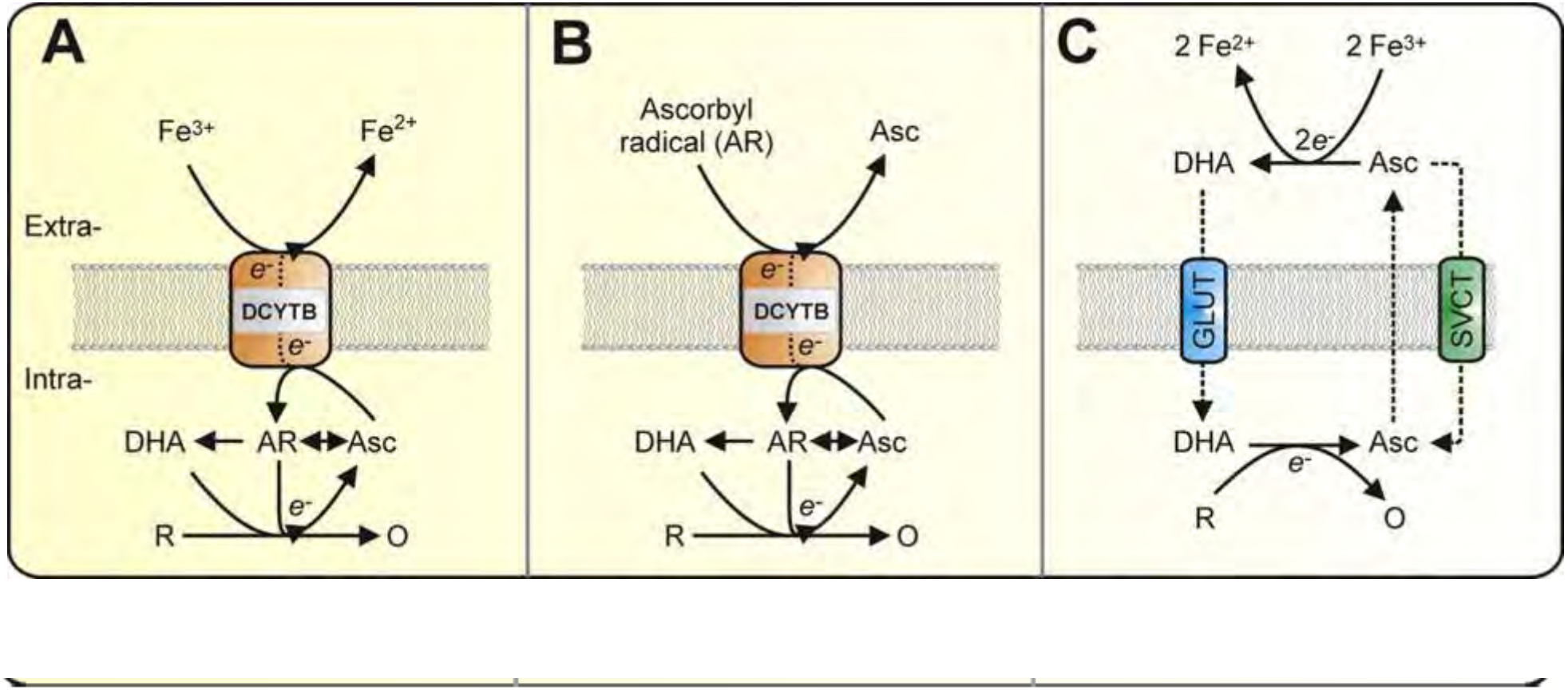


Fig. 3. Ascorbate and ferrireduction in non-transferrin-bound iron uptake. (A) Classical models of non-Tf-bound iron uptake postulate the requirement for a ferrireductase that reduces extracellular iron at the expense of intracellular reducing equivalents. Dcytb may function as a ferric (Fe^{3+}) reductase, particularly in duodenal enterocytes, by which ferric ions are reduced monoelectronically to ferrous (Fe^{2+}) ions, at the expense of intracellular Asc. (B) Dcytb may also function as an ascorbyl radical (AR) reductase, helping to preserve extracellular Asc. (C) A recently described, novel mechanism for extracellular ferrireduction in mammals involves release of Asc, possibly by volume-sensitive anion channels, that has been formed intracellularly as a result of DHA import and subsequent reduction back to Asc. Nascently effluxed Asc then reacts directly with extracellular non-Tf-bound ferric iron, reducing it to ferrous iron that can be imported by ferrous-selective transporters. The precise mechanisms and proteins involved in ascorbate efflux remain to be identified. Adapted from Lane and Lawen, [78].

Mitmesser et al. SpringerPlus (2016) 5:1161
DOI 10.1186/s40064-016-2605-7

SpringerPlu

RESEARCH Open Acces

Determination of plasma and leukocyte vitamin C concentrations in a randomized, double-blind, placebo-controlled trial with Ester-C®

Susan H. Mitmesser[1], Qian Ye[1*], Mal Evans[2] and Malle Combs[1]

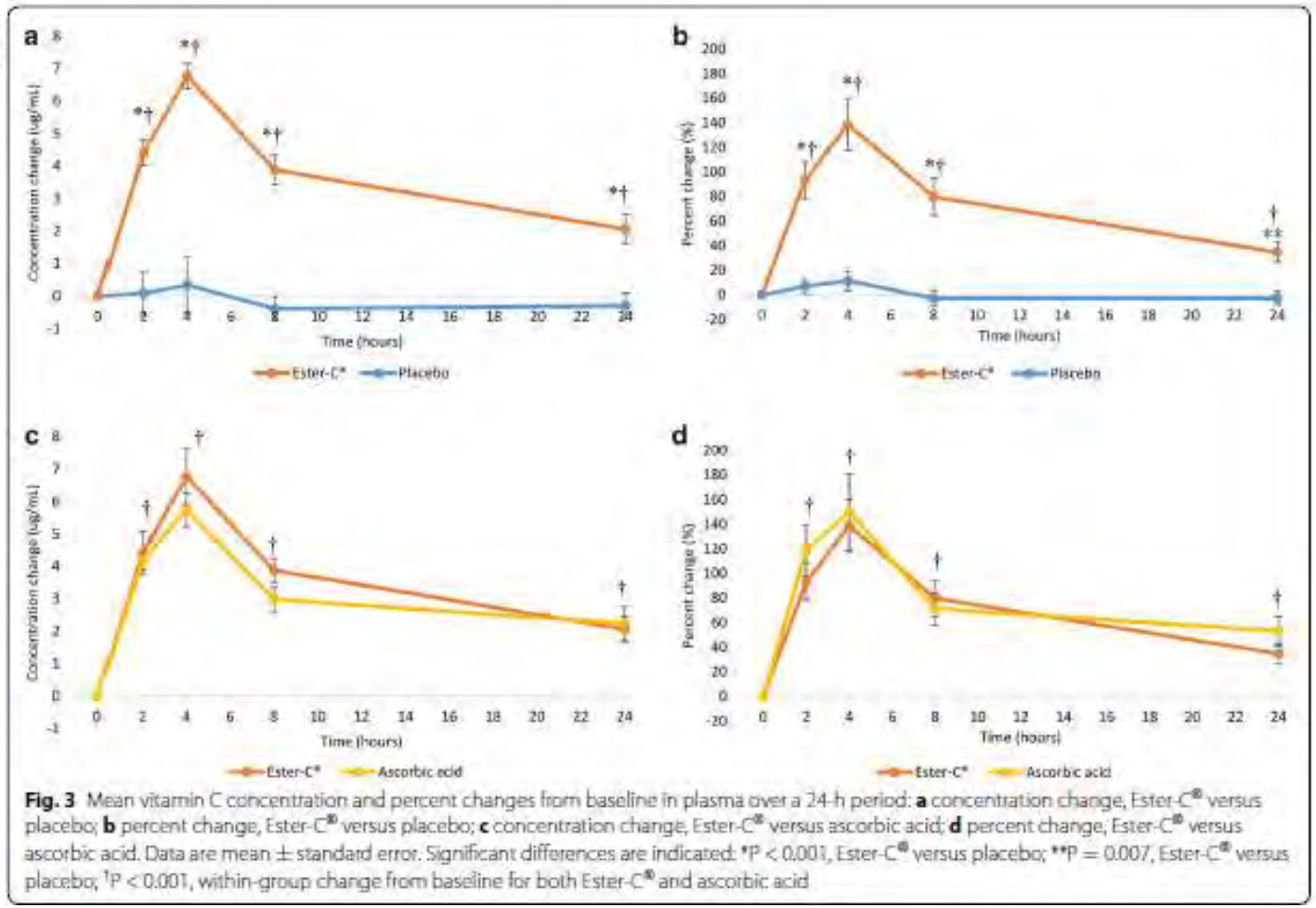
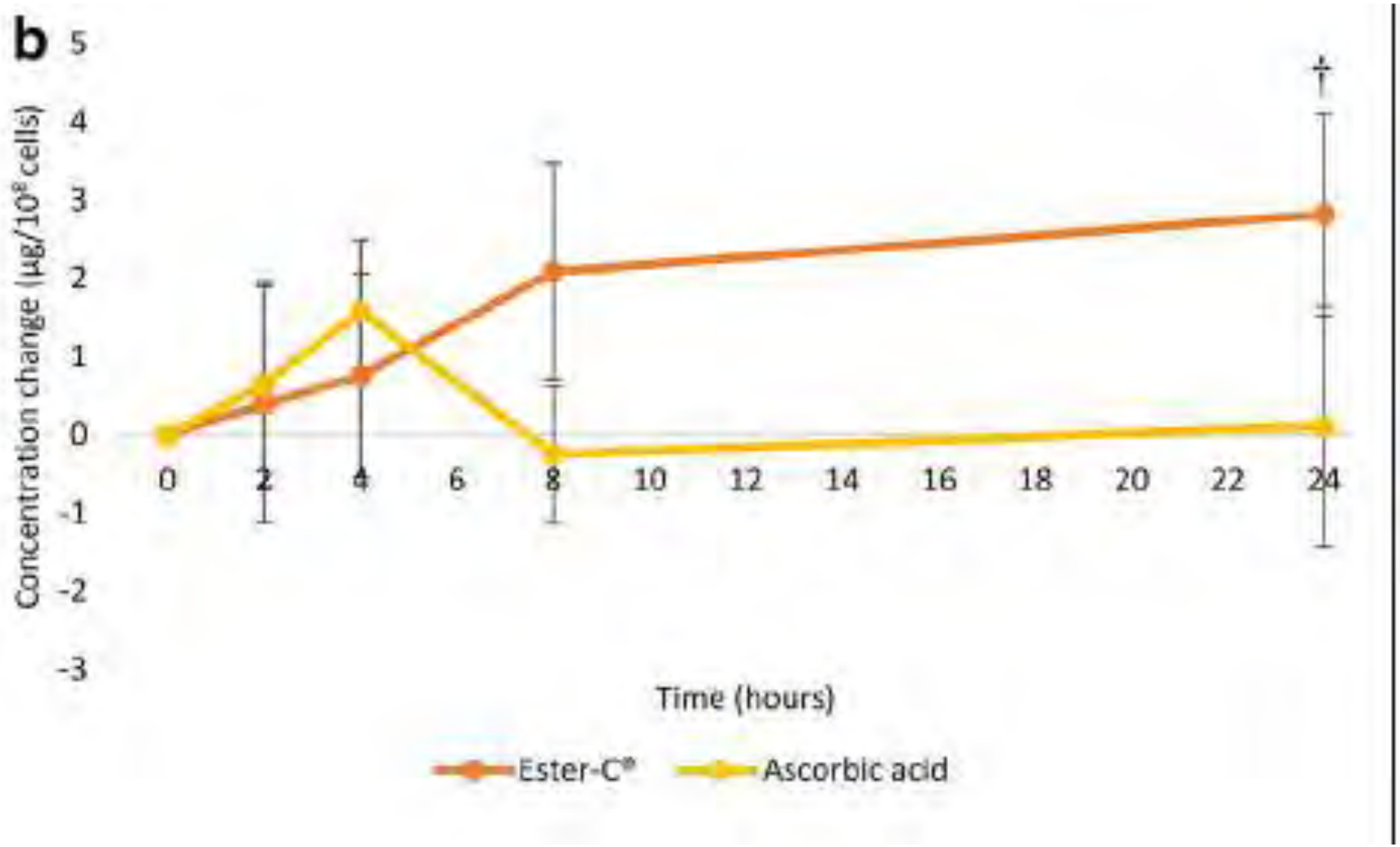
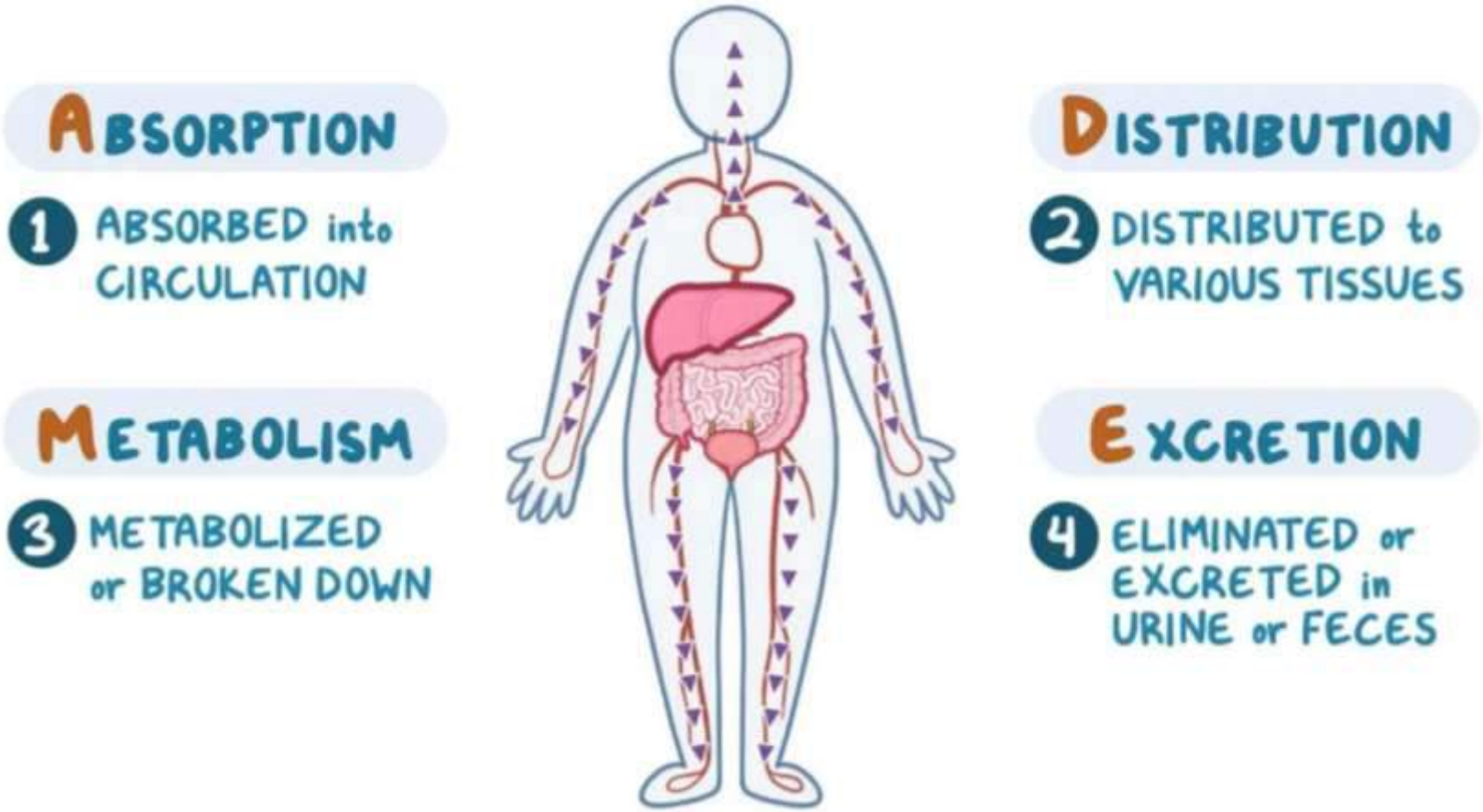


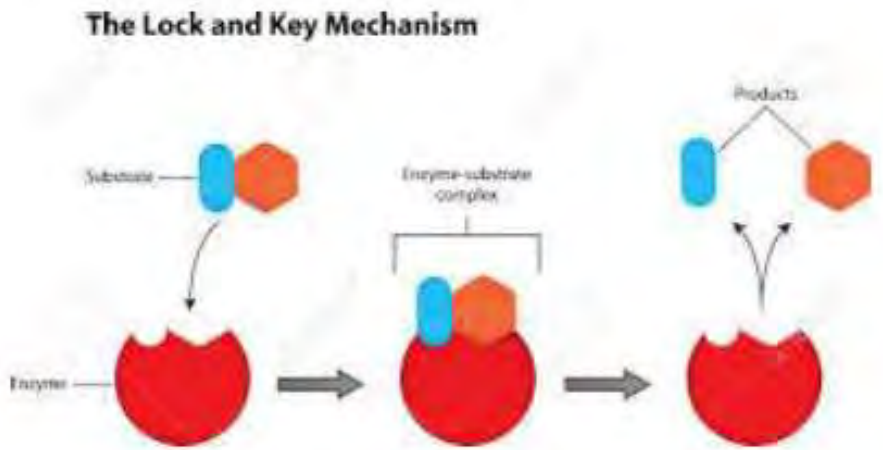
Fig. 3 Mean vitamin C concentration and percent changes from baseline in plasma over a 24-h period: **a** concentration change, Ester-C® versus placebo; **b** percent change, Ester-C® versus placebo; **c** concentration change, Ester-C® versus ascorbic acid; **d** percent change, Ester-C® versus ascorbic acid. Data are mean ± standard error. Significant differences are indicated: *$P < 0.001$, Ester-C® versus placebo; **$P = 0.007$, Ester-C® versus placebo; †$P < 0.001$, within-group change from baseline for both Ester-C® and ascorbic acid


b
Concentration change (µg/10⁸ cells)
5
4
3
2
1
0
-1
-2
-3
0
2
4
6
8
10
12
14
16
18
20
22
24
†
Time (hours)
Ester-C®
Ascorbic acid

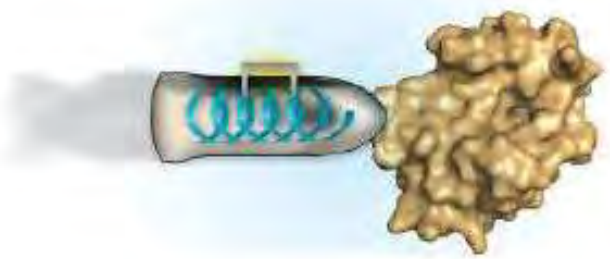
Farmacocinetica studia l'assorbimento, la distribuzione, il metabolismo e l'eliminazione dei farmaci ADME



MECCANISMI D'AZIONE …

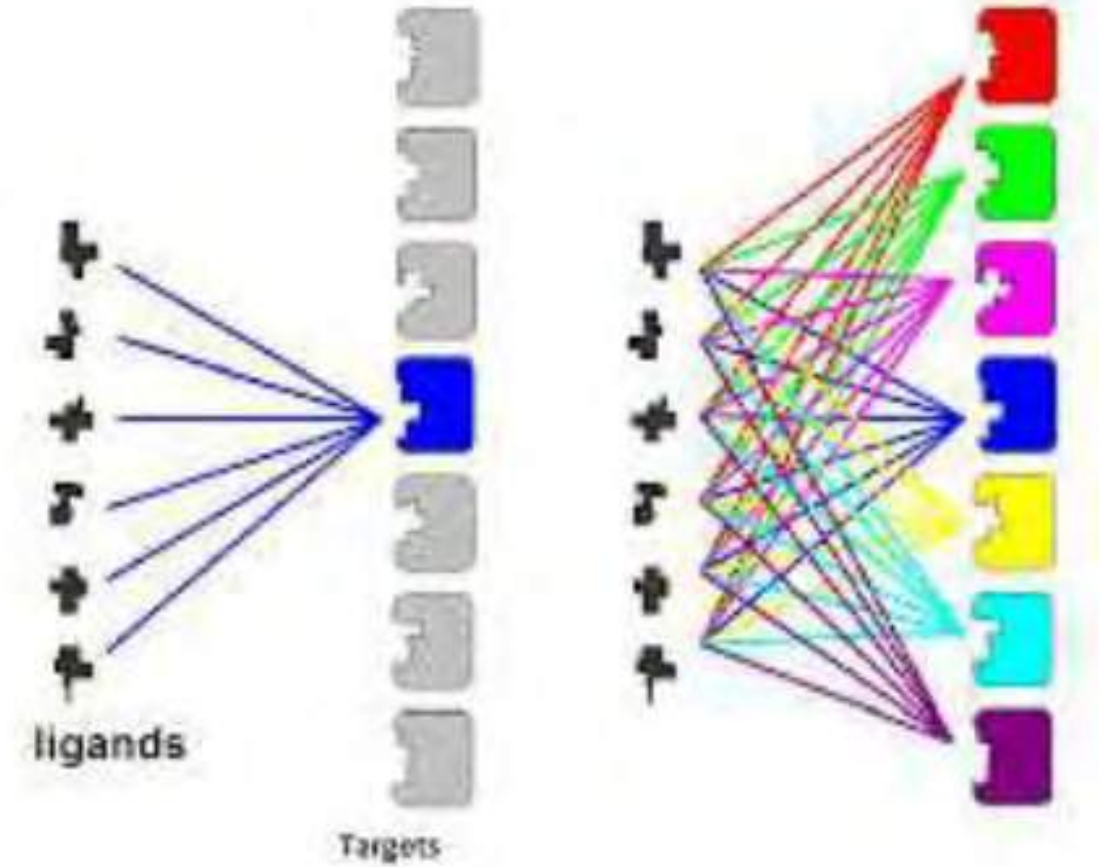


Un composto che colpisce uno specifico bersaglio



COMPOSTI SINTETICI

COMPOSTI NATURALI



MISCELA DI COMPOSTI → **AZIONE MULTI-TARGET**

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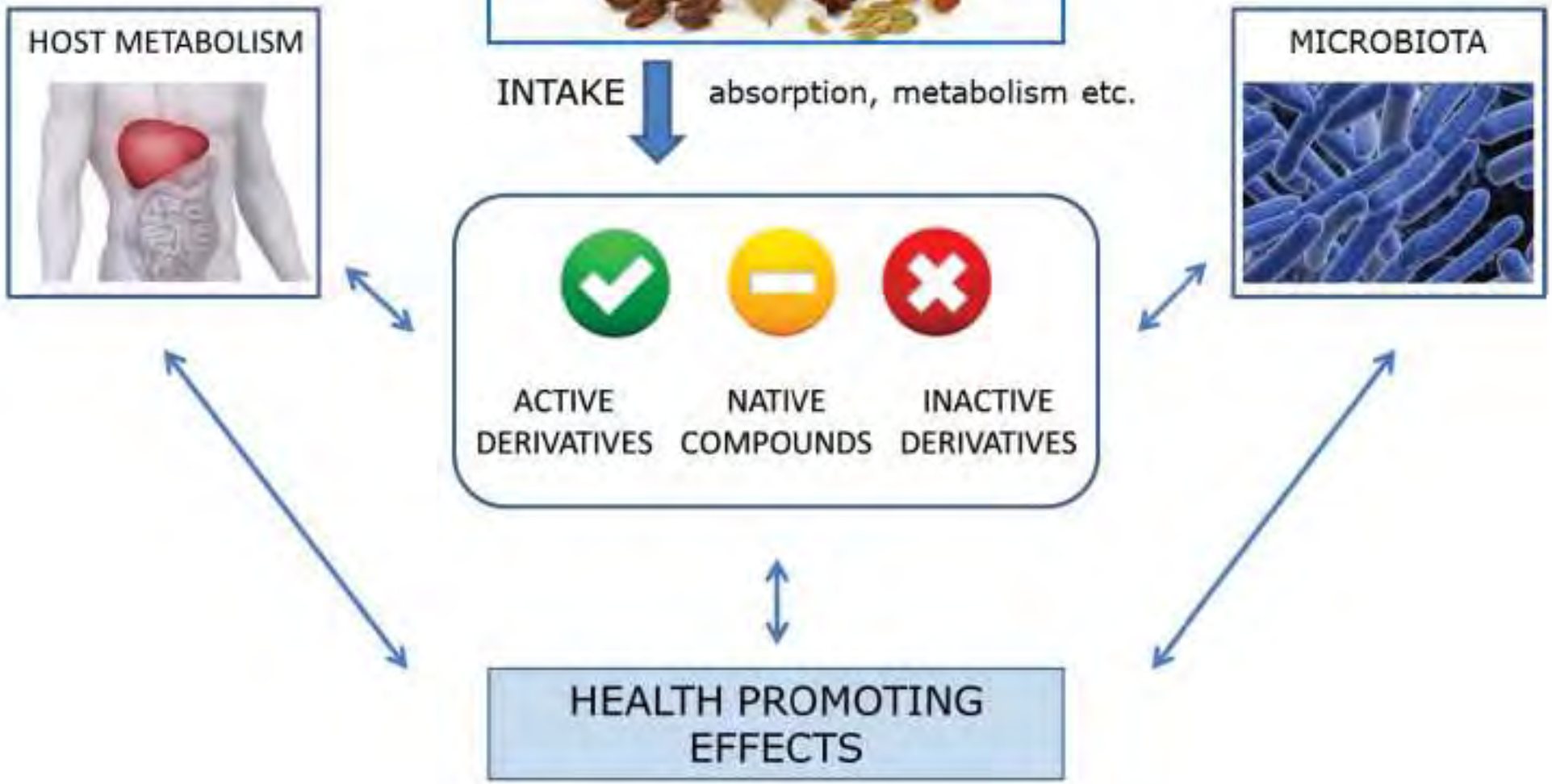
Current Medicinal Chemistry, 2016, 23, 1-26 1

REVIEW ARTICLE

Nutraceuticals, a New Challenge for Medicinal Chemistry

Stefania Sut, Valeria Baldan, Marta Faggian, Gregorio Peron, Stefano Dall'Acqua*

University of Padova - Pharmaceutical and Pharmacological Sciences, Padova, Italy



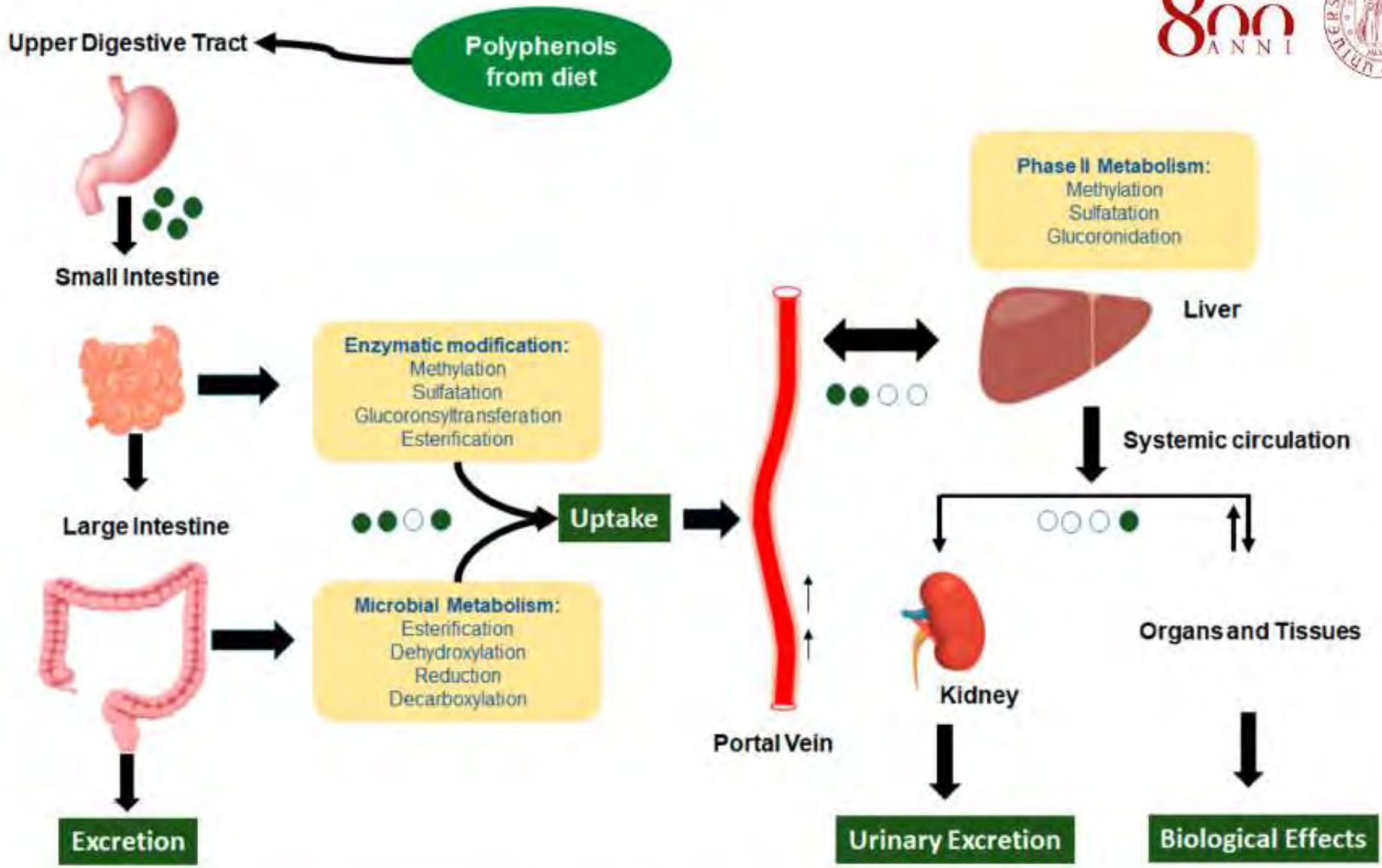
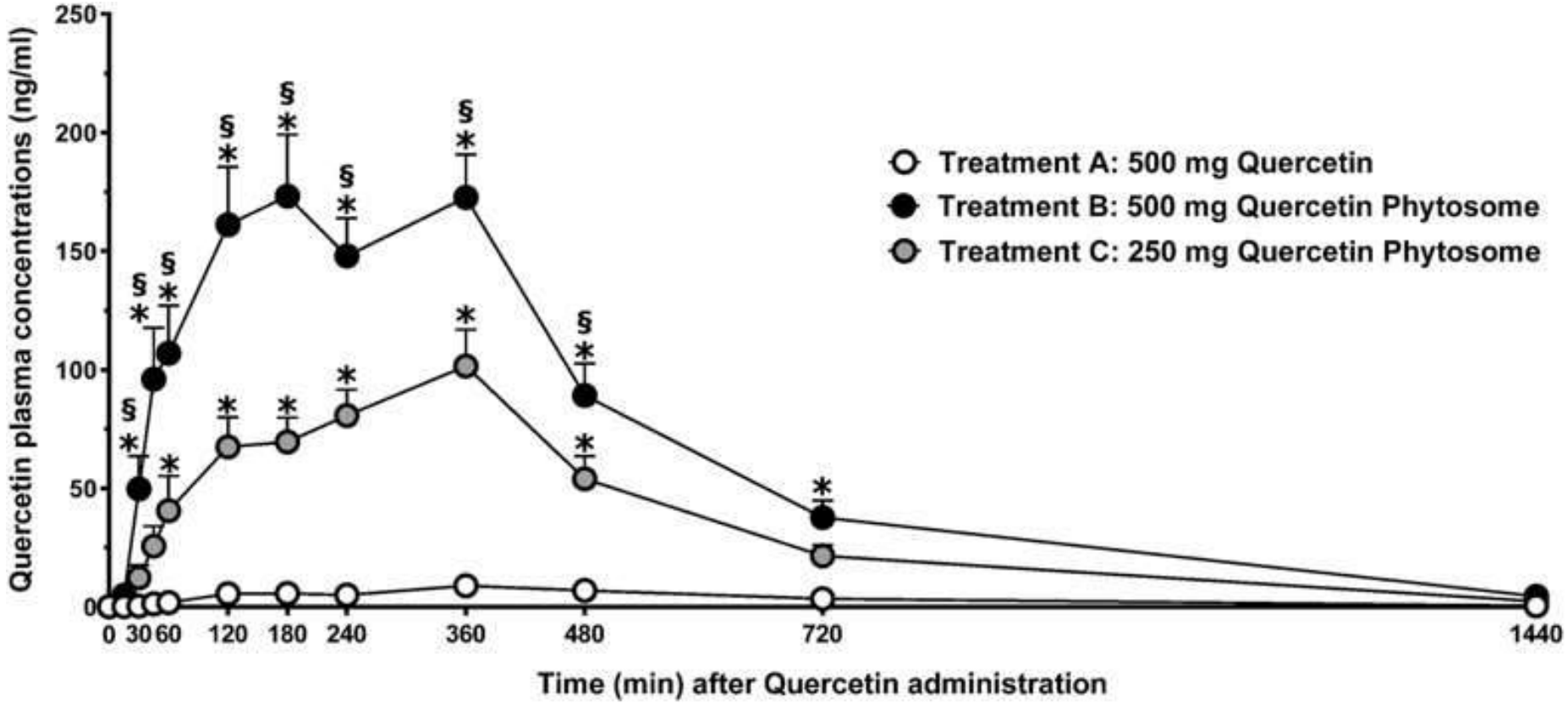


Figure 2. Schematic representation of the absorption and metabolism of dietary polyphenols. Green dots represent aglycon polyphenols, and white dots represent their metabolites.

Strategie per l'incremento dell'assorbimento dei polifenoli

Poco idrosolubili : aggiungere tensioattivi (lecitine, tween etc)
Ridurre azione di glucuronidasi (piperina) per aumentare emivita
Piperina inibisce trasportatori (Pgp) che riducono assorbimento
Enhancer come NAC
Nanoformulazioni
Formulazione in liposomi
Somministrazione con grassi per composti liposolubili
Micronizzazioni

Co-macinazione e formazione di emulsioni solide
Natural Deep Eutectic Solvents



European Journal of Drug Metabolism and Pharmacokinetics (2019) 44:169–177
https://doi.org/10.1007/s13318-018-0517-3

ORIGINAL RESEARCH ARTICLE

Improved Oral Absorption of Quercetin from Quercetin Phytosome®, a New Delivery System Based on Food Grade Lecithin

Antonella Riva[1] · Massimo Ronchi[1] · Giovanna Petrangolini[1] · Stefania Bosisio[1] · Pietro Allegrini[1]

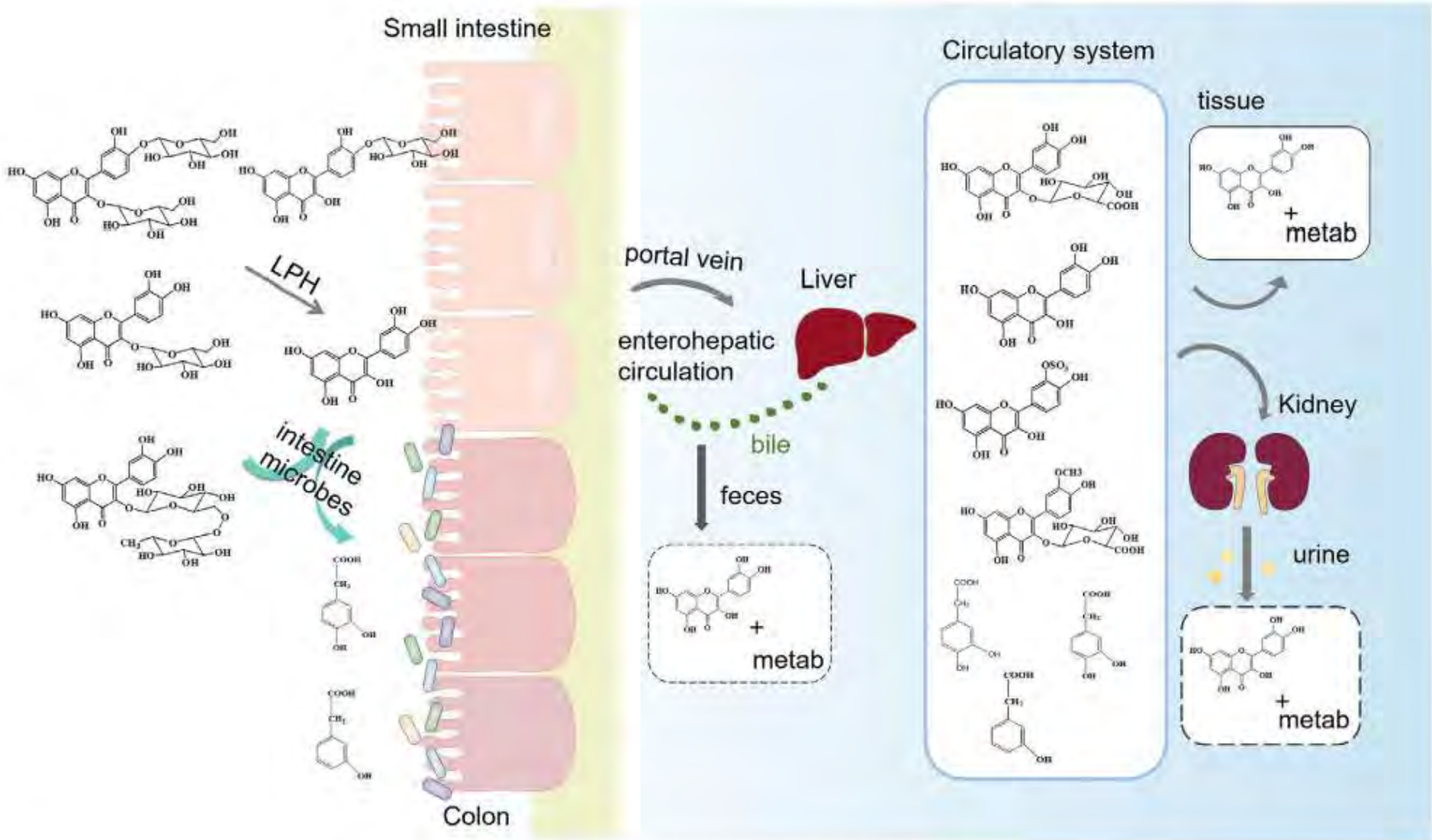
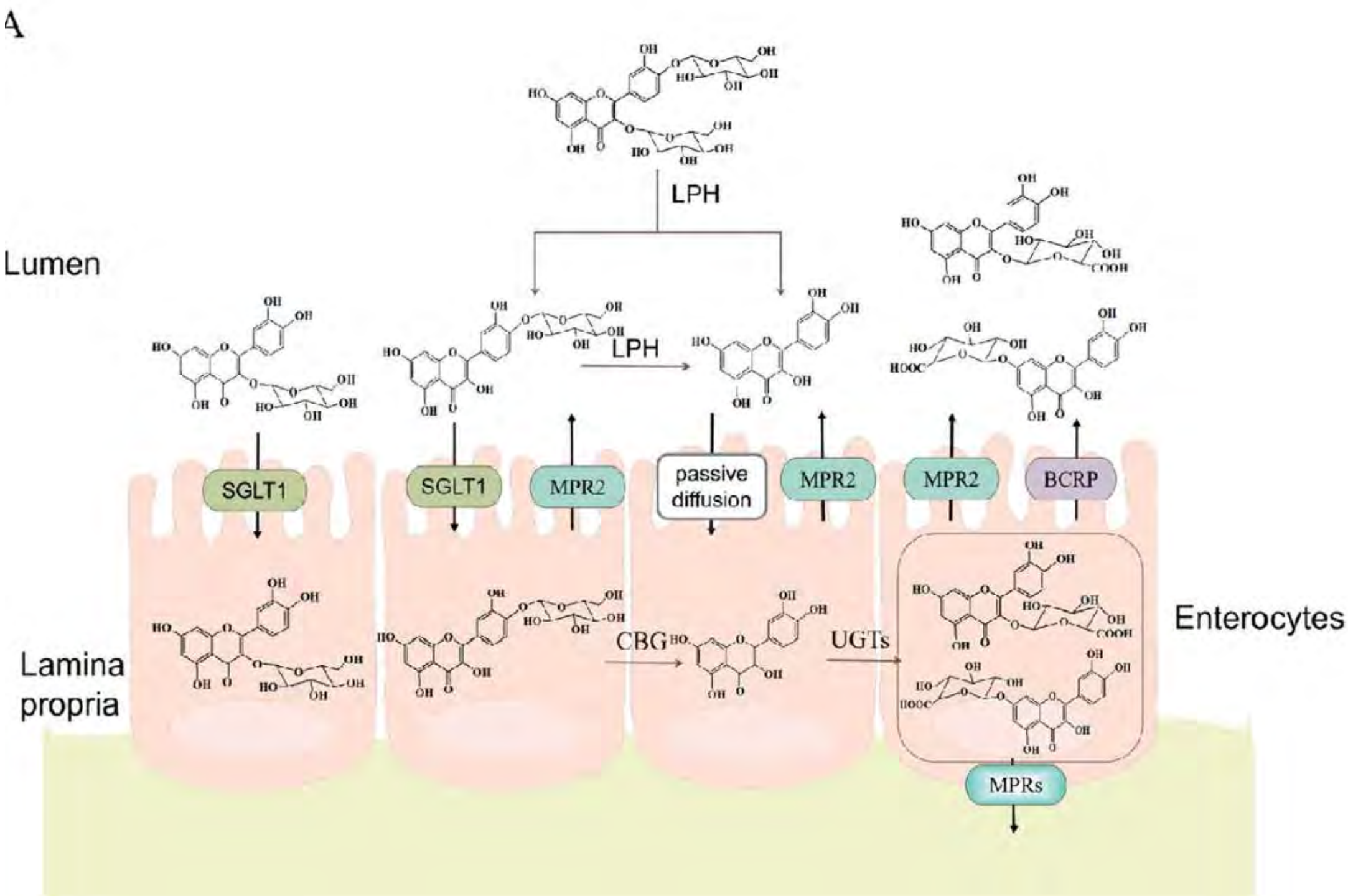
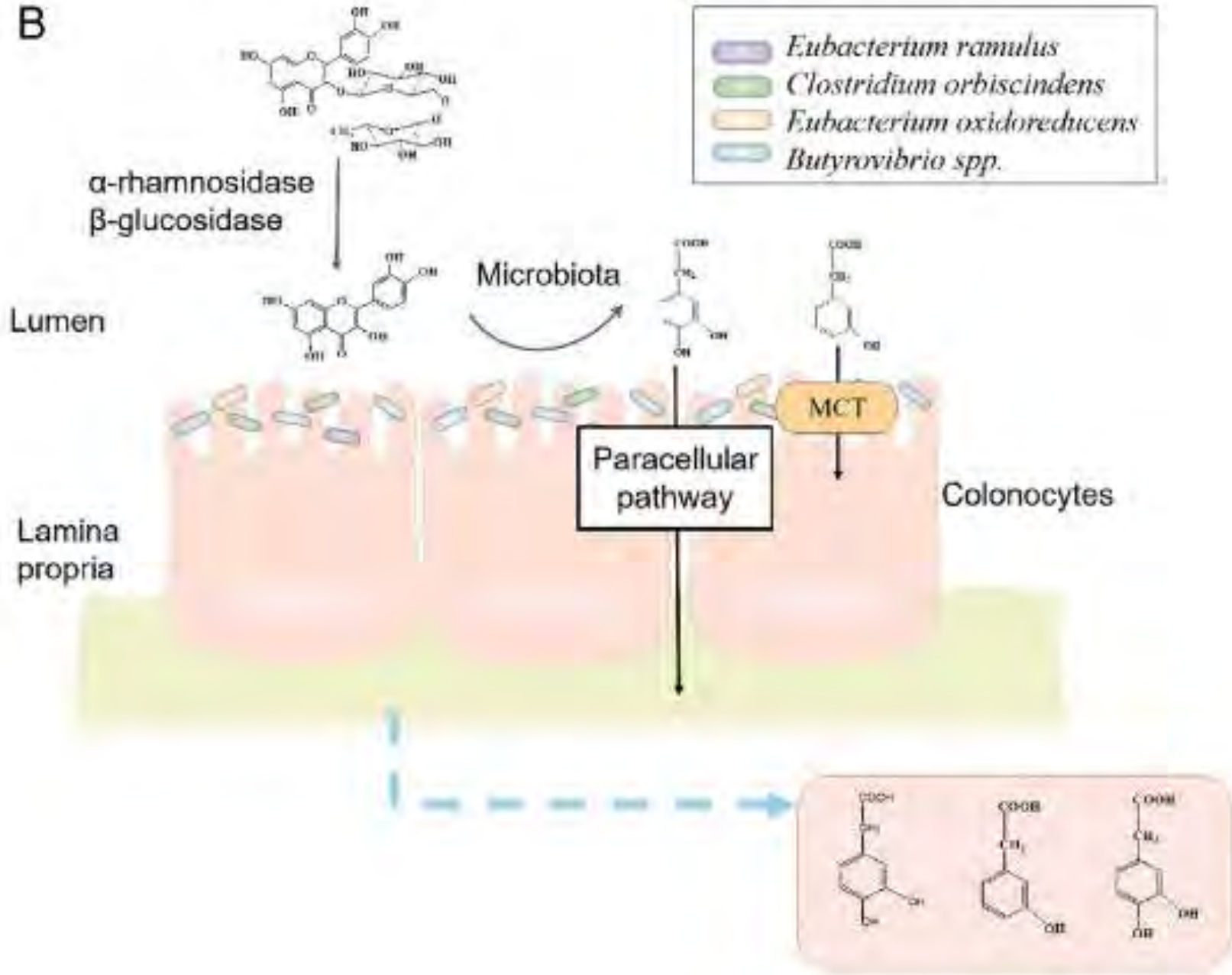


FIGURE 1 Schematic representation of processes of quercetin absorption metabolism and elimination *in vivo*. *Abbreviations*: LPH, lactasephlorizin hydrolase

A


Lumen
LPH
LPH
SGLT1
SGLT1
MPR2
passive diffusion
MPR2
MPR2
BCRP
Lamina propria
CBG
UGTs
Enterocytes
MPRs


B
Eubacterium ramulus
Clostridium orbiscindens
Eubacterium oxidoreducens
Butyrovibrio spp.
α-rhamnosidase
β-glucosidase
Microbiota
Lumen
MCT
Paracellular pathway
Colonocytes
Lamina propria

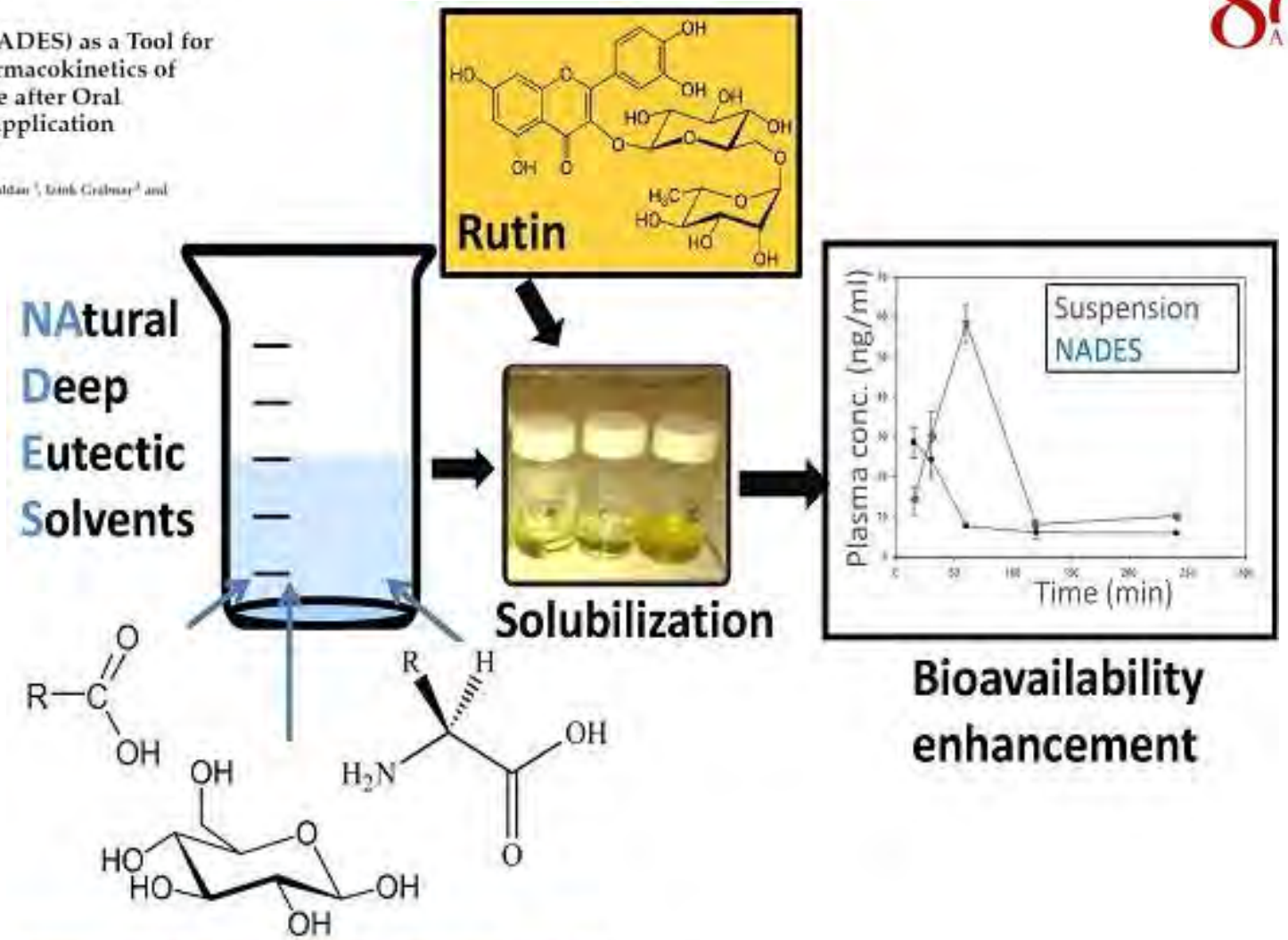
molecules

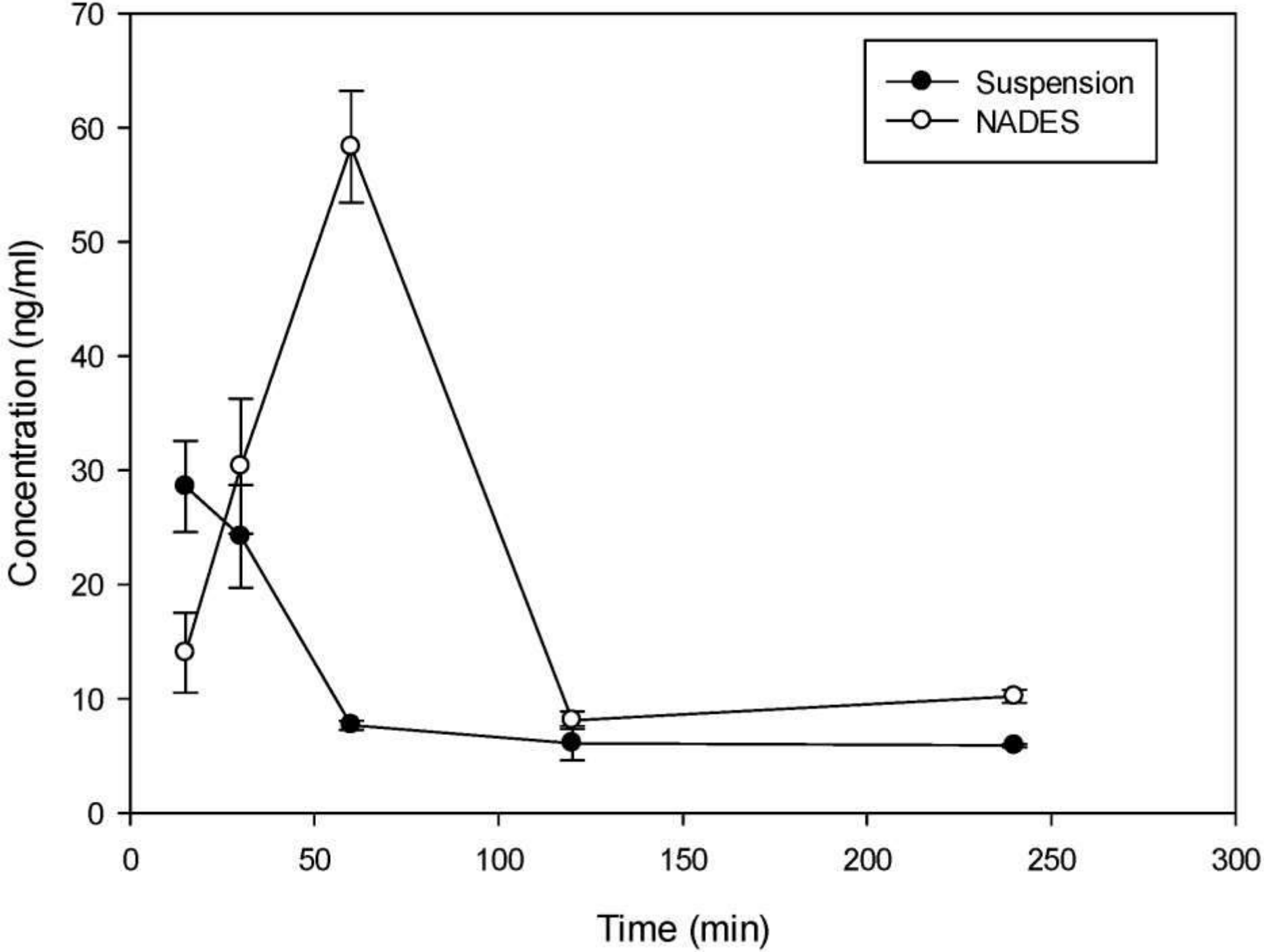
MDPI

Article

Natural Deep Eutectic Solvents (NADES) as a Tool for Bioavailability Improvement: Pharmacokinetics of Rutin Dissolved in Proline/Glycine after Oral Administration in Rats: Possible Application in Nutraceuticals

Marta Faggian [1], Stefania Sut [1], Beatrice Perissutti [2], Valeria Baldan [1], Erik Grabnar [3] and Stefano Dall'Acqua [1,*]




Suspension
NADES
Concentration (ng/ml)
Time (min)
0
10
20
30
40
50
60
70
0
50
100
150
200
250
300

Echinacea pallida, purpurea, angustifolia

Polifenoli (echinacoside, acido cicorico, etc)

Polisaccaridi

Alchilammidi

Alchini

Fitocomplesso

MODALITA' ESTRATTIVE

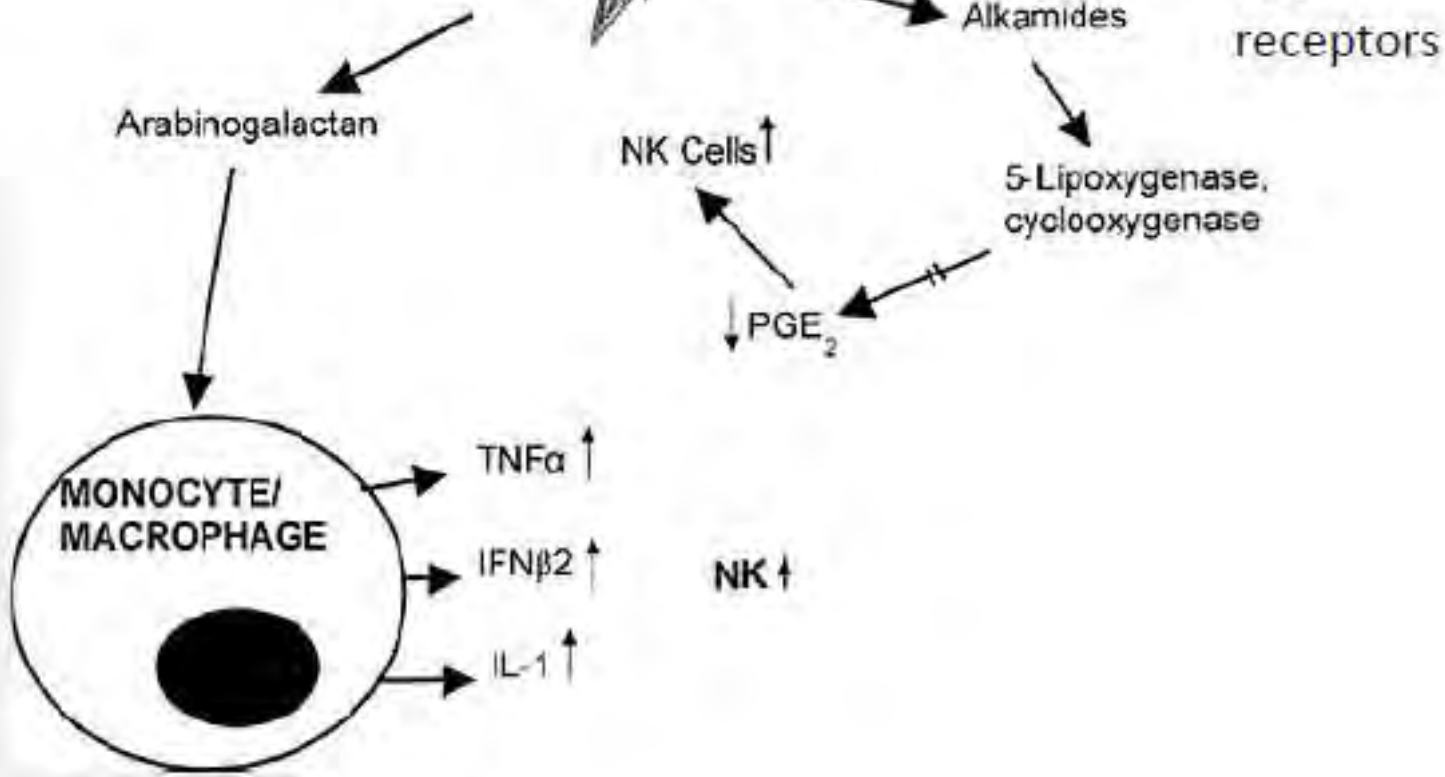
TIPOLOGIE DI ESTRATTO

DOSI

VEICOLO

Echinacea

MECCANISMI D'AZIONE MULTIPLI



Contents lists available at ScienceDirect

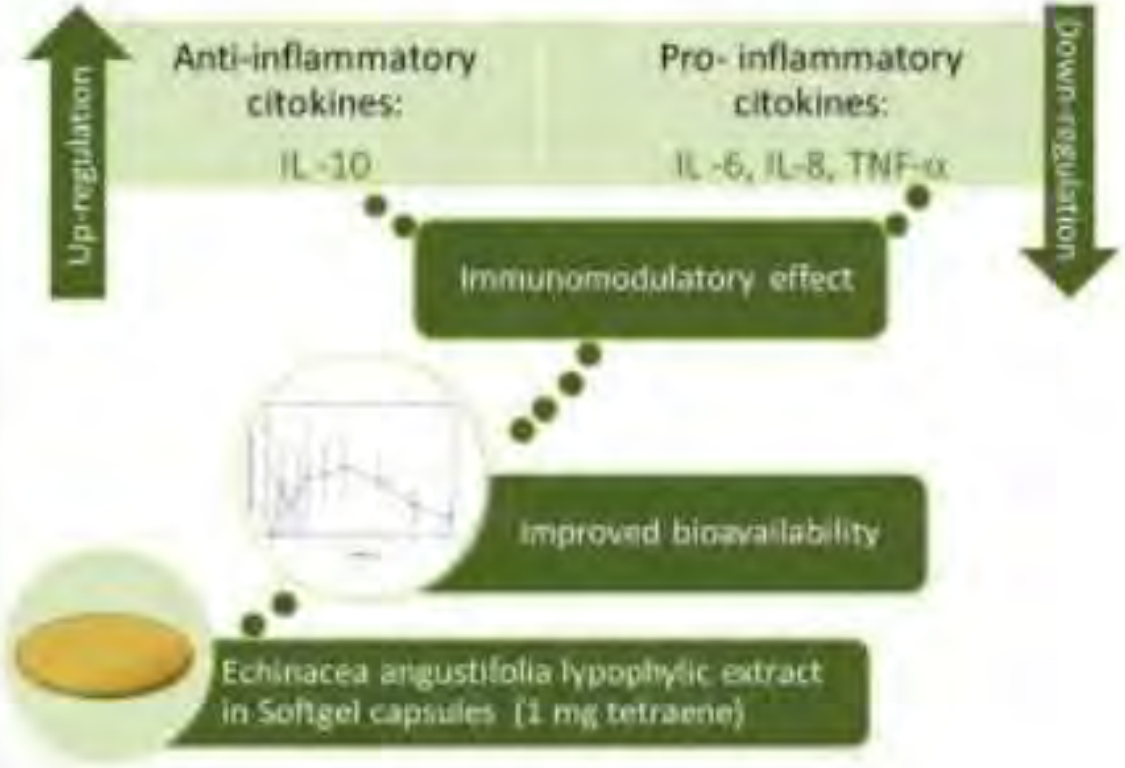
European Journal of Pharmaceutics and Biopharmaceutics

journal homepage: www.elsevier.com/locate/ejpb

Research Paper

Pharmacokinetics and immunomodulatory effect of lipophilic *Echinacea* extract formulated in softgel capsules

Stefano Dall'Acqua [a], Beatrice Perissutti [b], Iztok Grabnar [c], Rossella Farra [d], Manola Comar [e,f], Chiara Agostinis [g], Gabriella Caristi [g], Samuel Golob [b], Dario Voinovich [b,*]



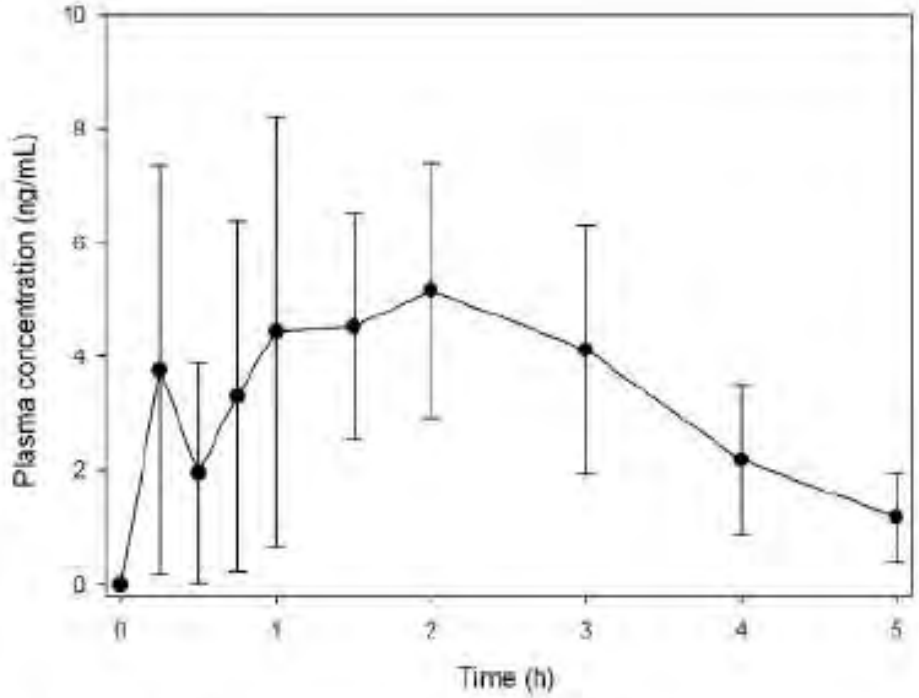
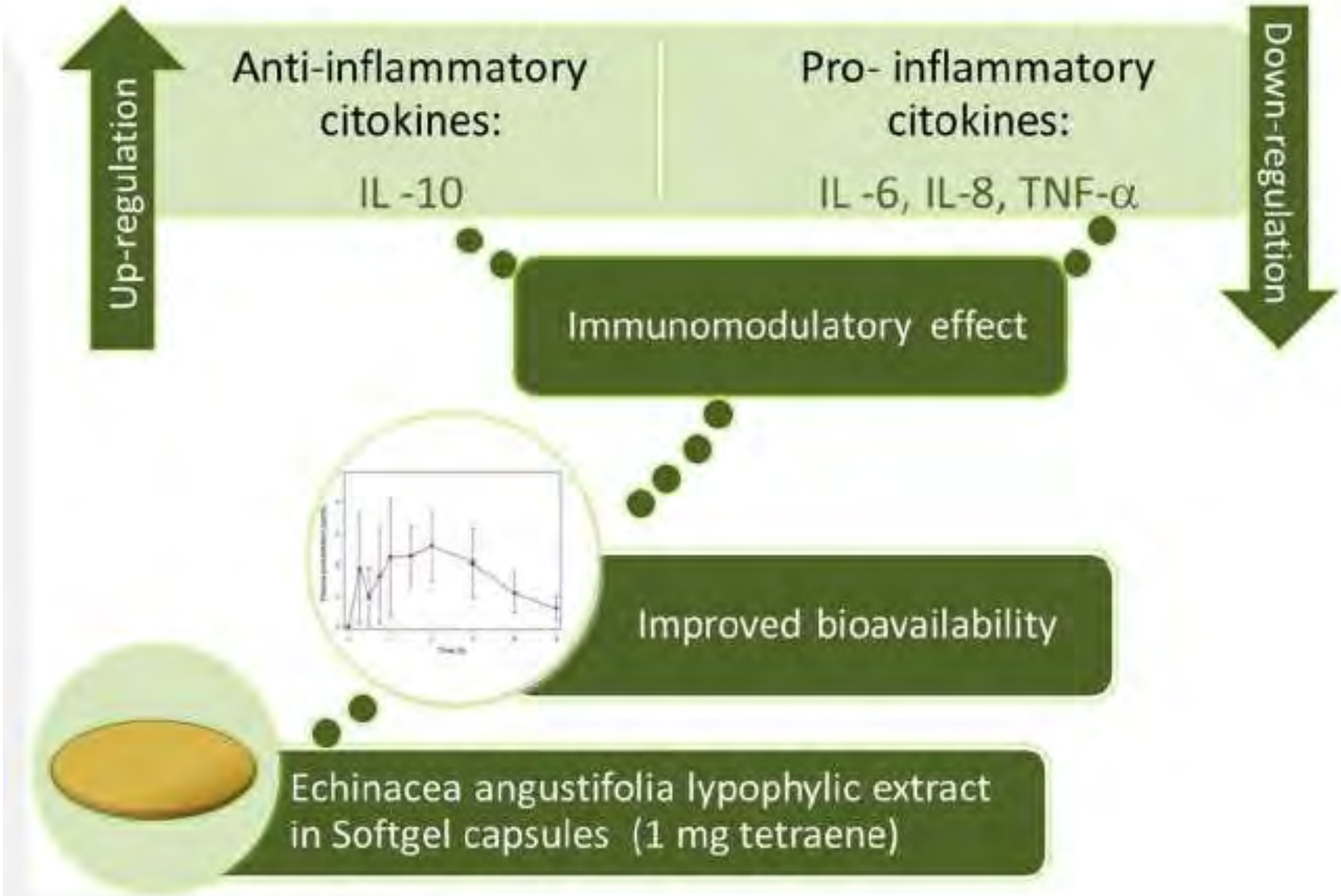


Fig. 1. Mean (±SD) time course of dodeca-2E,4E-dienoic acid isobutylamide concentration in plasma in 10 healthy volunteers following oral administration of *lipophilic Echinacea extract* formulated as softgel capsules (dose 1 mg).

Table 2
Pharmacokinetic parameters of dodeca-2E,4E-dienoic acid isobutylamide in 10 healthy volunteers following oral administration of *lipophilic Echinacea extract* formulated as softgel capsules (dose 1 mg).

Parameter	Mean	SD
t_{max} (h)	0.70	0.57
C_{max} (ng/mL)	7.75	2.96
$t_{1/2\lambda z}$ (h)	1.29	0.57
AUC (ng h/mL)	16.93	7.18
AUC_{inf} (ng h/mL)	19.17	8.26
V_z/F (L)	118.3	91.7
CL/F (L/h)	60.8	23.9
MRT (h)	2.77	0.46


Up-regulation
Anti-inflammatory citokines:
IL -10
Pro- inflammatory citokines:
IL -6, IL-8, TNF-α
Down-regulation
Immunomodulatory effect
Improved bioavailability
Echinacea angustifolia lypophylic extract in Softgel capsules (1 mg tetraene)