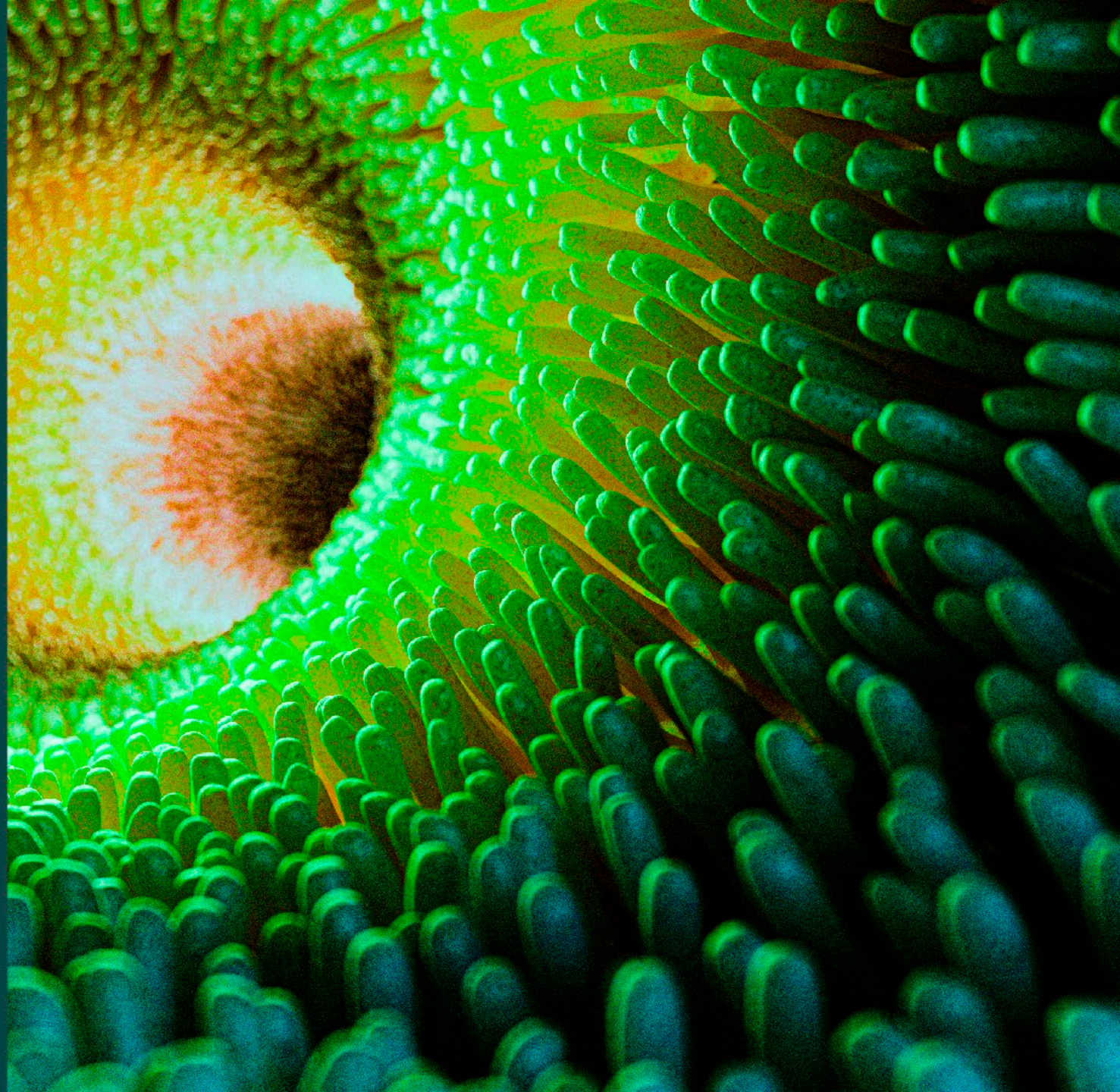
top ten
in gastroenterologia
14^ EDIZIONE

24-25 NOVEMBRE 20**23**

BERGAMO

HOTEL EXCELSIOR SAN MARCO
Piazza della Repubblica, 6



American Society for Nutrition
Excellence in Nutrition Research and Practice

Microbiota intestinale e Polifenoli

Vincenzo Sorrenti, PharmD, PhD, RDN

Professore a contratto di Farmacologia, Nutraceutica e Nutrizione – UNIPD

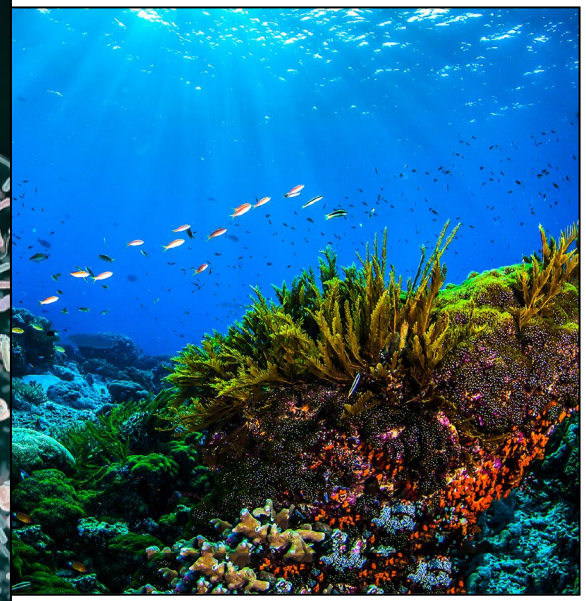
Nutrizionista Ricercatore – «Maria Paola Belloni» Center for Personalized Medicine - Padova

Consulente e Docente di Nutrizione e Nutraceutica - Polo didattico «Sapere e Vivere Bene» - Padova

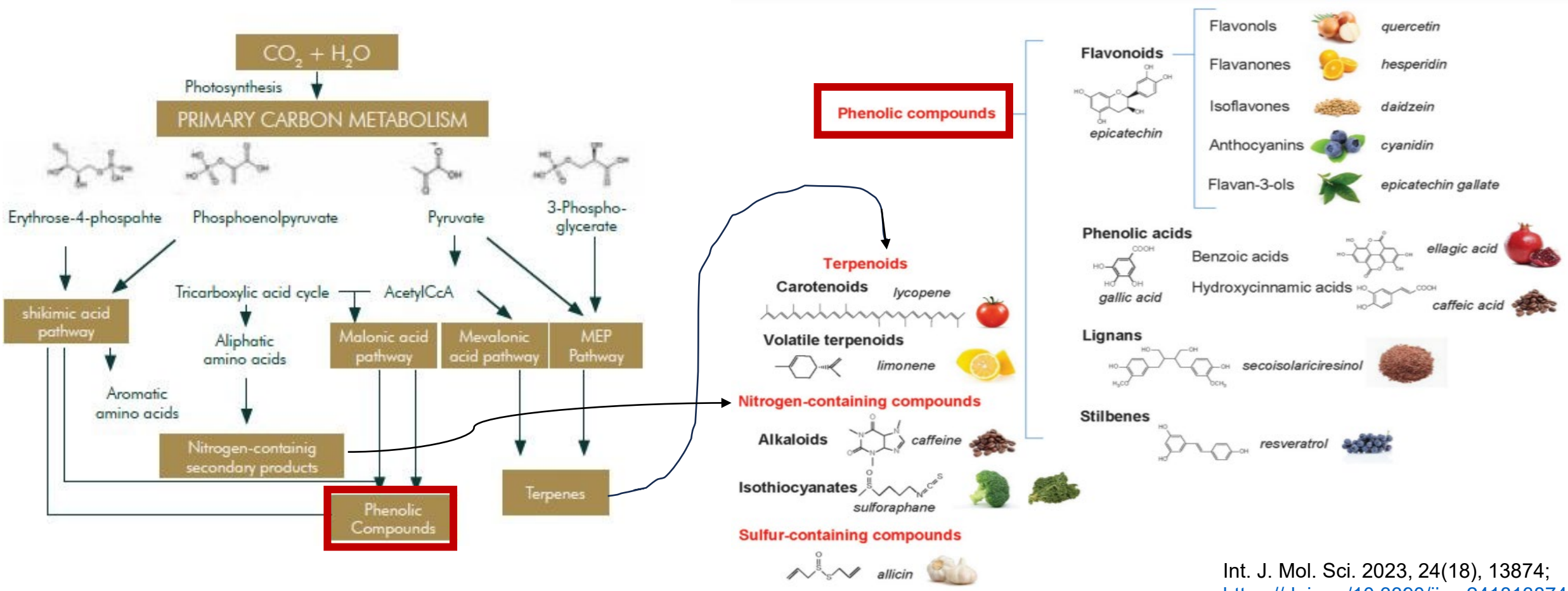
Membro ASN (American Society for Nutrition)

Titolare «Farmacia dei Sali» Mansuè (TV)

What makes a thriving ecosystem?



Biosynthetic pathways of phenolic compounds and main representatives of clinical interest



Int. J. Mol. Sci. 2023, 24(18), 13874;
https://doi.org/10.3390/ijms241813874

nutrients

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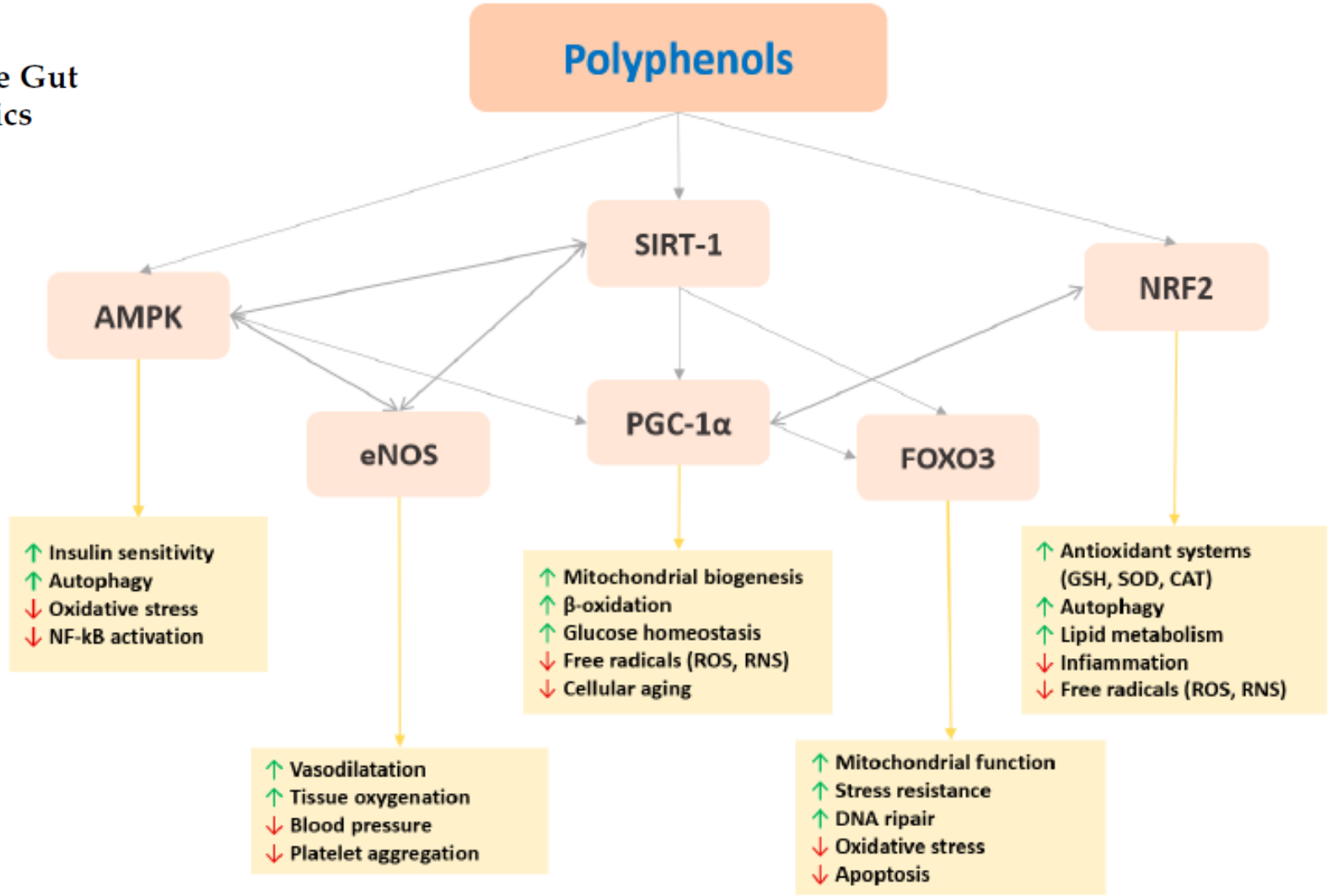
Review

Deciphering the Role of Polyphenols in Sports Performance: From Nutritional Genomics to the Gut Microbiota toward Phytonutritional Epigenomics

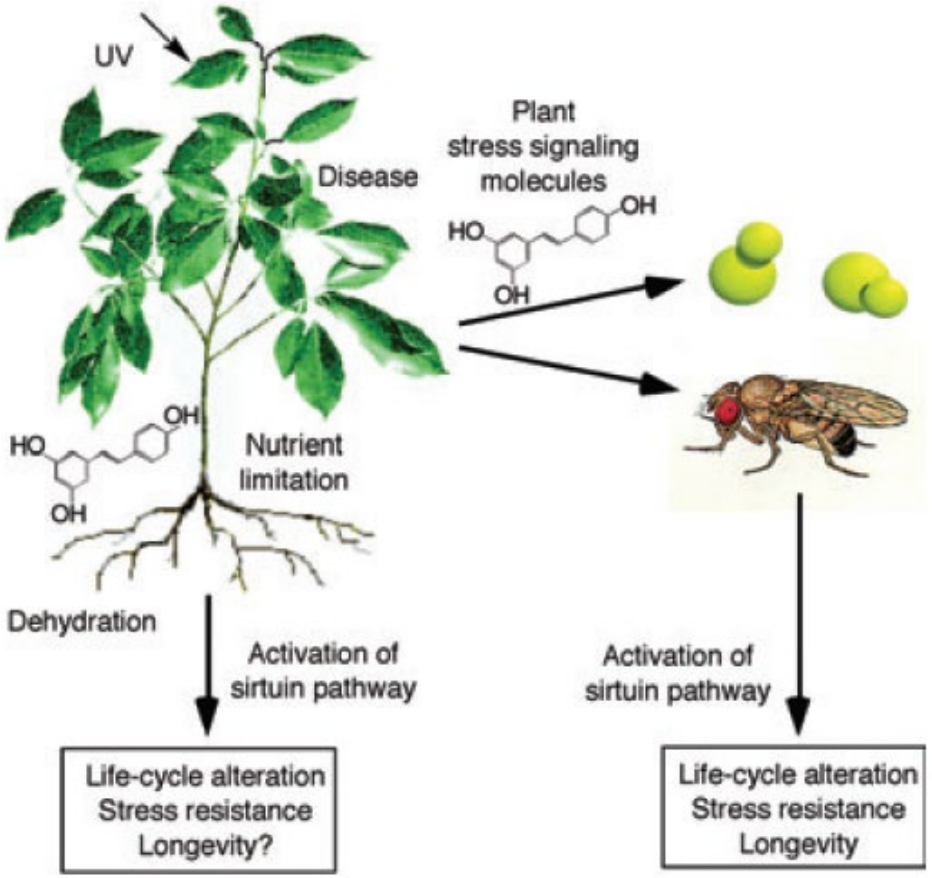
Vincenzo Sorrenti [1,2,3,*], Stefano Fortinguerra [2,3], Giada Caudullo [2] and Alessandro Buriani [2,3]

Polyphenols are secondary metabolites of plants and are generally involved in defense against ultraviolet radiation or aggression by pathogens.



“The Xenohormesis Hypothesis”

Organisms have evolved to respond to stress signaling molecules produced by other species in their environment.



Lamming DW, Wood JG, Sinclair DA.
Small molecules that regulate lifespan: evidence for xenohormesis.
Molecular Microbiology (2004)

nutrients

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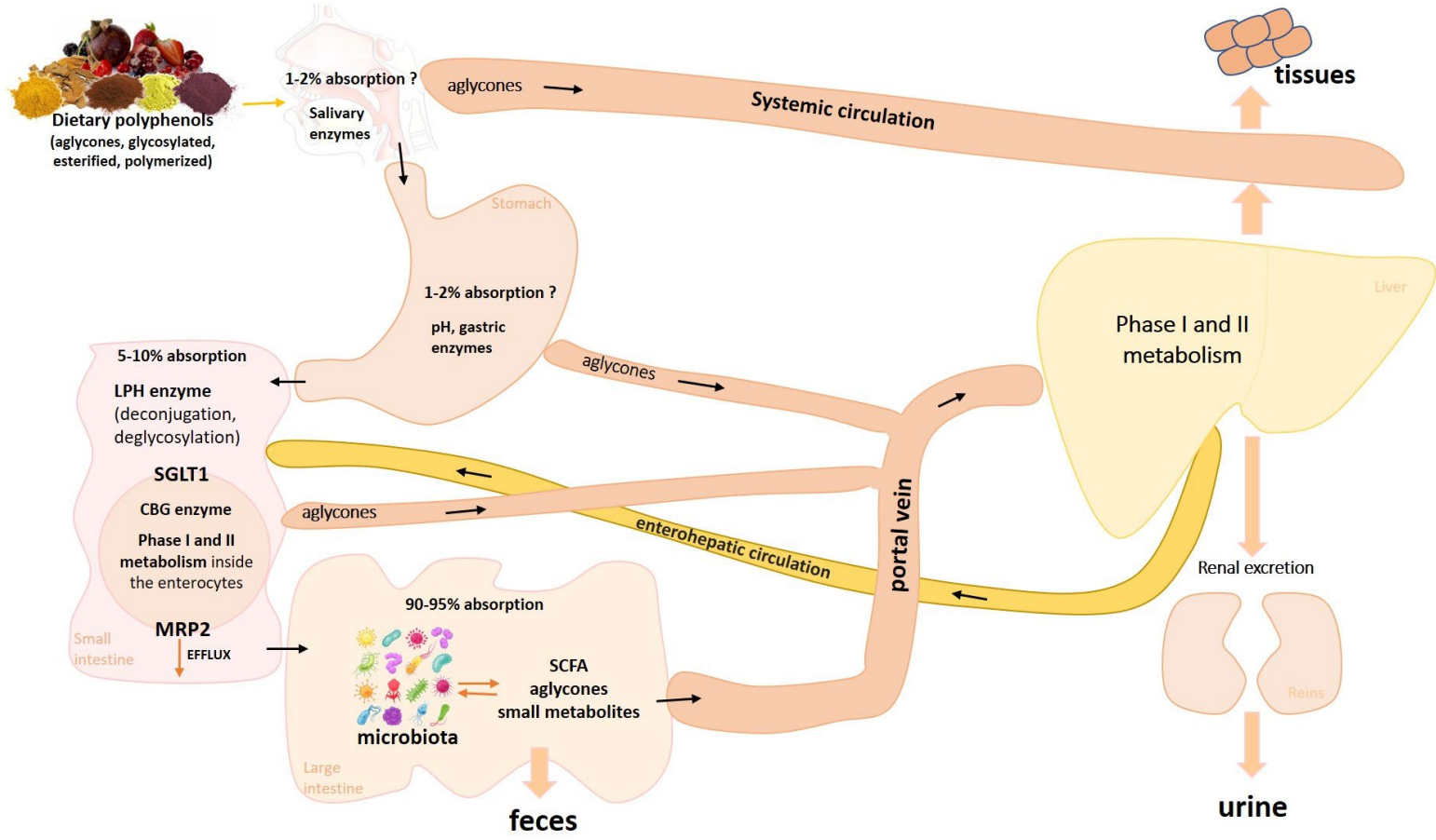
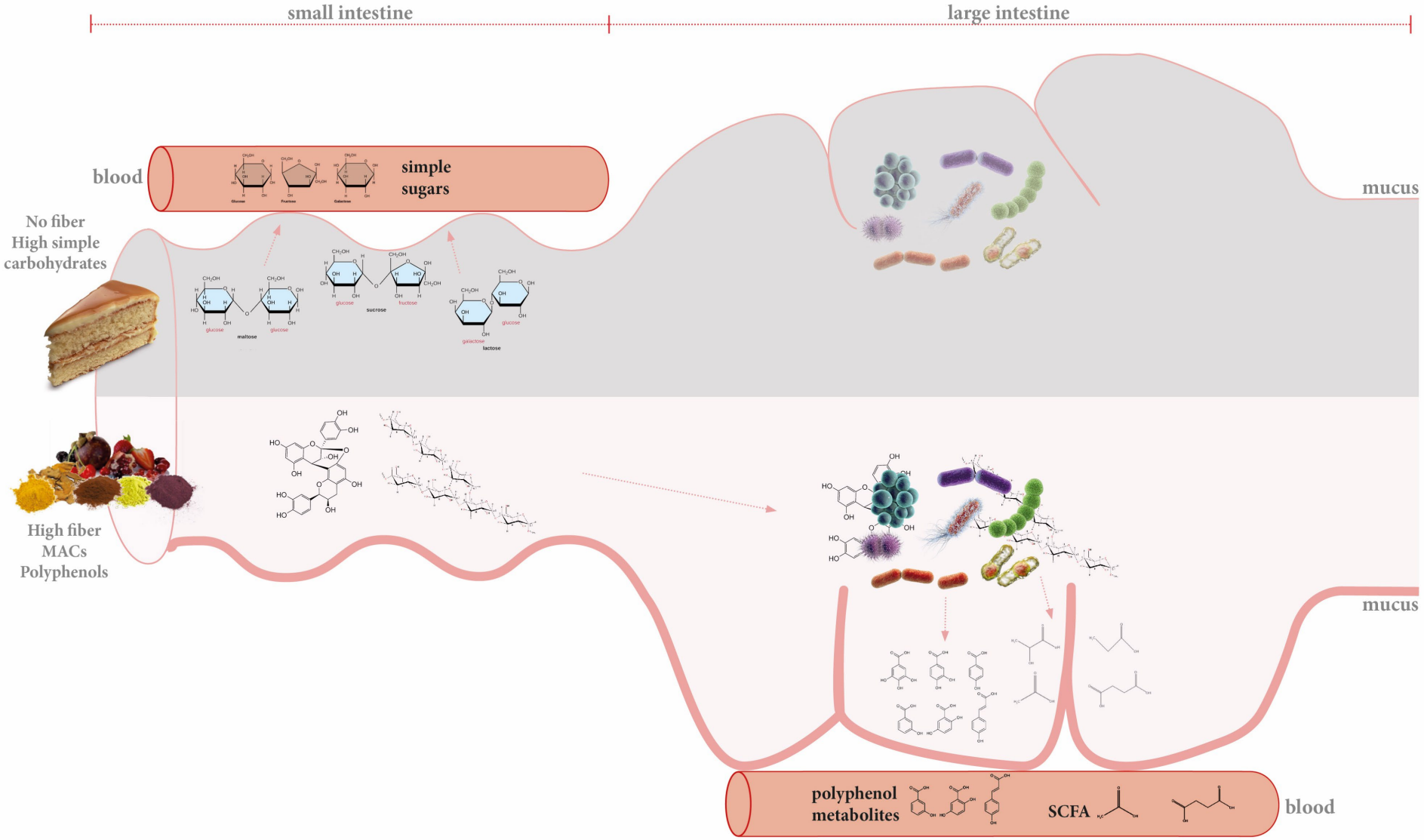
Cocoa Polyphenols and Gut Microbiota Interplay: Bioavailability, Prebiotic Effect, and Impact on Human Health

Vincenzo Sorrenti [1,2,*], Sawan Ali [3], Laura Mancin [2,4], Sergio Davinelli [3], Antonio Paoli [2] and Giovanni Scapagnini [3]

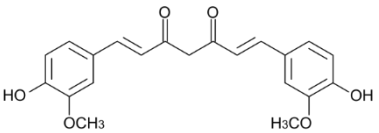




Sorrenti V. et al, 2024 (in press)

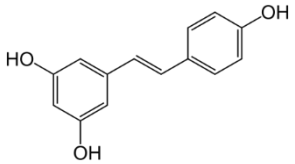
Phytonutritional Epigenomics:

Curcuma longa



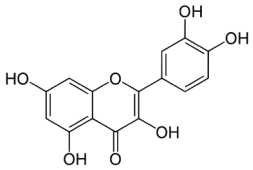
Curcumin

Polygonum cuspidatum



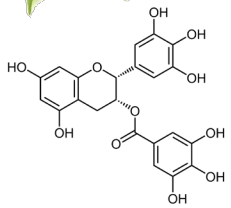
Resveratrol

Quercetin



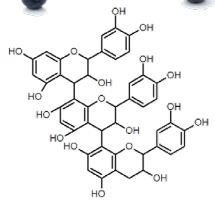
Quercetin

Camellia sinensis



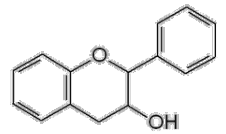
EGCG

Vaccinium myrtillus

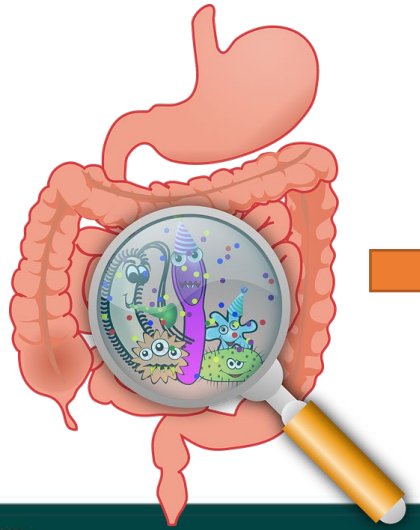


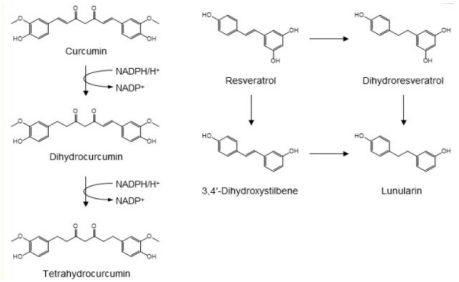
OPCs

Theobroma cacao

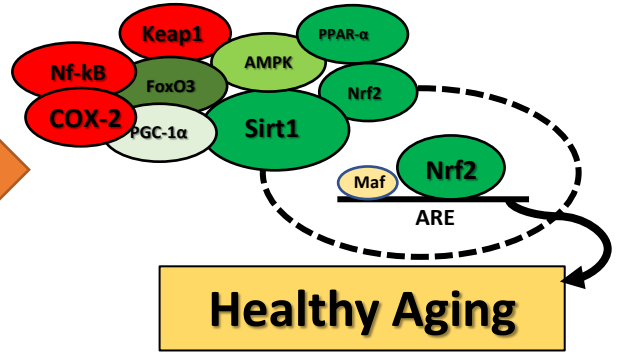


Flavanols





Metabolites



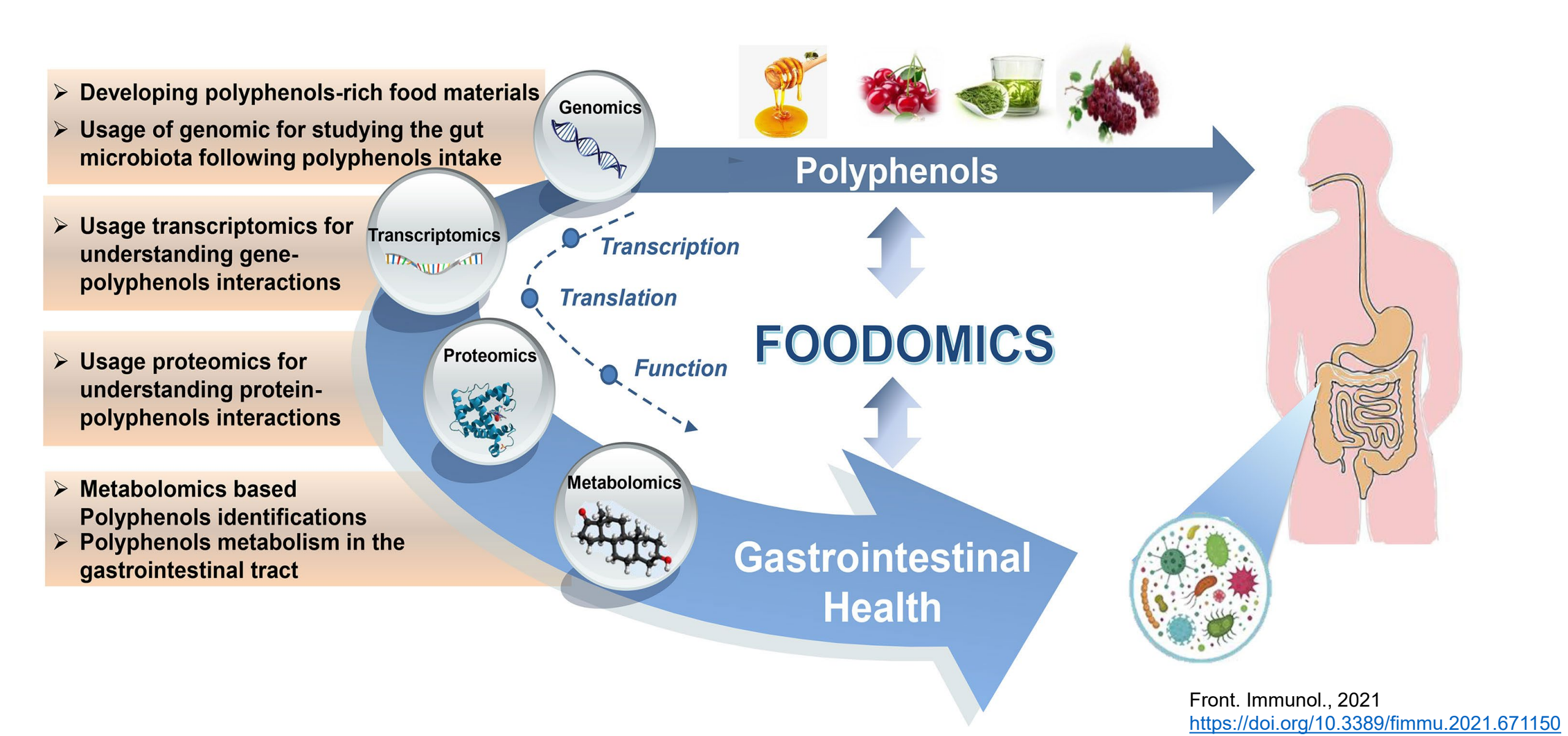
Sorrenti V et al. 2024 (in press)

- Developing polyphenols-rich food materials
- Usage of genomic for studying the gut microbiota following polyphenols intake

- Usage transcriptomics for understanding gene-polyphenols interactions

- Usage proteomics for understanding protein-polyphenols interactions

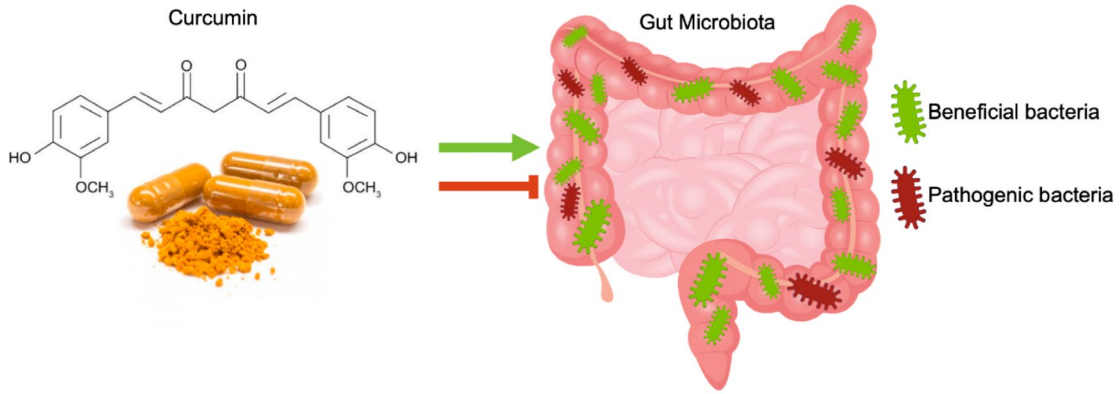
- Metabolomics based Polyphenols identifications
- Polyphenols metabolism in the gastrointestinal tract



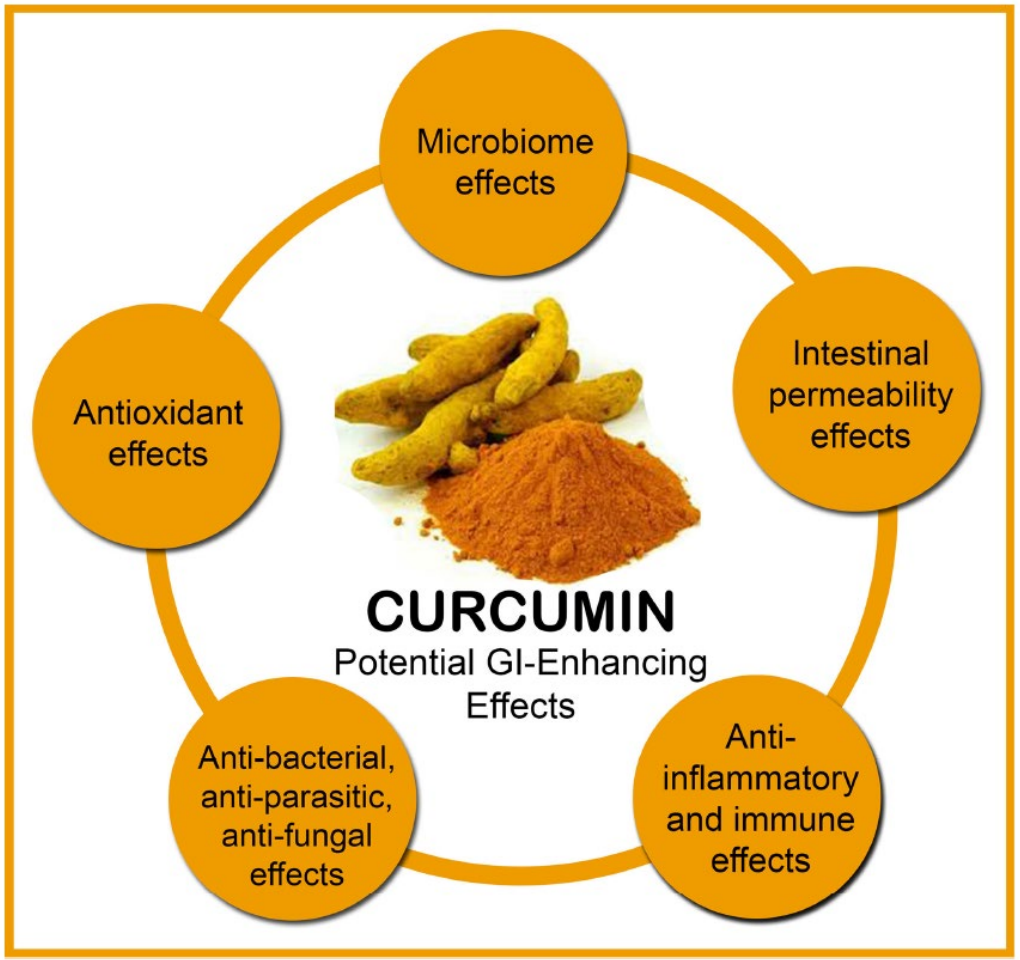
Front. Immunol., 2021
https://doi.org/10.3389/fimmu.2021.671150

The Problem of Curcumin and Its Bioavailability: Could Its Gastrointestinal Influence Contribute to Its Overall Health-Enhancing Effects?

Adrian L Lopresti
School of Psychology and Exercise Science, Murdoch University, Perth, Western Australia, Australia



Potential GI effects of curcumin that may contribute to its systemic health effects.

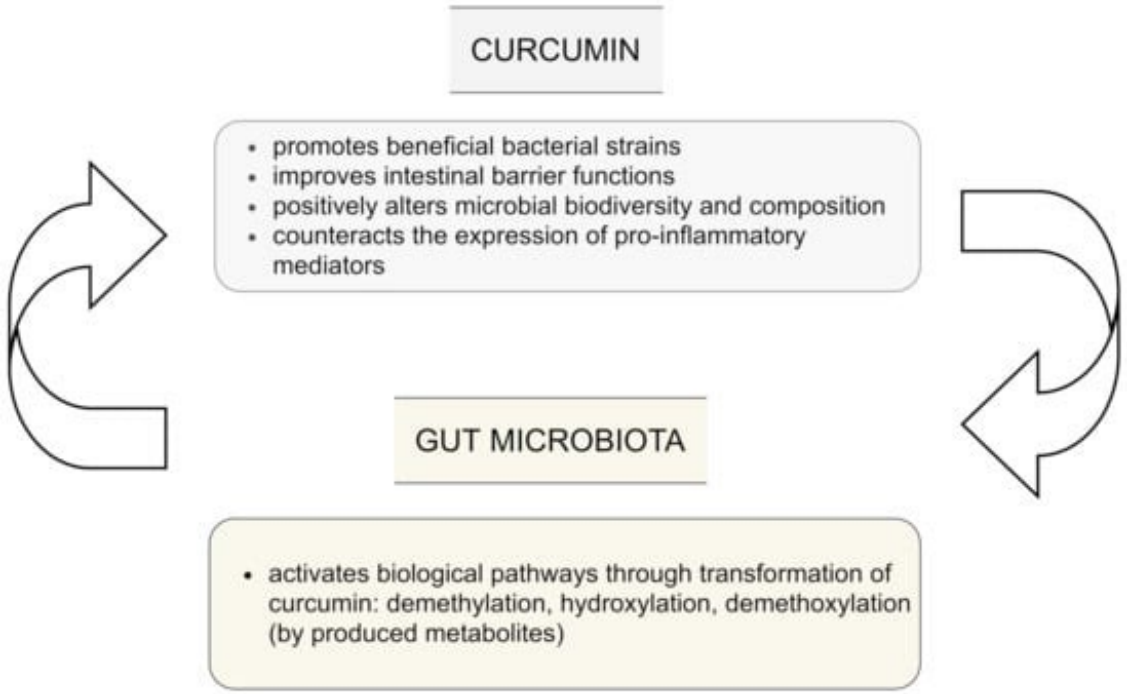


frontiers in Pharmacology

ORIGINAL RESEARCH
published: 05 March 2018
doi: 10.3389/fphar.2018.00183

Curcumin Prevents Acute Neuroinflammation and Long-Term Memory Impairment Induced by Systemic Lipopolysaccharide in Mice

Vincenzo Sorrenti[1], Gabriella Contarini[1], Stefania Sut[2], Stefano Dall'Acqua[1], Francesca Confortin[1], Andrea Pagetta[1], Pietro Giusti[1] and Morena Zusso[1]*



TISSUE BARRIERS
2018, VOL. 6, NO. 1, e1425085 (13 pages)
https://doi.org/10.1080/21688370.2018.1425085

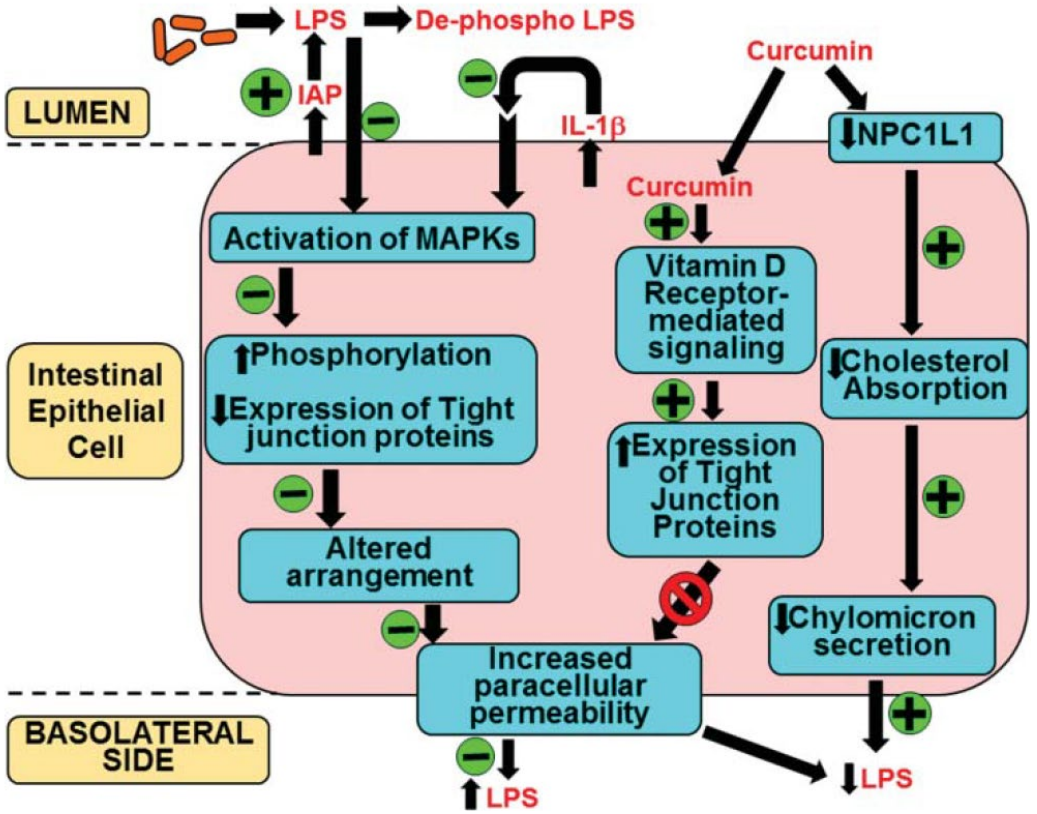
Taylor & F
Taylor & Francis G

REVIEW

Curcumin-mediated regulation of intestinal barrier function: The mechanism underlying its beneficial effects

Siddhartha S. Ghosh, Hongliang He, Jing Wang, Todd W. Gehr, and Shobha Ghosh

3



nutrients

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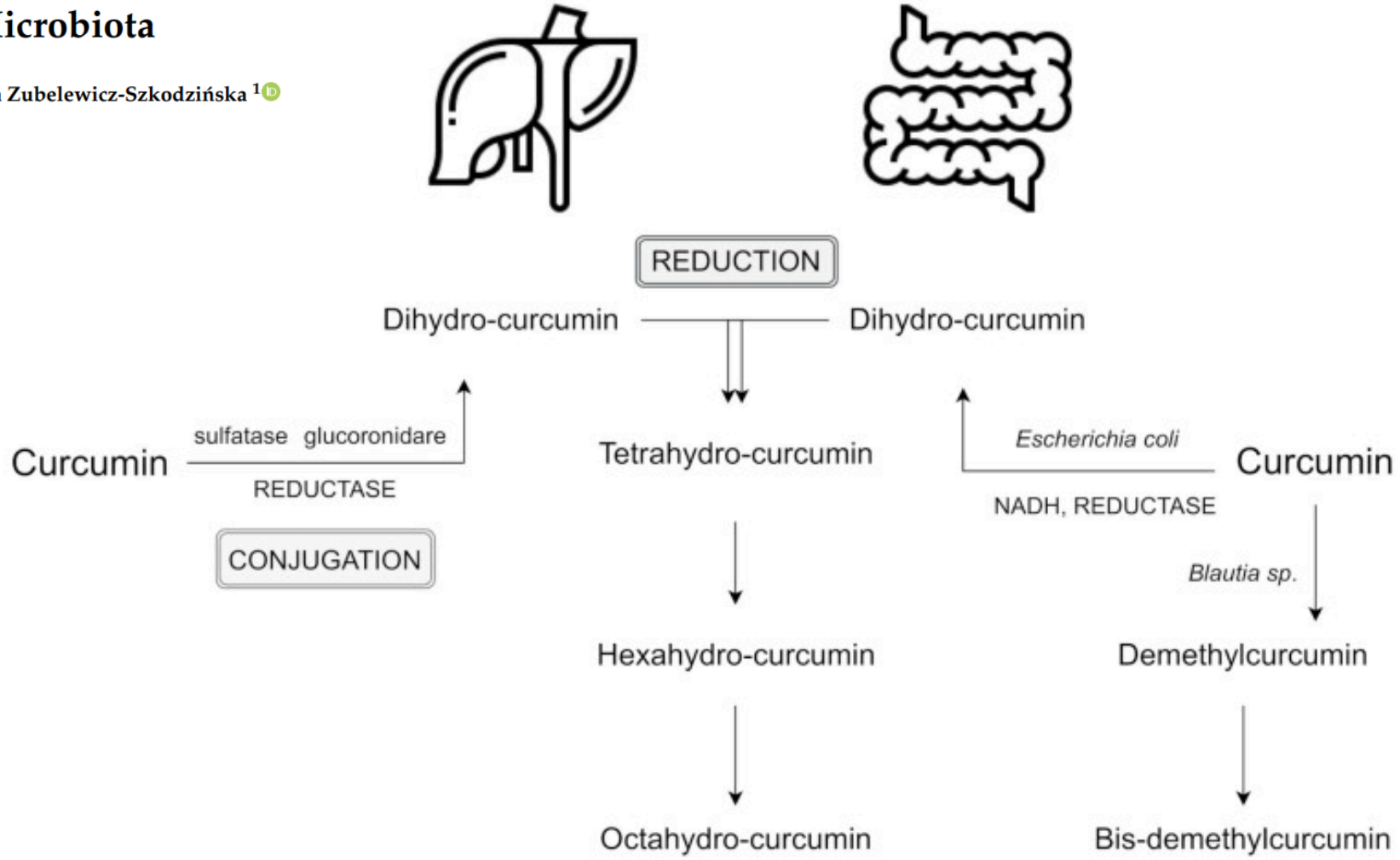
Review

Curcumin and Its Potential Impact on Microbiota

Marzena Jabczyk [1], Justyna Nowak [2,*], Bartosz Hudzik [2,3] and Barbara Zubelewicz-Szkodzińska [1]

Reductive conjugative metabolism of curcumin and an alternative metabolism by intestinal microbiota;



Resveratrol: the «molecule of youth» Mimetic agent of caloric restriction

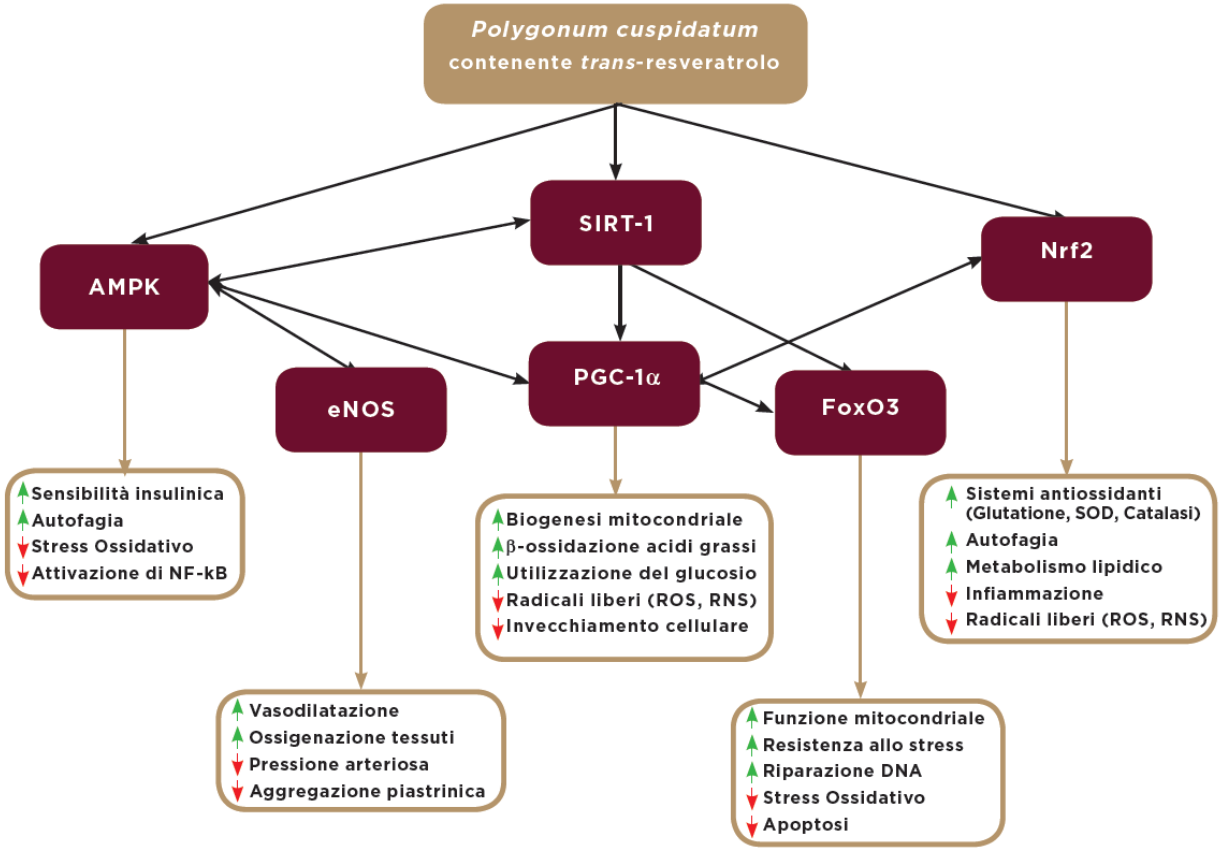
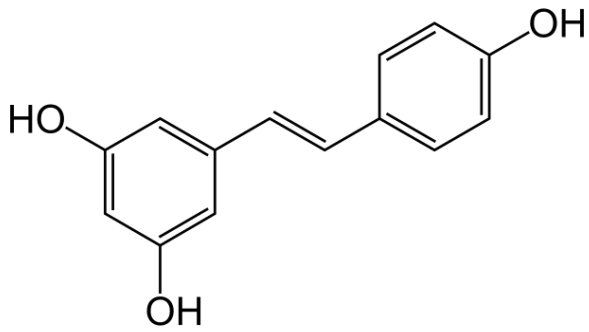


Figura 4. Effetti fisiologici e vie di segnale modulate dell'estratto di radice di *Polygonum cuspidatum* contenente *trans*-resveratrolo.



Legend

AMPK: AMP-activated protein kinase;

SIRT-1: Sirtuin1;

FoxO: Forkhead box O3;

Nrf2: Nuclear factor erythroid-derived 2;

PGC-1α: Peroxisome proliferator-activated gamma coactivator receptor 1α;

eNOS: endothelial nitric oxide synthase.

viruses

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Review

Resveratrol, Rapamycin and Metformin as Modulators of Antiviral Pathways

Francesca Benedetti [1,†], Vincenzo Sorrenti [2,3,4,†], Alessandro Buriani [4], Stefano Fortinguerra [5], Giovanni Scapagnini [6,*] and Davide Zella [1,*]

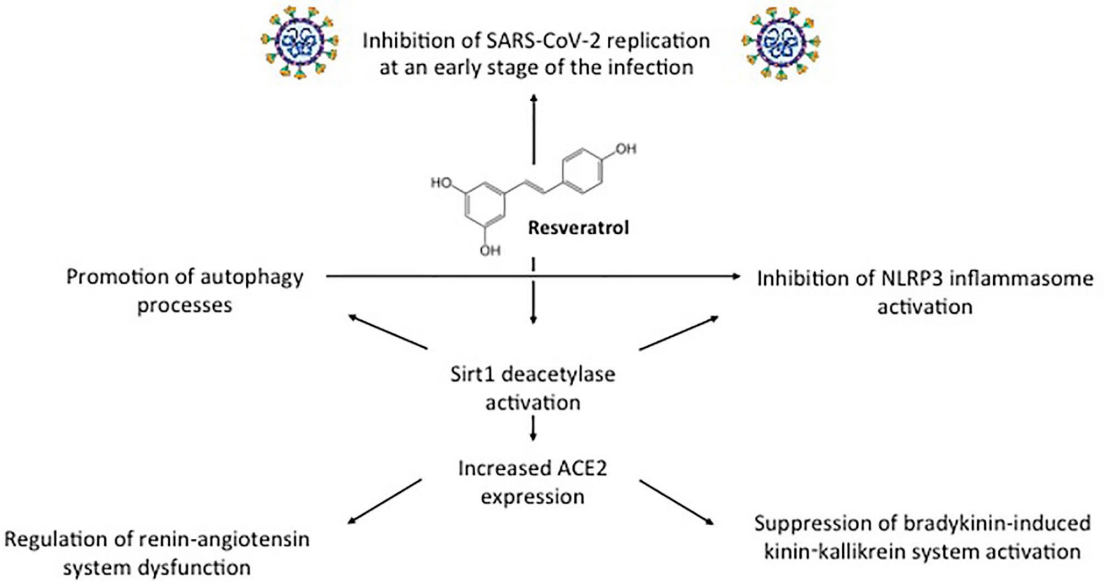

Table 1. Antiviral effects of resveratrol.

Virus	Antiviral Effects
Influenza Virus	Block of nuclear-cytoplasmic translocation in decreased expression [31].
Respiratory syncytial virus (RPSV)	Reduced inflammation and levels IFN-γ and TLR3; inhibition of TRIF signaling, induction of M2R [35,36]; decreased production of IL-6 and TBK1 [34]; increased expression of SARM and decreased expression of MMP-12 and TRIF leading to decreased IFN-γ expression and AHR [33,51]; reduced levels of NGF [36]; increased levels of TNF-α, IFN-γ, and IL-2 in infected mice [32].
Varicella Zoster virus	Decreased synthesis of IE 62 [38].
Epstein-Barr virus (EBV)	Inhibition of EBV early antigen and reduced papilloma production in mouse [52]; inhibition of EBV lytic cycle resulting in reduced production of viral particles [40]; inhibition of protein synthesis, reduction in ROS production, and inhibition of transcription factors NF-κB and AP1 [53]; prevention of EBV-mediated transformation of human B-cells [39].
Herpes simplex virus (HSV-1 and HSV-2)	Decreased production of early viral protein ICP-4 and reduced production of viral particles; prevention of virus reactivation in latently infected neuron cells [43]; suppression of the development of cutaneous lesions in abraded skin infected with HSV-1 [44]; prevention of the development of vaginal lesions in mice infected with HSV-2 and HSV-1, with reduced mortality rate [42]; inhibition of the expression of immediate-early, early, and late HSV genes and viral DNA synthesis [41,54].
Human immunodeficiency virus (HIV)	Resveratrol, decitabine and 15 other derivatives of resveratrol were potent antiviral drugs [45]: inhibition of DNA synthesis [46]; block of HIV-1 infection in resting CD4 T cells; 3,3′,4,4′,5,5′-hexahydroxy-trans-stilbene (M8) showed potent anti-HIV activity [55].
Enterovirus 71 (EV 71)	Inhibition of viral protein 1 (VP1) synthesis and phosphorylation of proinflammatory cytokines in Rhabdomyosarcoma cell line [48].
MERS-CoV	Inhibition of MERS-CoV infection; downregulation of apoptosis induced by MERS-CoV in vitro [56].
SARS-CoV-2	Upregulation of ACE-2 [57]; decreased high levels of circulating cytokines such as IL-6 and TNF-α, upregulated following SARS-CoV-2 infection [58].

pharmaceuticals

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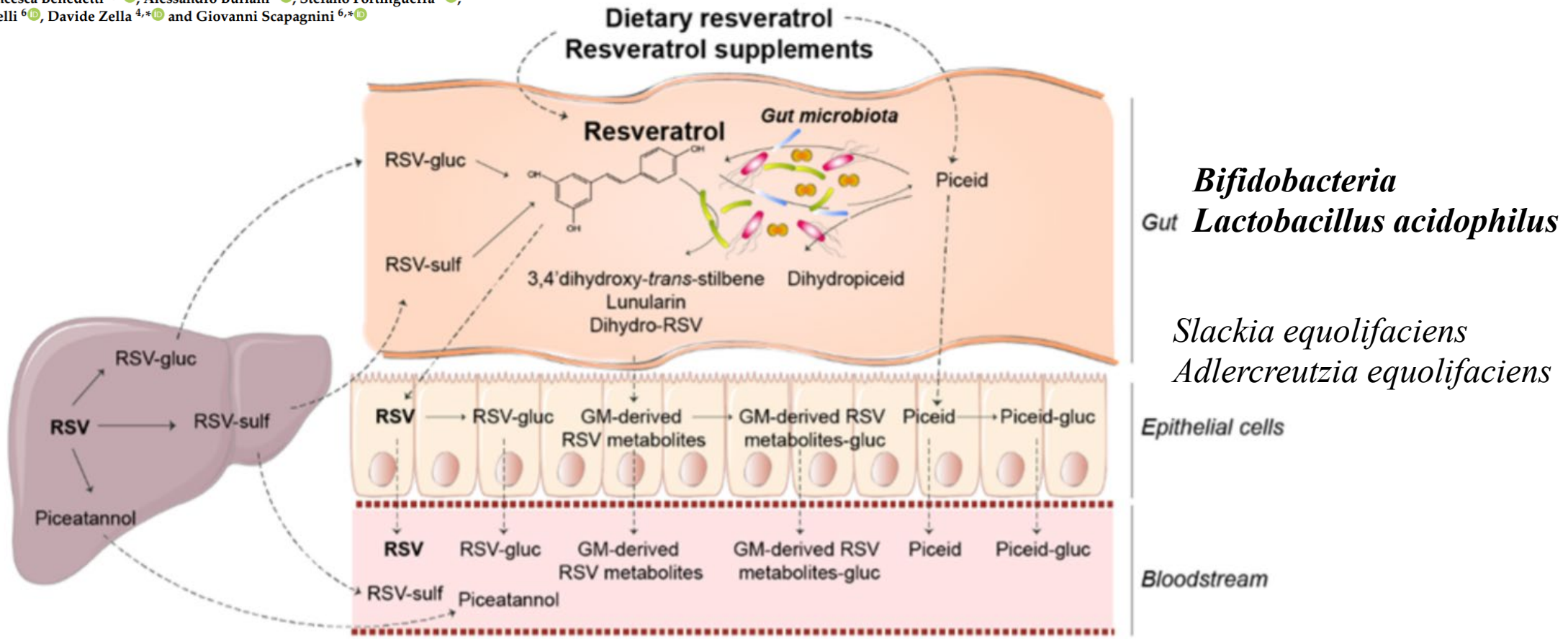
Review

Immunomodulatory and Antiaging Mechanisms of Resveratrol, Rapamycin, and Metformin: Focus on mTOR and AMPK Signaling Networks

Vincenzo Sorrenti [1,2,3,*,†], Francesca Benedetti [4,†], Alessandro Buriani [4], Stefano Fortinguerra [5], Giada Caudullo [2], Sergio Davinelli [6], Davide Zella [4,*] and Giovanni Scapagnini [6,*]



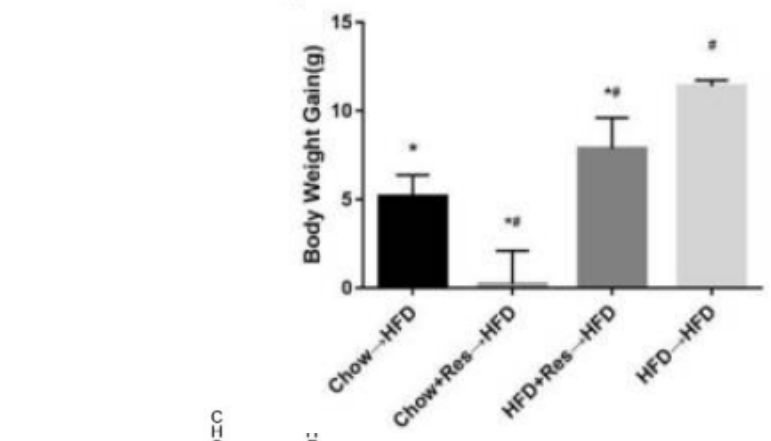
Bifidobacteria
Lactobacillus acidophilus

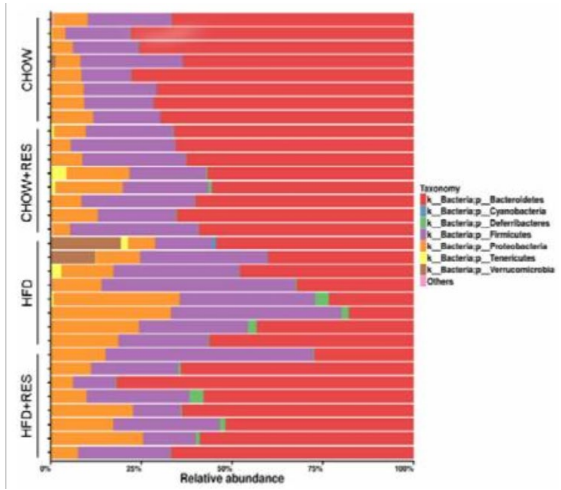
Slackia equolifaciens
Adlercreutzia equolifaciens

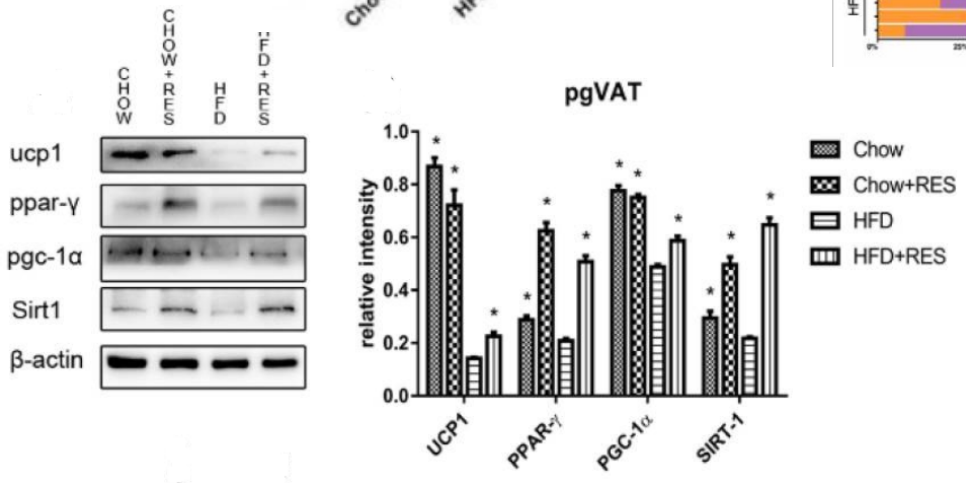
molecules MDPI
Molecules. 2018 Dec; 23(12): 3356.

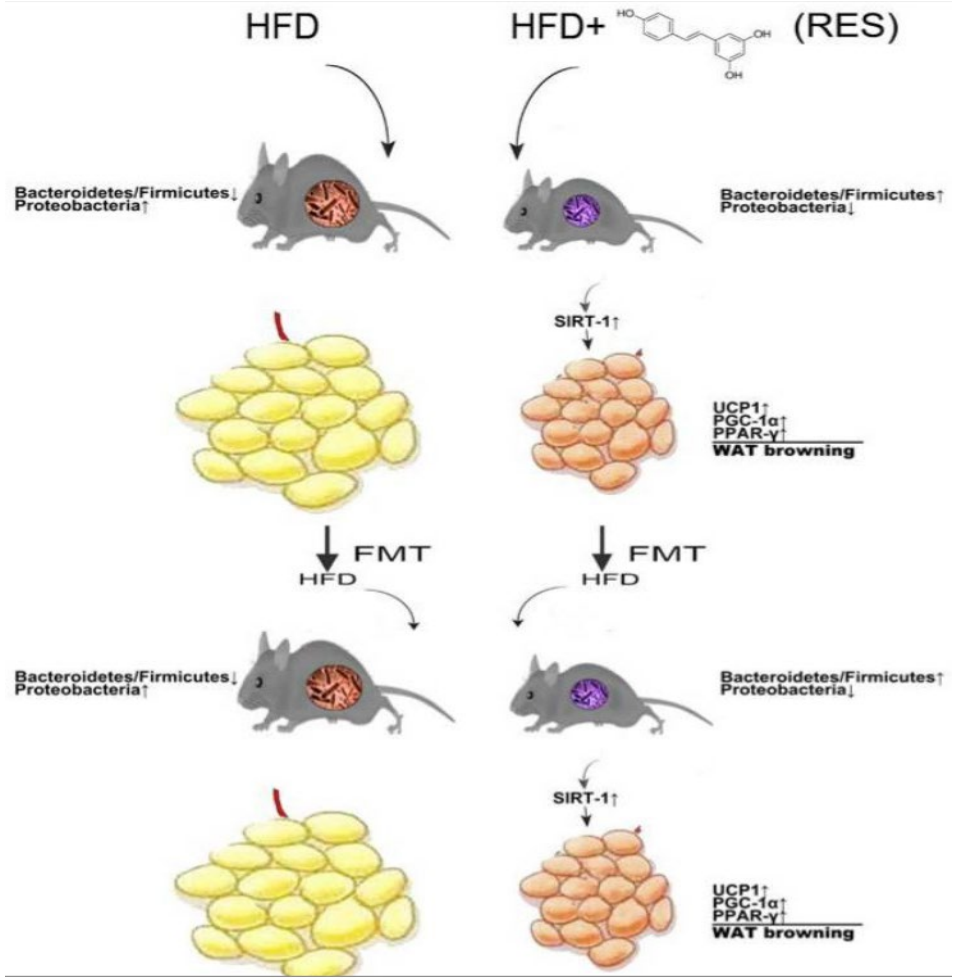
Resveratrol-Induced White Adipose Tissue Browning in Obese Mice by Remodeling Fecal Microbiota

Liao W et al









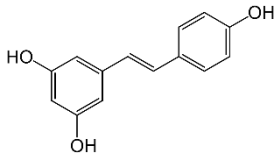
European Journal of Clinical Nutrition (2017), 1–6

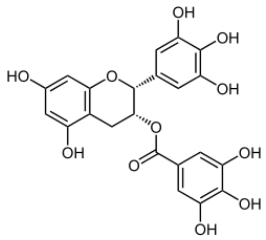
Gut microbiota composition in relation to the metabolic response to 12-week combined polyphenol supplementation in overweight men and women

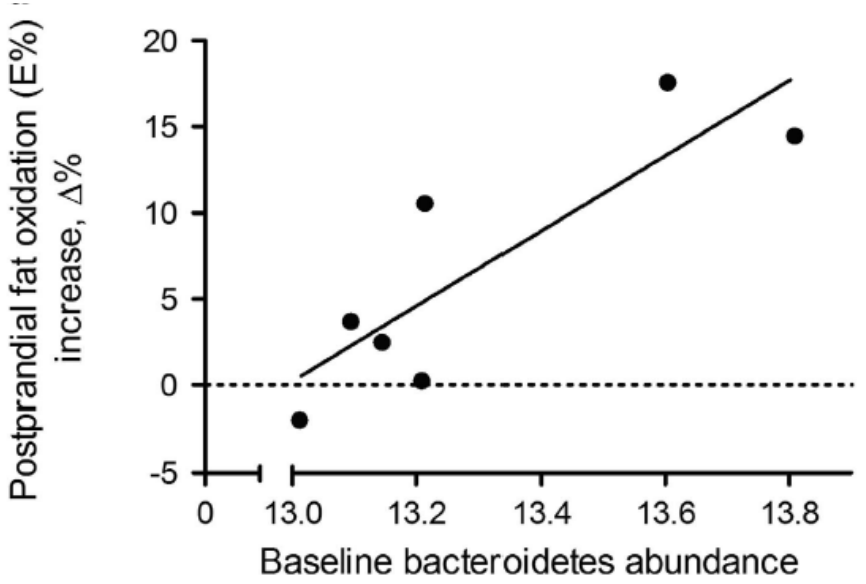
J Most[1], J Penders[2], M Lucchesi[2], GH Goossens[1] and EE Blaak[1]

80mg/die

285mg/die







EGCG+RES supplementation significantly decreased Bacteroidetes. Strikingly, baseline Bacteroidetes abundance was predictive for the EGCG+RES-induced increase in fat oxidation

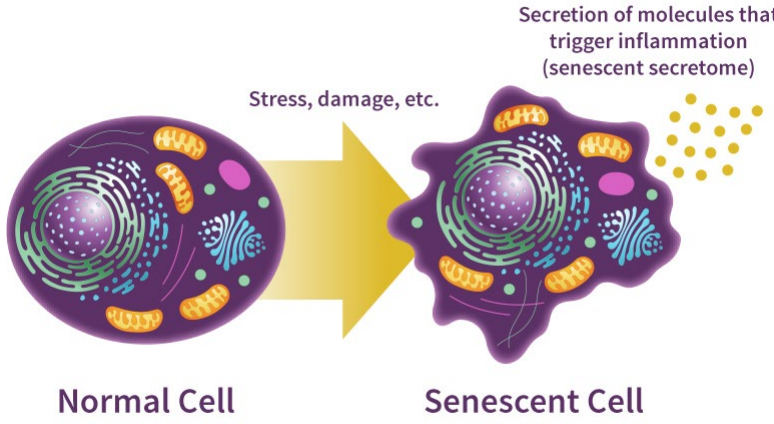
Advances in Nutrition 14 (2023) 1111–1130

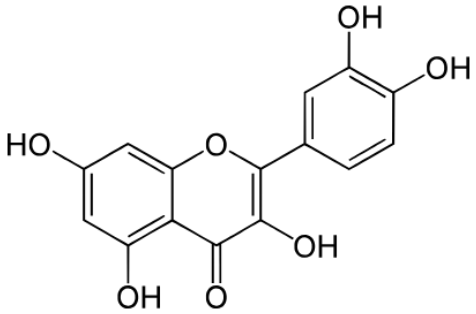
Advances in Nutrition
AN INTERNATIONAL REVIEW JOURNAL
journal homepage: https://advances.nutrition.org/

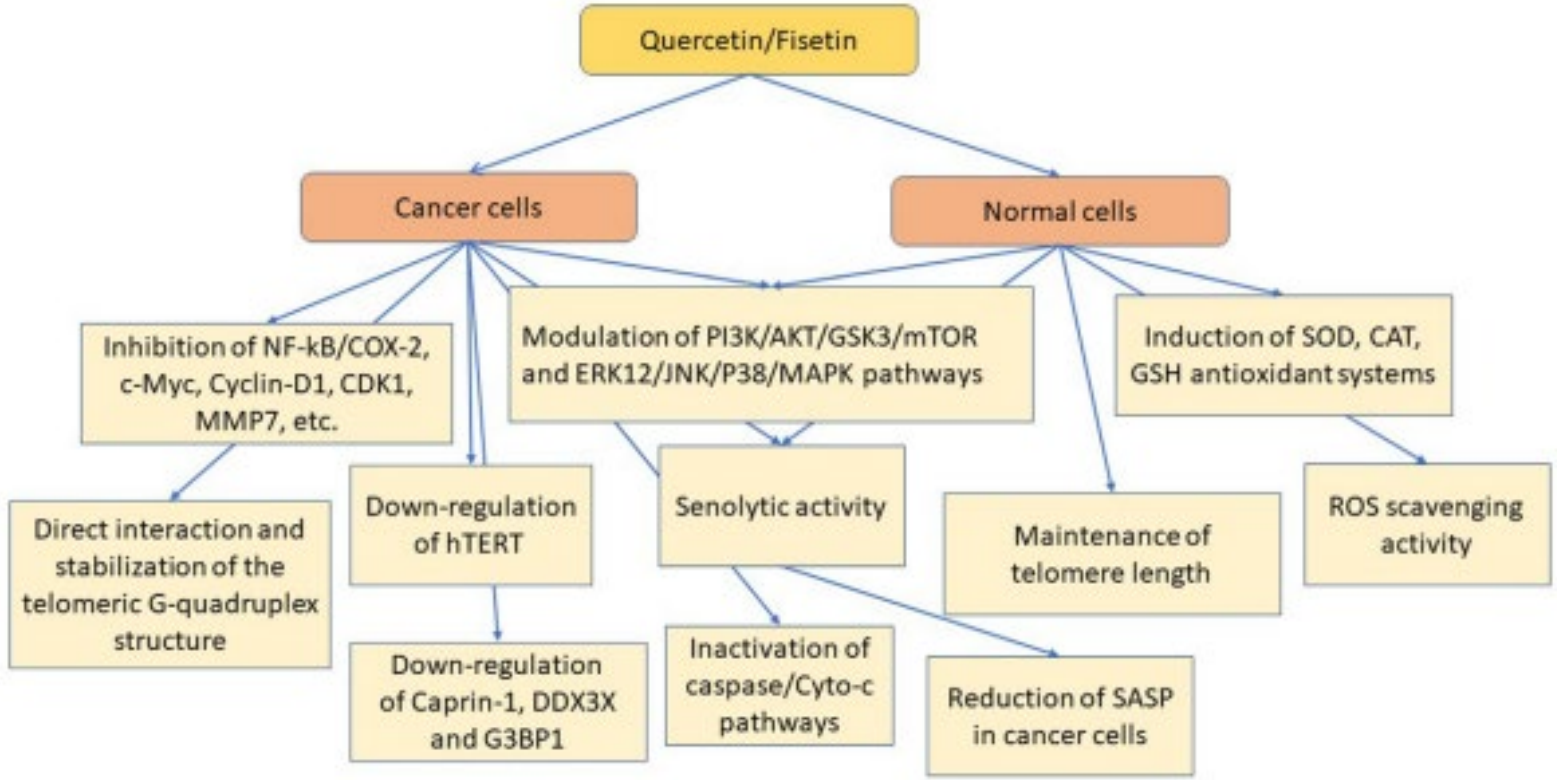
Review

Cell Survival, Death, and Proliferation in Senescent and Cancer Cells: the Role of (Poly)phenols

Vincenzo Sorrenti [1,2,*,†], Alessandro Buriani [2,†], Stefano Fortinguerra [3,†], Sergio Davinelli [4], Giovanni Scapagnini [4], Aedin Cassidy [5], Immaculata De Vivo [6]





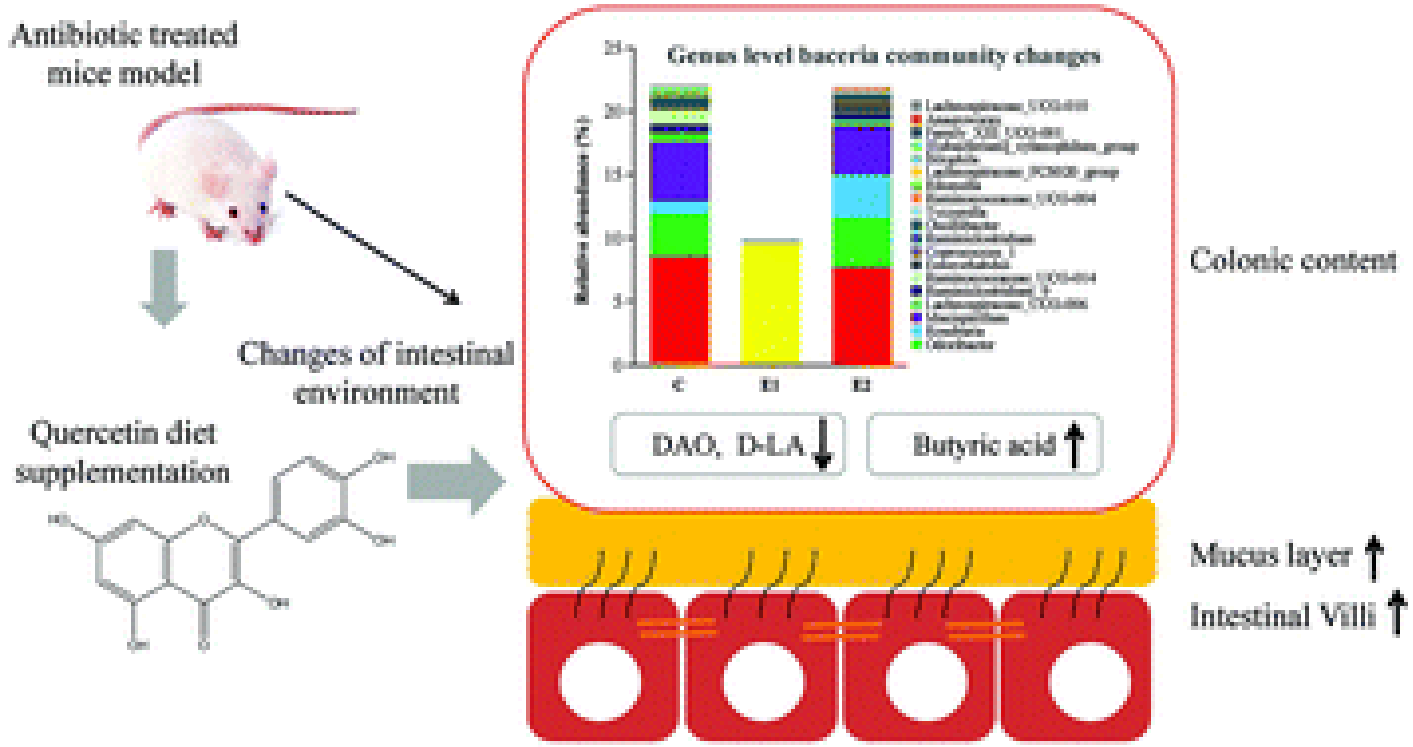


From the journal:
Food & Function

Quercetin improves gut dysbiosis in antibiotic-treated mice†

Tala Shi, ‡[ab] Xiangyu Bian,[a] Zhanxin Yao,[a] Yawen Wang,[a] Weina Gao*[a] and Changjiang Guo*[a]

The results showed that quercetin supplementation significantly **improved the diversity of the gut bacterial community** in antibiotic-treated mice ($P < 0.05$). Meanwhile, **intestinal barrier function was also recovered** remarkably as indicated by a decrease in the content of serum D-lactic acid and the activity of serum diamine oxidase ($P < 0.05$). The **length of intestinal villi** and mucosal thickness were also **significantly increased** in response to quercetin treatment ($P < 0.05$). Furthermore, the **production of butyrate in faeces was enhanced** significantly in quercetin-treated mice ($P < 0.05$). In conclusion, quercetin is effective in recovering gut microbiota in mice after antibiotic treatment and may act as a prebiotic in combatting gut dysbiosis.



International Journal of
Molecular Sciences

MDPI

Article

Screening of Human Gut Bacterial Culture Collection Identifies Species That Biotransform Quercetin into Metabolites with Anticancer Properties

Ranjini Sankaranarayanan [1], Prabhjot Kaur Sekhon [2], Achuthan Ambat [2], Julia Nelson [2], Davis Jose [3], G. Jayarama Bhat [1,*] and Joy Scaria [2,*]

We demonstrated that five of these species were able to degrade quercetin including Bacillus glycinifermentans, Flavonifractor plautii, Bacteroides eggerthii, Olsenella scatoligenes and Eubacterium eligens. Additional studies showed that B. glycinifermentans could generate 2,4,6-THBA and 3,4-DHBA from quercetin while F. plautii generates DOPAC

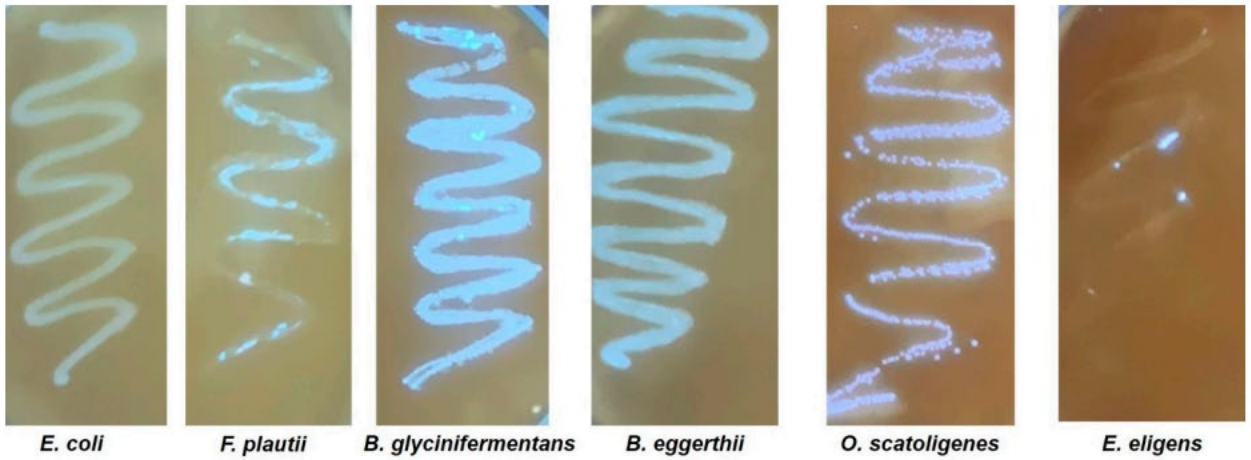


Figure 2. DPH assay demonstrating the ability of five bacterial species to biotransform quercetin. The figure shows bacterial growth on a nylon membrane soaked in a mixture of 1 mM DPH and 20 mM quercetin in mBHI agar plates. All the five quercetin-biotransforming bacterial species presented fluorescence, although to different degrees. However, the negative control, *E. coli* (non-quercetin-degrading bacteria), did not result in any fluorescence in this assay.

These results now tie in well with our previously published reports where we demonstrated the ability of some of these hydroxybenzoic acid metabolites (2,4,6-THBA, 3,4-DHBA and 3,4,5-THBA) to inhibit cancer cell growth

nutrients

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Review

Deciphering the Role of Polyphenols in Sports Performance: From Nutritional Genomics to the Gut Microbiota toward Phytonutritional Epigenomics

Vincenzo Sorrenti [1,2,3,*], Stefano Fortinguerra [2,3], Giada Caudullo [2] and Alessandro Buriani [2,3]

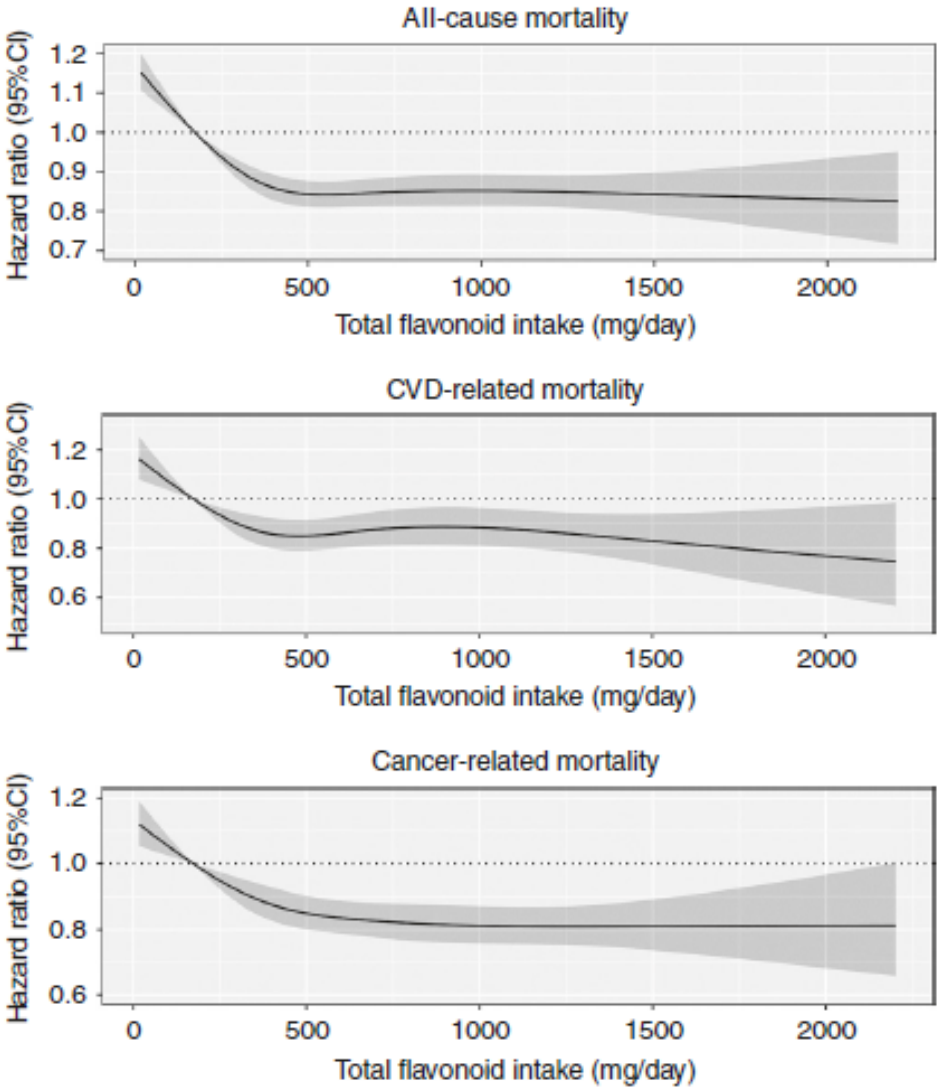
Table 1. Average daily dose and overall benefits in humans of polyphenol supplementation in sports performance.

	Average Daily Dose	Overall Benefits	References
Curcumin	80–200 mg	- reduces muscle fatigue, muscle mass loss, muscle soreness, and post-exercise recovery; - ameliorates redox homeostasis and insulin sensitivity	[59,65,68]
Resveratrol	100–500 mg	- improves muscle strength and fatigue tolerance, and muscle regeneration after disuse; - increases skeletal muscle mitochondrial capacity; - exerts ergogenic, and anti-obesity properties; - increases fatty-acid beta-oxidation and glucose metabolism; - improves glucose control and insulin sensitivity in diabetic or prediabetic subjects without altering glycemic measures in nondiabetic individuals	[100,109,114,119]
Cocoa Flavanols	200–500 mg	- induces vasodilation, improves endothelial function and reduces blood pressure; - increases cerebral blood flow; - improves vascular function; - reduces exercise-induced oxidative stress; - alters fat and carbohydrate utilization during exercise without affecting athletic performance;	[131,132]
Quercetin	200–1000 mg	- increases athletic performance and energy expenditure; - boosts both physical and mental performance; - improves neuromuscular performance during and after resistance training sessions; - attenuates muscle weakness severity caused by eccentric-induced myofibrillar disruption and sarcolemmal action potential propagation impairment; - reduces post-stroke muscle pain, localized pain, oxidative stress, cramps, and post-exercise recovery time;	[146,148,150,153]
Green tea extract	250–1000 mg	- reduces muscle damage and oxidative stress with positive effects on neuromuscular parameters on muscle fatigue;	[156–158]
Blueberry	75–150 g	- improves recovery after exercise; - improves vascular functions and vasodilation;	[160,161]
Pycnogenol®	100–800 mg	- improves physical performance and protect from oxidative stress post-exercise; improve training and performances both in normal subjects and in semi-professional athletes performing at high levels in difficult, high-stress sports such as the triathlon.	[171]
Montmorency cherry juice	30 mL	- Increases muscle recovery, and reduce post-exercise pain mainly in strength sports;	[174,177]
Ecklonia cava polyphenols	40 mg	- increases glucose oxidation; - reduces lactate production during intense exercise;	[178]

nature COMMUNICATIONS

Flavonoid intake is associated with lower mortality in the Danish Diet Cancer and Health Cohort

Nicola P. Bondonno [1,2,12], Frederik Dalgaard [3,12], Cecilie Kyrø [4], Kevin Murray [5], Catherine P. Bondonno [1,2], Joshua R. Lewis [1,2], Kevin D. Croft [1], Gunnar Gislason [3,6,7], Augustin Scalbert [8], Aedin Cassidy [9], Anne Tjønneland [4], Kim Overvad [10,11] & Jonathan M. Hodgson [1,2]



500 mg flavonoidi/die → soggetti sani

1000 mg flavonoidi/die → soggetti a rischio

Prima Valutazione Nutrizionale e Nutraceutica

Cliente: [redacted]

Età alla valutazione: 47

Altezza: 162 cm

Peso: 69,2 Kg; Peso ideale: 58-60 Kg

BMI: 26,37 Sovrappeso

Regime alimentare: LOW FODMAP 1 mese + MED DIET

Introito calorico giornaliero a riposo: 1374 Kcal +- 150 Kcal

Anamnesi:

Problemi con gli zuccheri, picchi glicemici rapidi con episodi presincopali.

Nausea, emicrania, dizziness, con eccesso di carboidrati lievitati, pizza, focacce, pane.

Disidratata con ritenzione idrica

Alvo stitico e diarroico

Difficoltà digestive e acidità di stomaco.

Iperattività neurovegetativa

Stress cronico

Intolleranza genetica al lattosio

Ipercolesterolemia familiare eterozigote LDLR

15 settembre 2023

BIOCHIMICA

GLUCOSIO [S/P]		86	mg/dl	[60 - 100]
COLESTEROLO LDL [SIERO/PLASMA]	**	187	mg/dl	[desiderabile=<115] valori > 190 necessita di valutazione clinica per ipercolesterolemia familiare
S-ASPARTATO AMINOTRANSFERASI		20	U/l	[5 - 32]
S-ALANINA AMINOTRANSFERASI		18	U/l	[5 - 33]
S-COLESTEROLO HDL		70	mg/dl	[> 45]
S-TRIGLICERIDI		60	mg/dl	[desiderabile =<150] valori >= 880 necessita di valutazione clinica per possibile rischio di pancreatite acuta

Sistema ROCHE fotometria,potenziometria indiretta ed elettrochemioluminescenza

ORMONI E MARCATORI

TIREOTROPINA [TSH] [S/P]		1.36	ulU/mL	[0.27 - 4.20]
VITAMINA B12 [S/P]		526.0	pg/mL	[191.0 - 663.0]
FOLATO [S/P]		4.8	ng/mL	[3.1 - 17.5]
FERRITINA [SIERO/PLASMA]		21.0	ng/mL	[15.00 - 150.00]
25-OH-Vitamina D Totale	**	16	ng/ml	[30 - 100]

PROTEINE

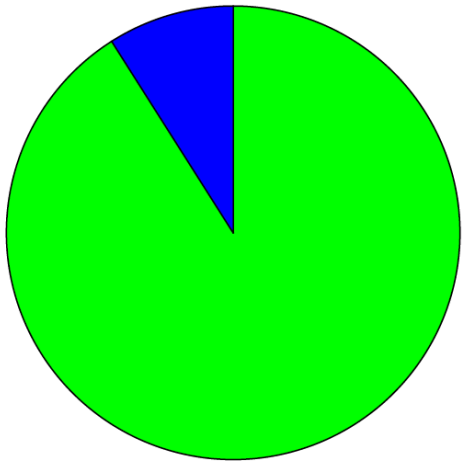
P-OMOCISTEINA	**	11.20	umoli/l	[3.20 - 10.70]

Candida albicans	1.60 x10^3

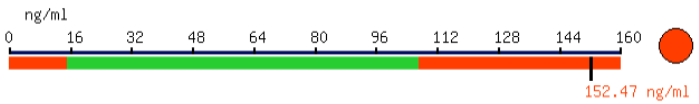
Gene	Sequenza di riferimento	Regione	Variante identificata	Genotipo	Interpretazione
LDLR	NM_000527.4	Introne 3	c.313+1 G>A	Eterozigote	Variante patogenetica

LIPOPROTEINA (a)	40,3	mg/dl	< 30	*

Metodo: Immunoturbidimetria

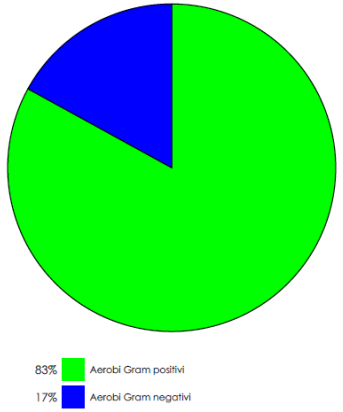


ZONULINA FECALE



152.47 ng/ml
15- 107

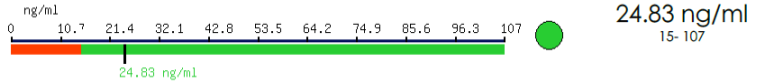
20 ottobre 2023

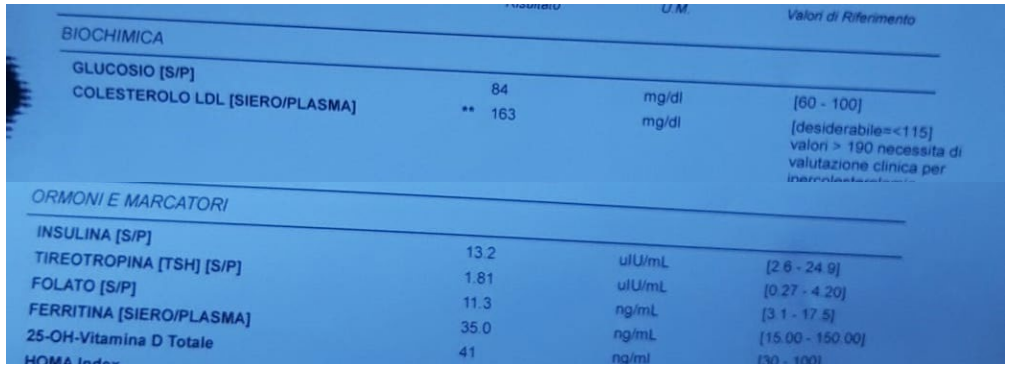


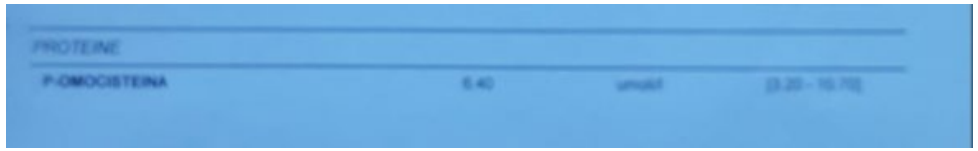
INTEGRAZIONE:
- VITAMINA D3: 2000 U.I a colazione
- SPIRULINA: 1 g a colazione
- QUERCETINA: 250 mg a colazione
- CURCUMINA: 80 mg a pranzo
- OMEGA 3 FOSFO: 1 g la sera dopo cena
- MAGNESIO BISGLICINATO: 200 mg la sera dopo cena

COLAZIONE (scegliere una delle seguenti opzioni):
SEMPRE come base: 100g di mirtilli neri o lamponi misto frutti di bosco (1 pugno abbondante) o 1 melograno (estratto 100%).

ZONULINA FECALE







nutrients

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Review

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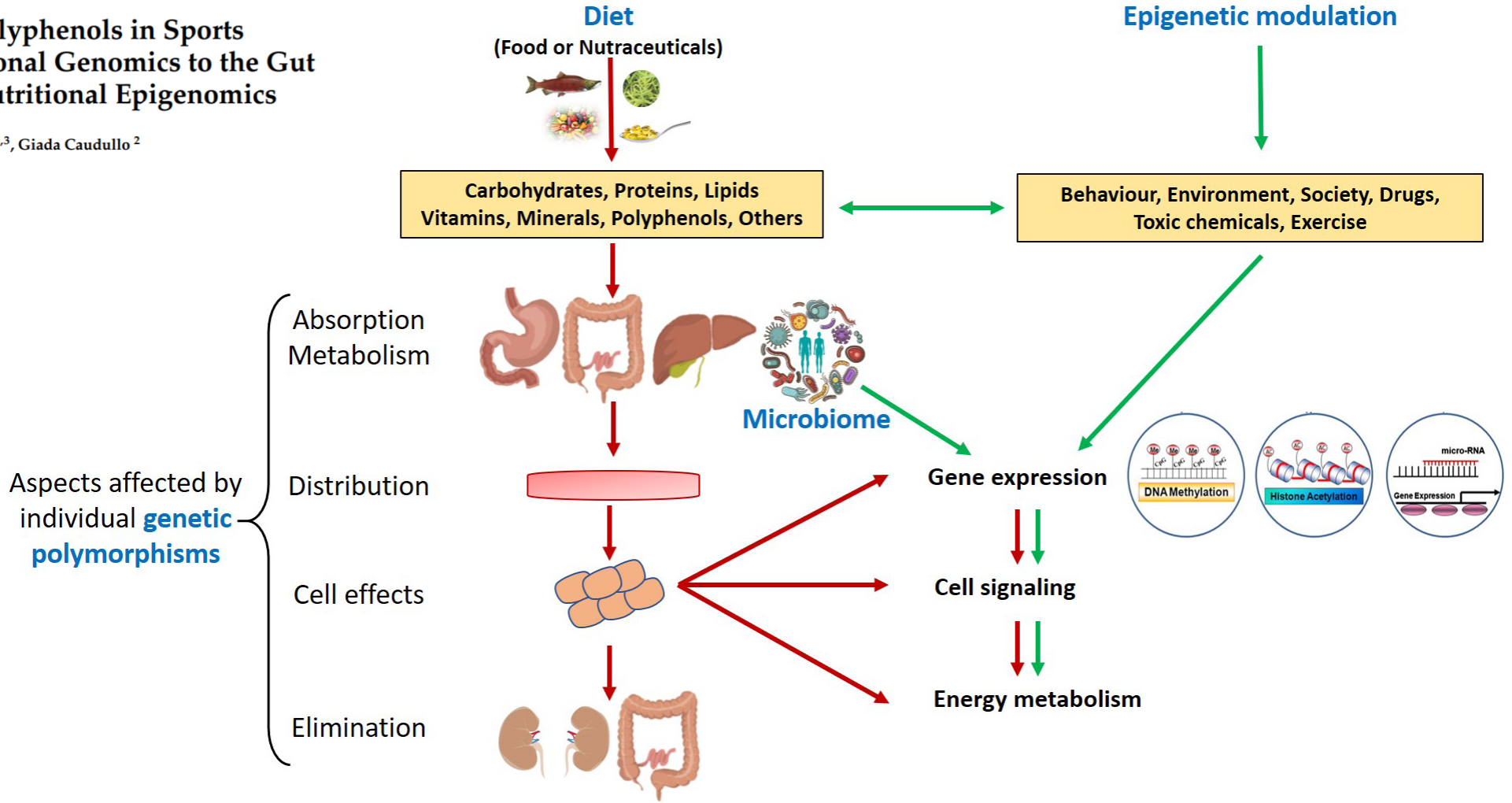

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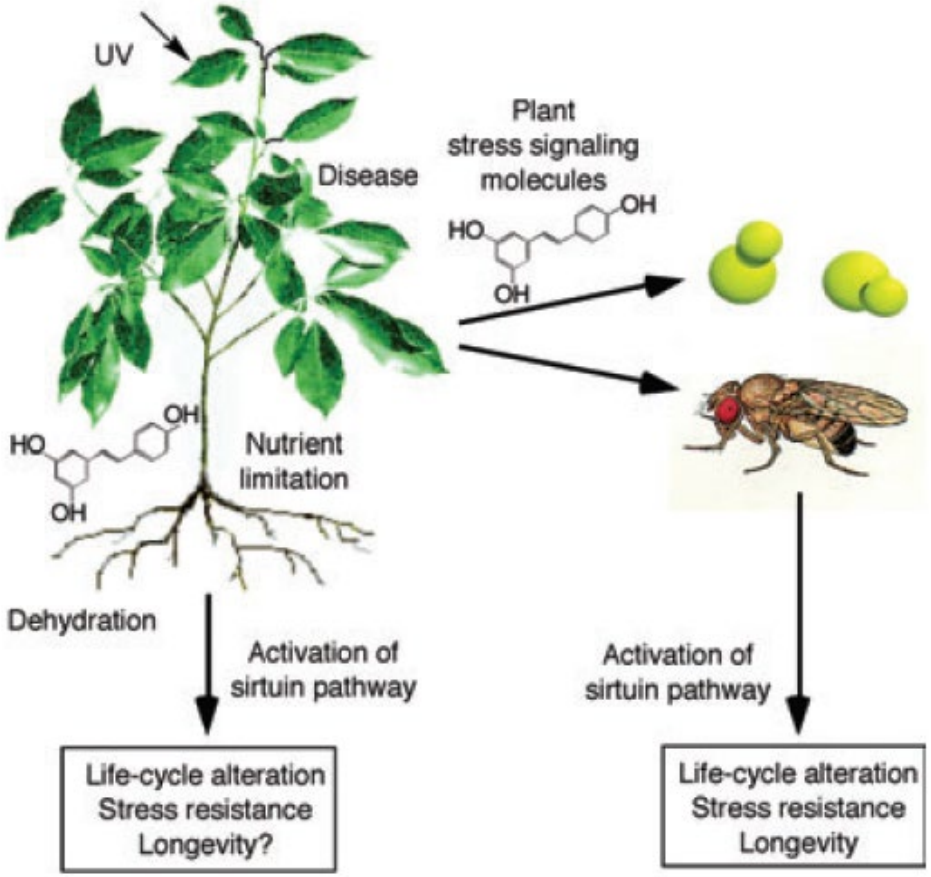
TOP TEN Slides

"The Xenohormesis Hypothesis"

Organisms have evolved to respond to stress signaling molecules produced by other species in their environment.

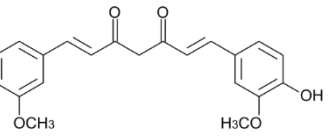


Lamming DW, Wood JG, Sinclair DA.
Small molecules that regulate lifespan: evidence for xenohormesis.
Molecular Microbiology (2004)

2

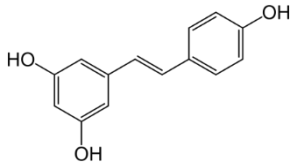
Phytonutritional Epigenomics:

Curcuma longa



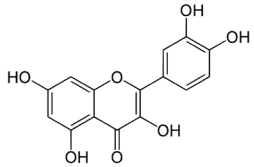
Curcumin

Polygonum cuspidatum



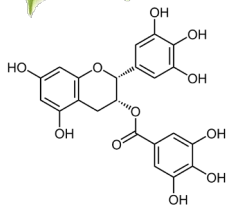
Resveratrol

Quercetin



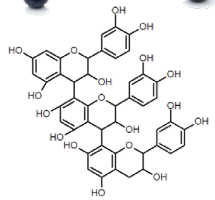
Quercetin

Camellia sinensis



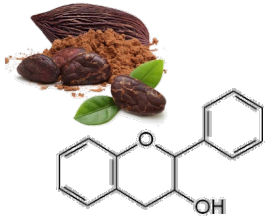
EGCG

Vaccinium myrtillus

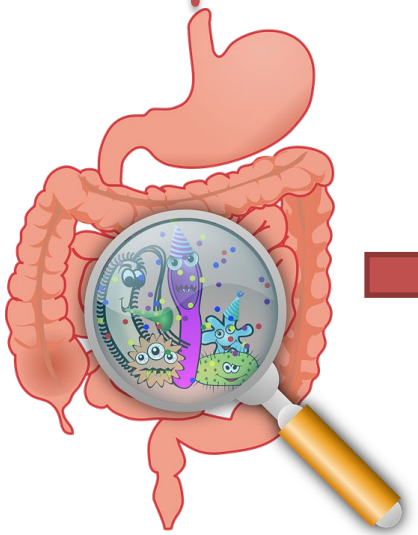


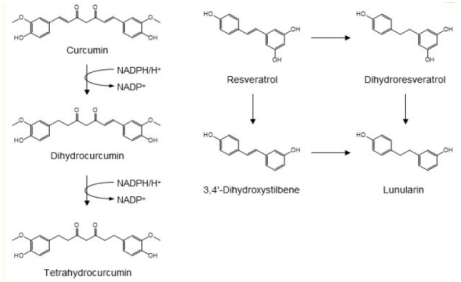
OPCs

Theobroma cacao

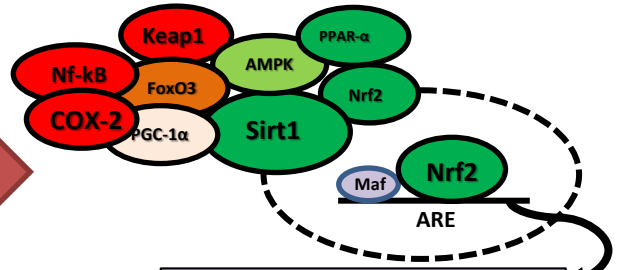


Flavanols





Metabolites



Healthy Aging

Sorrenti V et al. 2024 (in press)

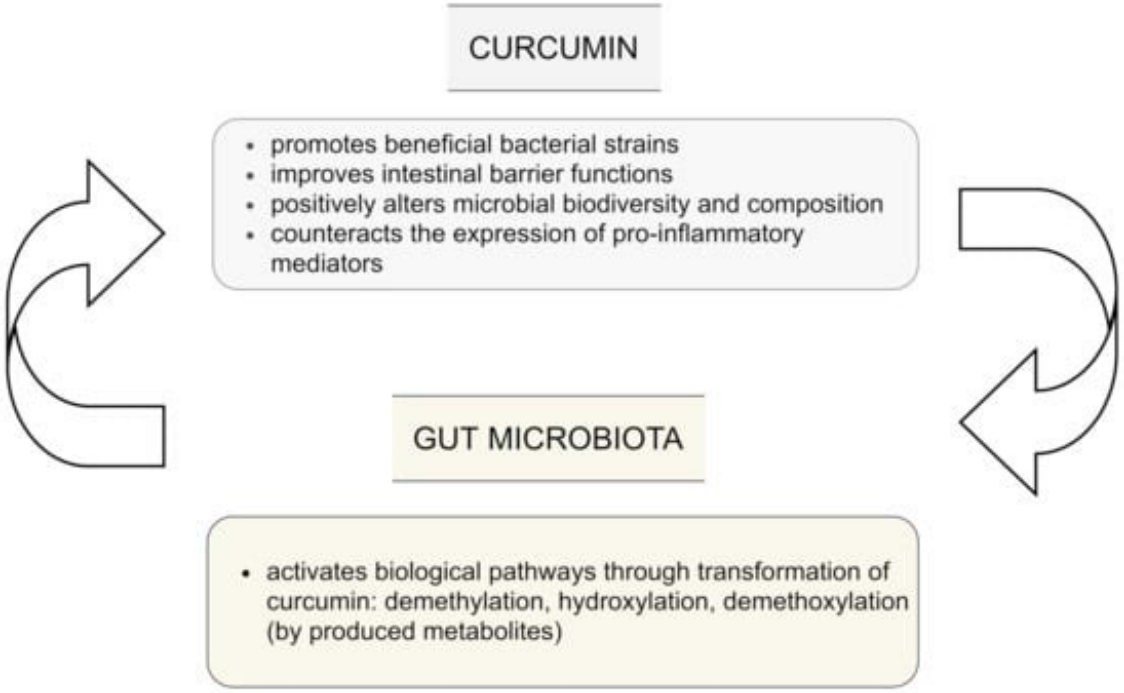
3

frontiers in Pharmacology

ORIGINAL RESEARCH
published: 05 March 2018
doi: 10.3389/fphar.2018.00183

Curcumin Prevents Acute Neuroinflammation and Long-Term Memory Impairment Induced by Systemic Lipopolysaccharide in Mice

Vincenzo Sorrenti[1], Gabriella Contarini[1], Stefania Sut[2], Stefano Dall'Acqua[1], Francesca Confortin[1], Andrea Pagetta[1], Pietro Giusti[1] and Morena Zusso[1]*



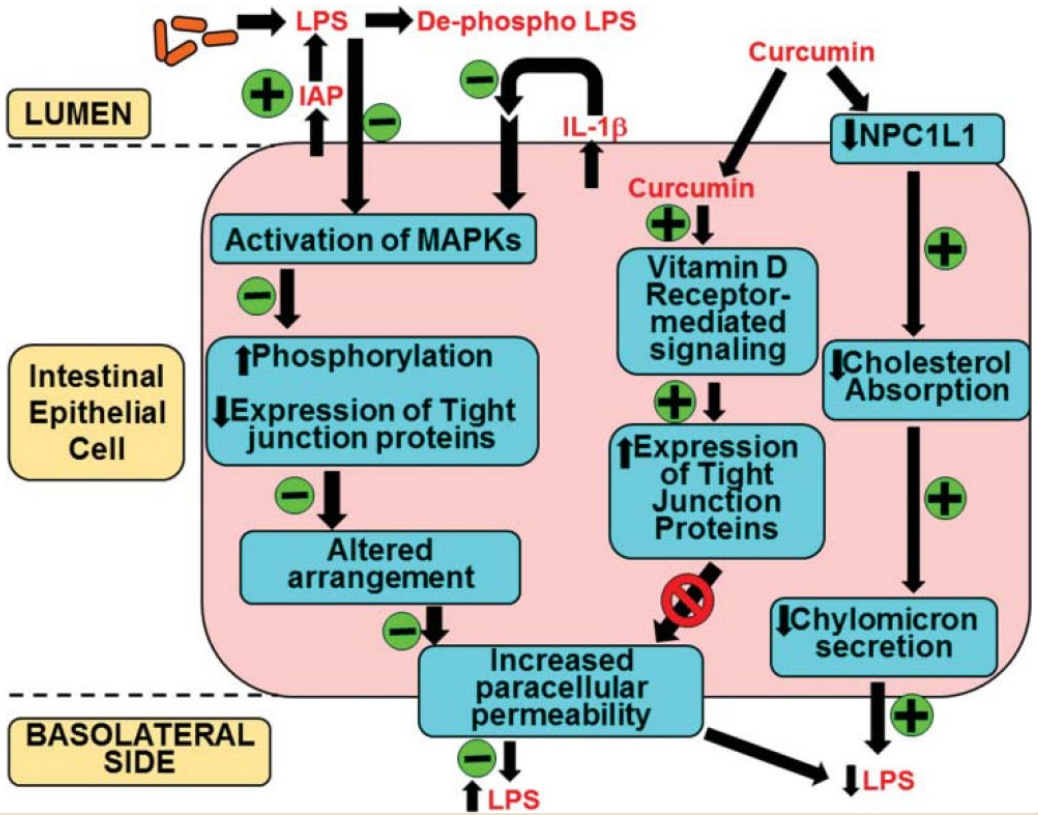
TISSUE BARRIERS
2018, VOL. 6, NO. 1, e1425085 (13 pages)
https://doi.org/10.1080/21688370.2018.1425085

Taylor & F
Taylor & Francis G

REVIEW

Curcumin-mediated regulation of intestinal barrier function: The mechanism underlying its beneficial effects

Siddhartha S. Ghosh, Hongliang He, Jing Wang, Todd W. Gehr, and Shobha Ghosh



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pharmaceuticals

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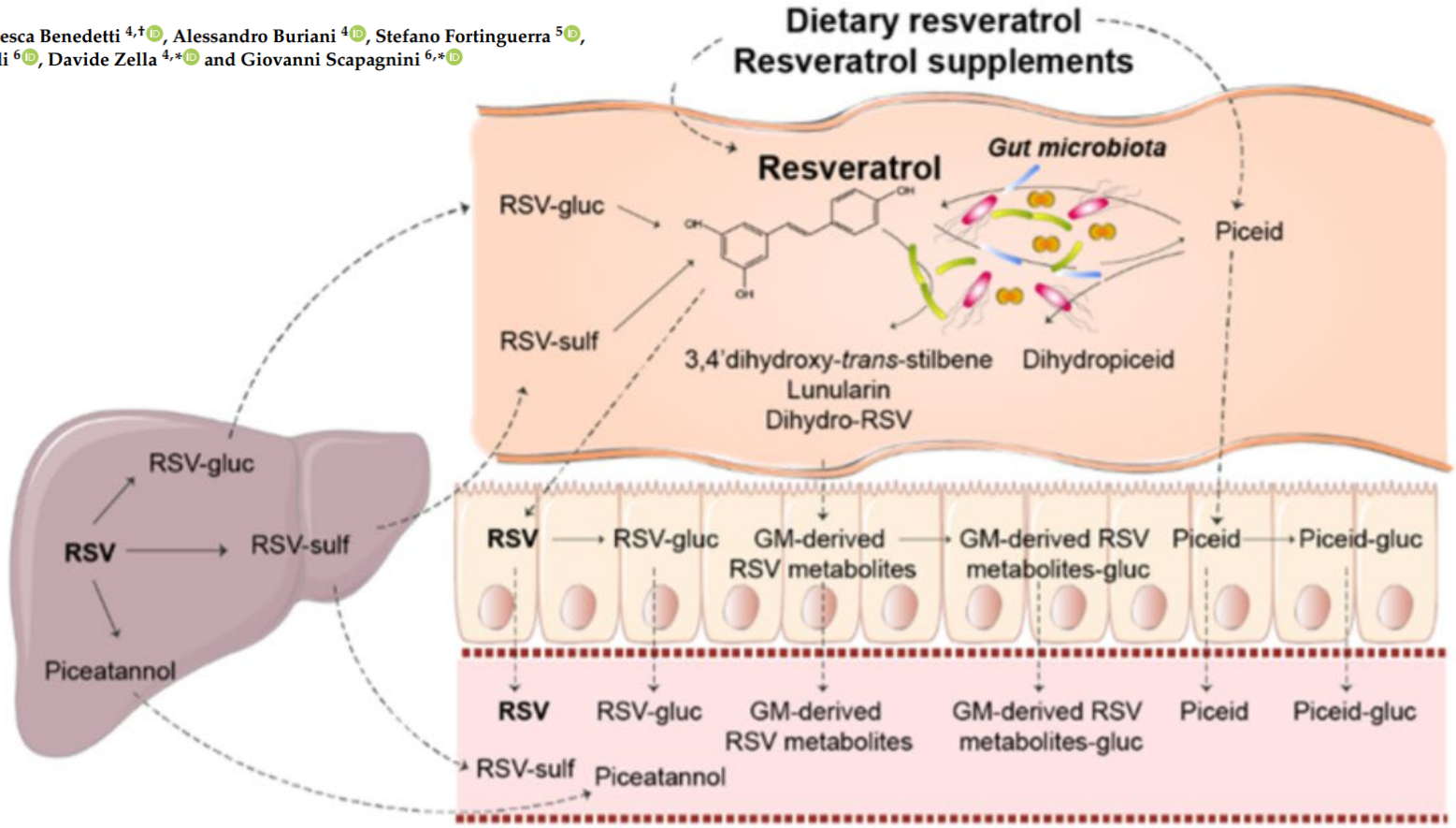
Review

Immunomodulatory and Antiaging Mechanisms of Resveratrol, Rapamycin, and Metformin: Focus on mTOR and AMPK Signaling Networks

Vincenzo Sorrenti [1,2,3,*,†], Francesca Benedetti [4,†], Alessandro Buriani [4], Stefano Fortinguerra [5], Giada Caudullo [2], Sergio Davinelli [6], Davide Zella [4,*] and Giovanni Scapagnini [6,*]



Bifidobacteria
Lactobacillus acidophilus

Slackia equolifaciens
Adlercreutzia equolifaciens

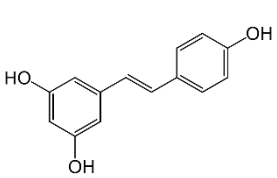
5

European Journal of Clinical Nutrition (2017), 1–6

Gut microbiota composition in relation to the metabolic response to 12-week combined polyphenol supplementation in overweight men and women

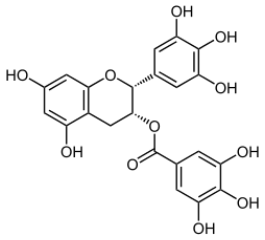
J Most[1], J Penders[2], M Lucchesi[2], GH Goossens[1] and EE Blaak[1]

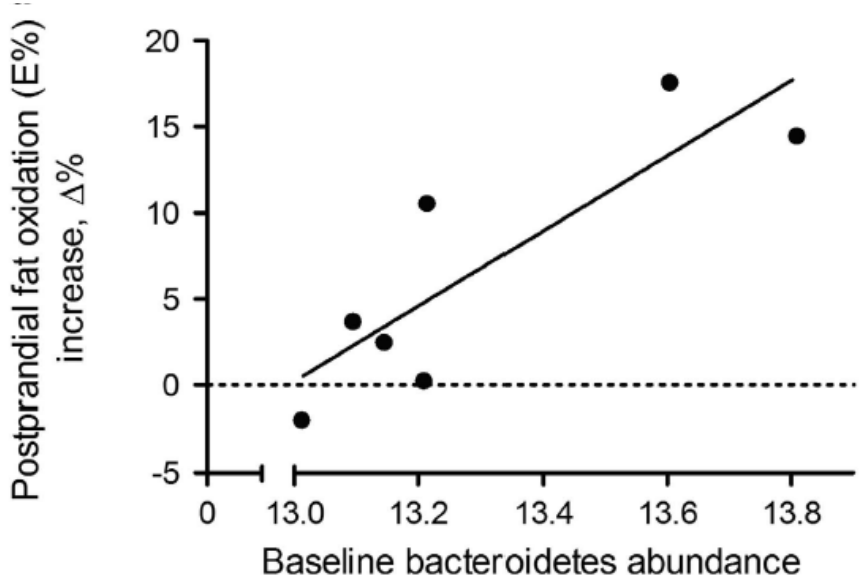
80mg/die



+

285mg/die





EGCG+RES supplementation significantly decreased Bacteroidetes. Strikingly, baseline Bacteroidetes abundance was predictive for the EGCG+RES-induced increase in fat oxidation

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Advances in Nutrition 14 (2023) 1111–1130

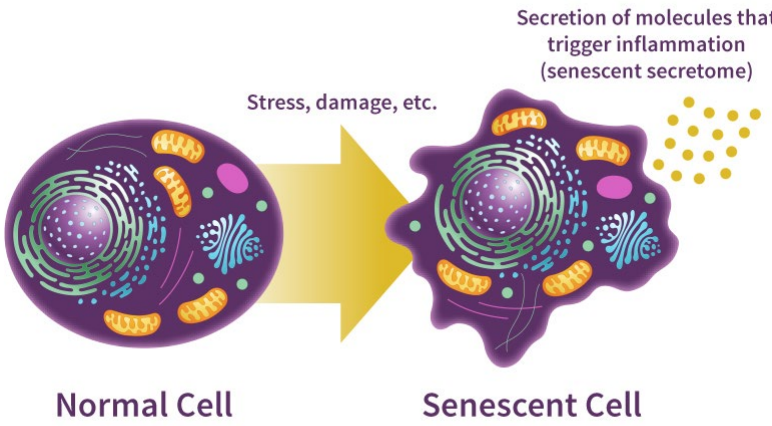
American Society for Nutrition

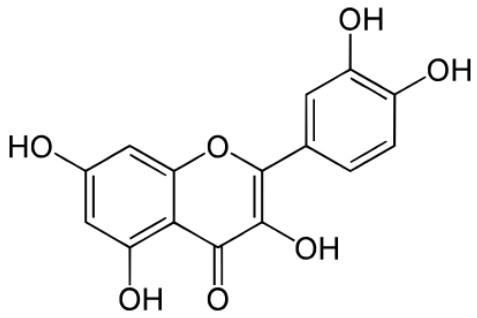
Advances in Nutrition
AN INTERNATIONAL REVIEW JOURNAL
journal homepage: https://advances.nutrition.org/

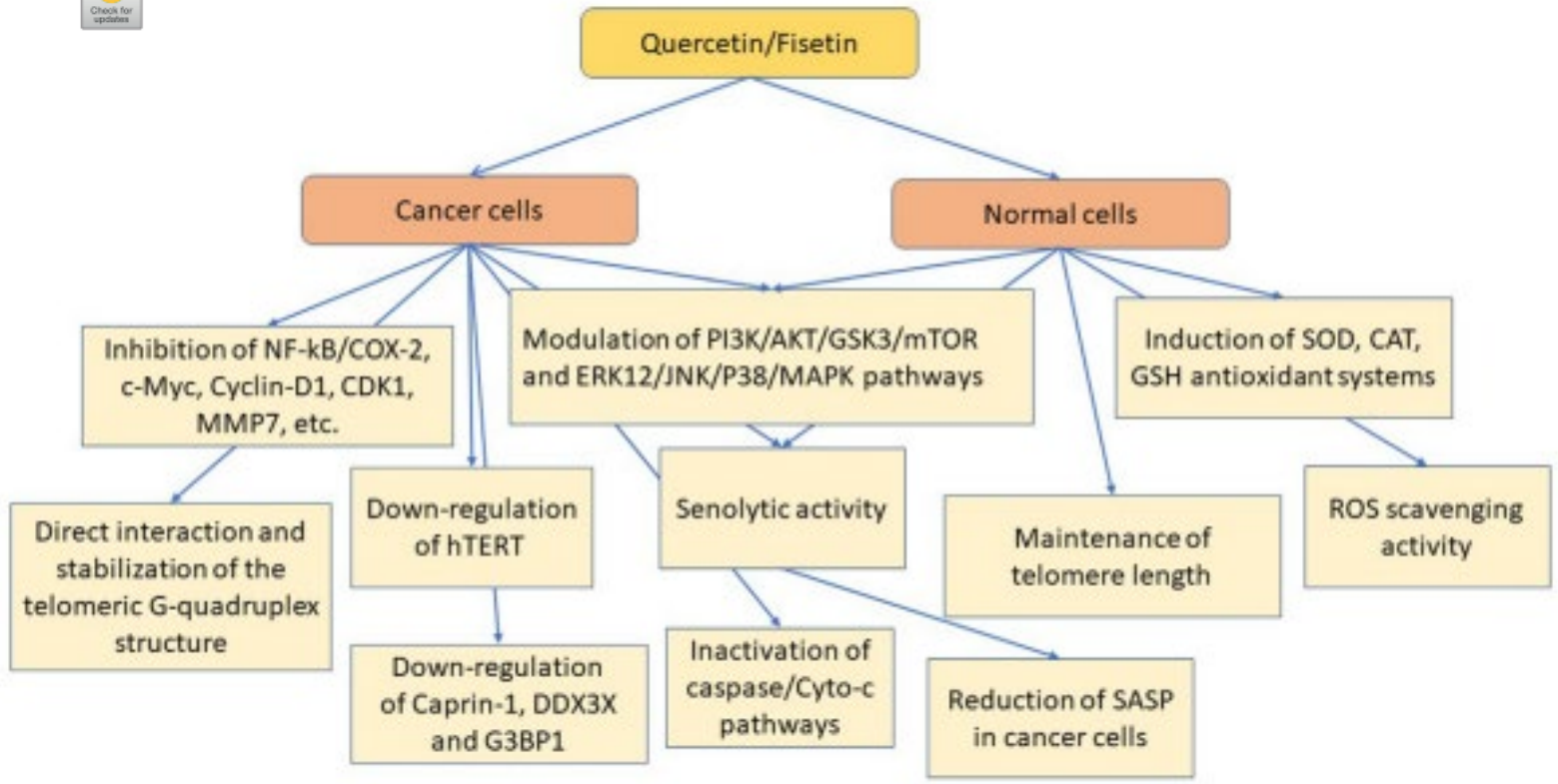
Review

Cell Survival, Death, and Proliferation in Senescent and Cancer Cells: the Role of (Poly)phenols

Vincenzo Sorrenti [1,2,*,†], Alessandro Buriani [2,†], Stefano Fortinguerra [3,†], Sergio Davinelli [4], Giovanni Scapagnini [4], Aedin Cassidy [5], Immaculata De Vivo [6]







International Journal of *Molecular Sciences*

MDPI

Article

Screening of Human Gut Bacterial Culture Collection Identifies Species That Biotransform Quercetin into Metabolites with Anticancer Properties

Ranjini Sankaranarayanan [1], Prabhjot Kaur Sekhon [2], Achuthan Ambat [2], Julia Nelson [2], Davis Jose [3], G. Jayarama Bhat [1,*] and Joy Scaria [2,*]

We demonstrated that five of these species were able to degrade quercetin including Bacillus glycinifermentans, Flavonifractor plautii, Bacteroides eggerthii, Olsenella scatoligenes and Eubacterium eligens. Additional studies showed that B. glycinifermentans could generate 2,4,6-THBA and 3,4-DHBA from quercetin while F. plautii generates DOPAC

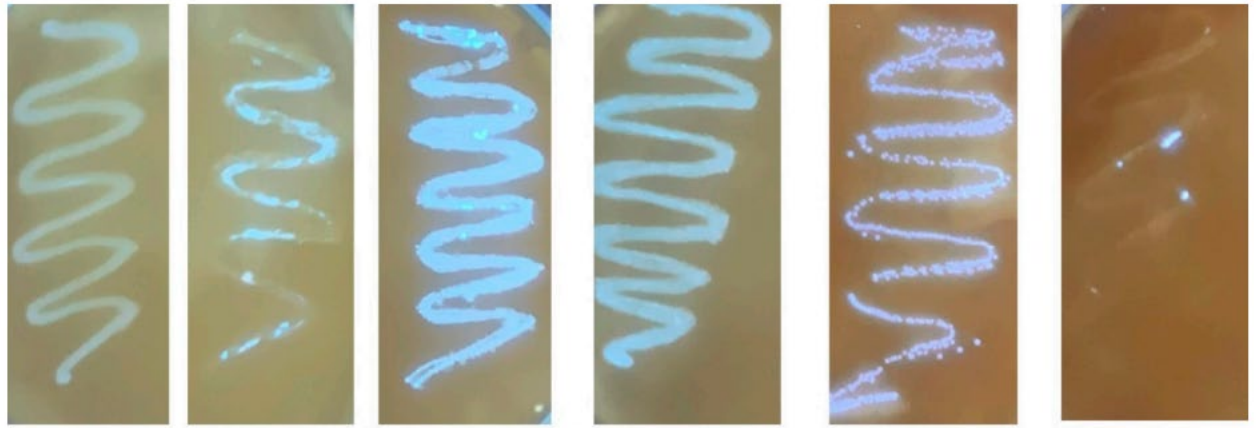


Figure 2. DPH assay demonstrating the ability of five bacterial species to biotransform quercetin. The figure shows bacterial growth on a nylon membrane soaked in a mixture of 1 mM DPH and 20 mM quercetin in mBHI agar plates. All the five quercetin-biotransforming bacterial species presented fluorescence, although to different degrees. However, the negative control, *E. coli* (non-quercetin-degrading bacteria), did not result in any fluorescence in this assay.

These results now tie in well with our previously published reports where we demonstrated the ability of some of these hydroxybenzoic acid metabolites (2,4,6-THBA, 3,4-DHBA and 3,4,5-THBA) to inhibit cancer cell growth

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top ten in gastroenterologia 14^ EDIZIONE 24-25 NOVEMBRE 2023 BERGAMO

Review

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Table 1. Average daily dose and overall benefits in humans of polyphenol supplementation in sports performance.

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Pycnogenol®	100–800 mg	- improves physical performance and protect from oxidative stress post-exercise; improve training and performances both in normal subjects and in semi-professional athletes performing at high levels in difficult, high-stress sports such as the triathlon.	[171]
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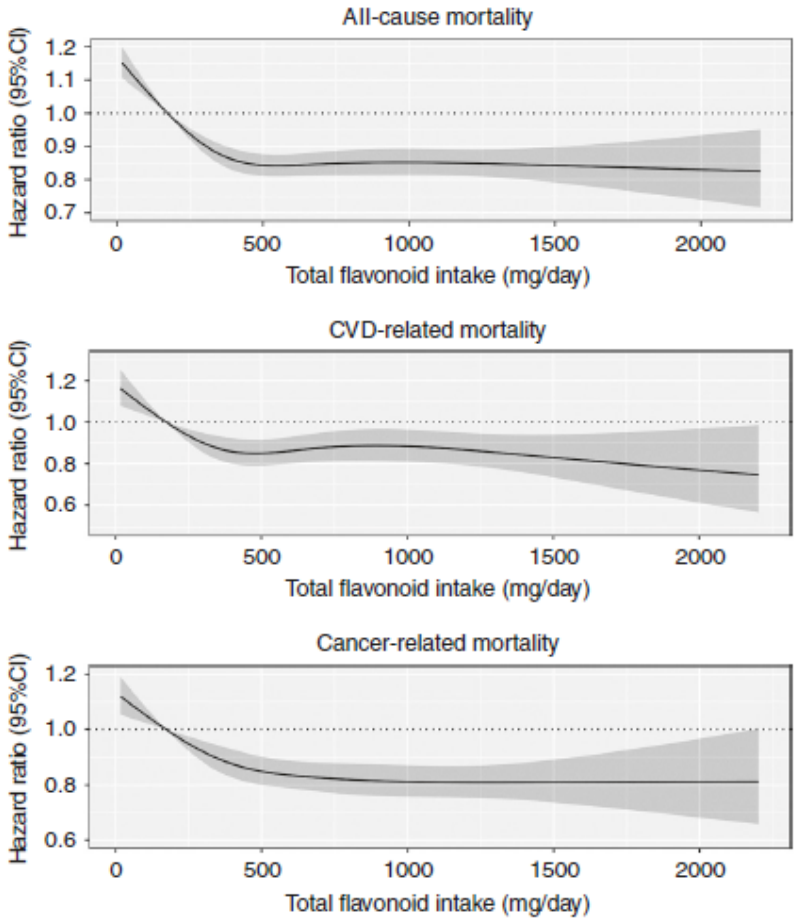
nature COMMUNICATIONS

Flavonoid intake is associated with lower mortality in the Danish Diet Cancer and Health Cohort

Nicola P. Bondonno [1,2,12], Frederik Dalgaard [3,12], Cecilie Kyrø [4], Kevin Murray [5], Catherine P. Bondonno [1,2], Joshua R. Lewis [1,2], Kevin D. Croft [1], Gunnar Gislason[3,6,7], Augustin Scalbert [8], Aedin Cassidy [9], Anne Tjønneland [4], Kim Overvad [10,11] & Jonathan M. Hodgson [1,2]

500 mg flavonoidi/die → soggetti sani

1000 mg flavonoidi/die → soggetti a rischio



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