Nutrients 2015, *7*, 1037-1051; doi:10.3390/nu7021037

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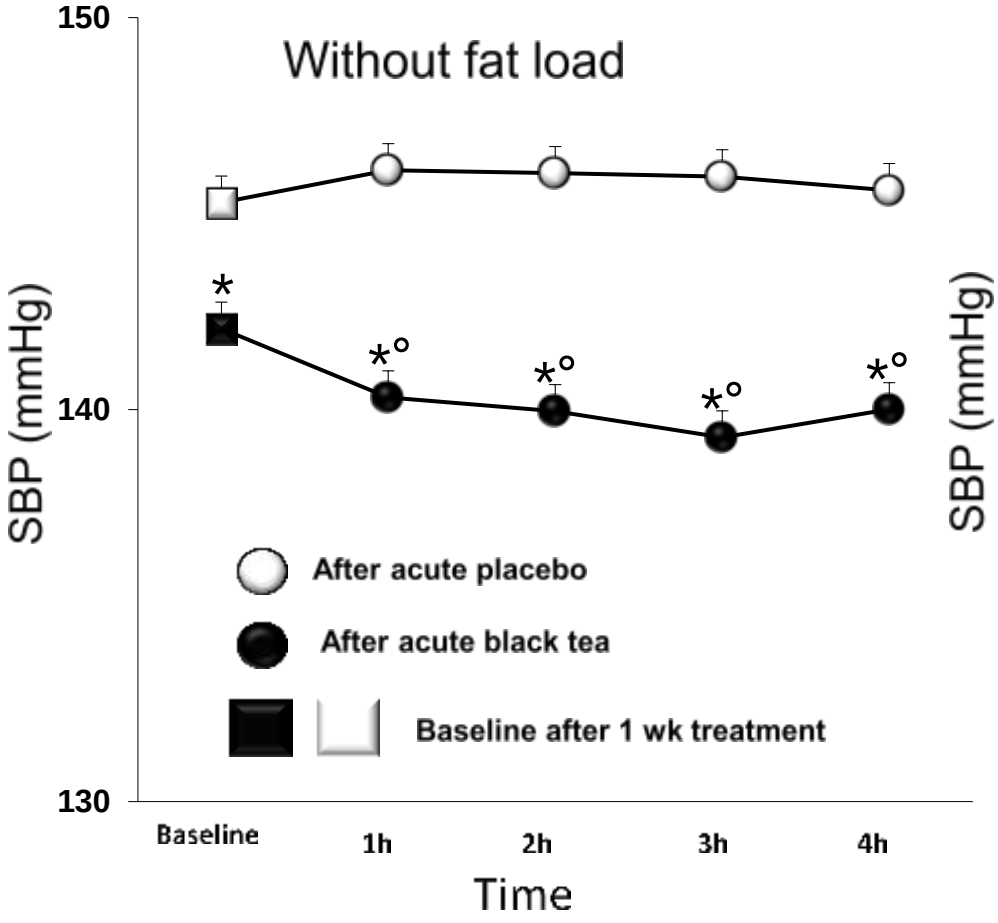
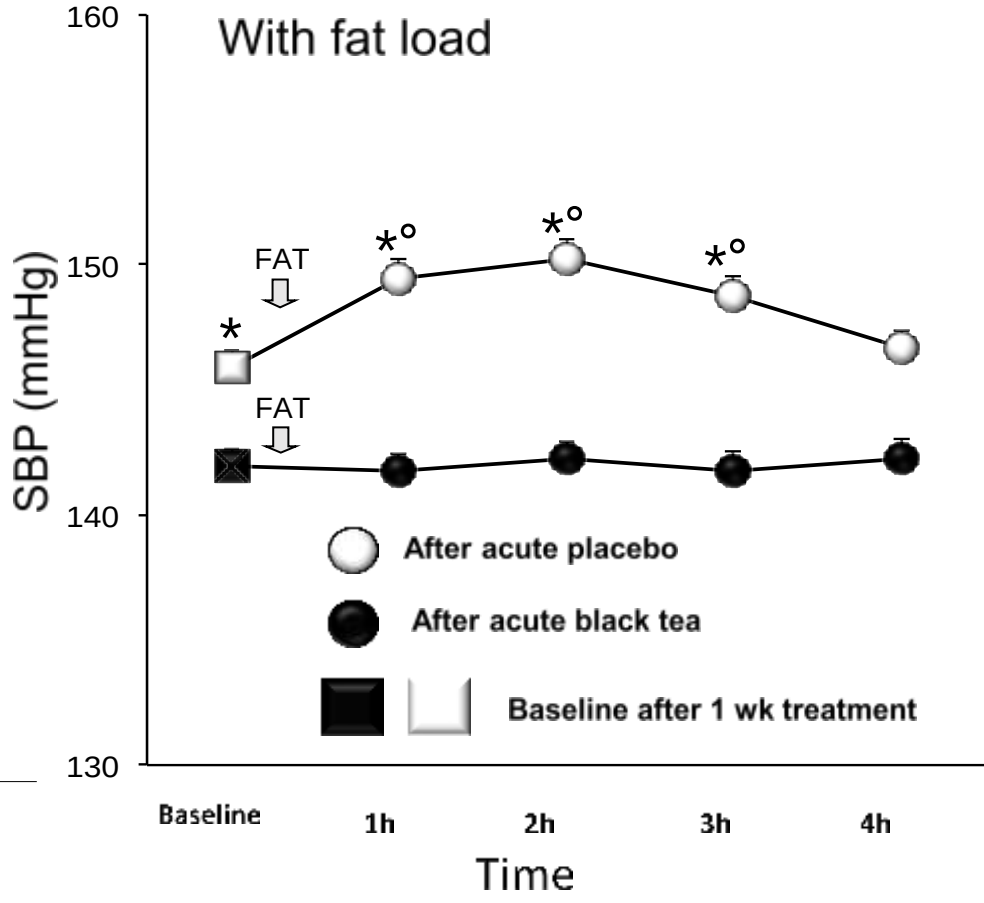
Article

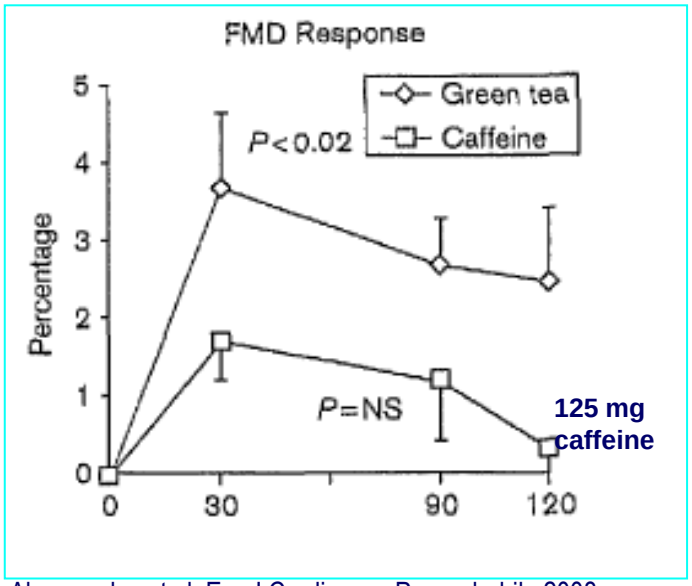
Black Tea Lowers Blood Pressure and Wave Reflections in Fasted and Postprandial Conditions in Hypertensive Patients: A Randomised Study

Davide Grassi [1,*], Richard Draijer [2], Giovambattista Desideri [1], Theo Mulder [2] and Claudio Ferri [1]

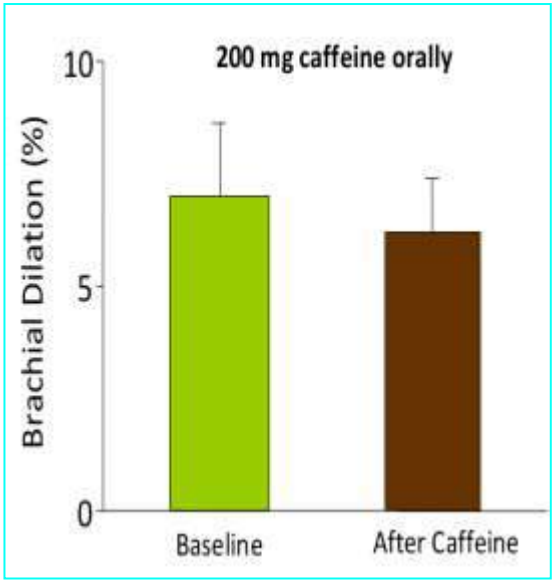




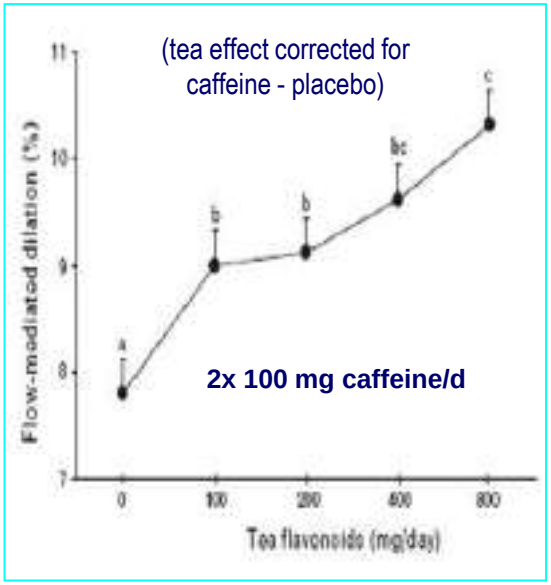
Caffeine does not explain the vascular effect (FMD) of tea



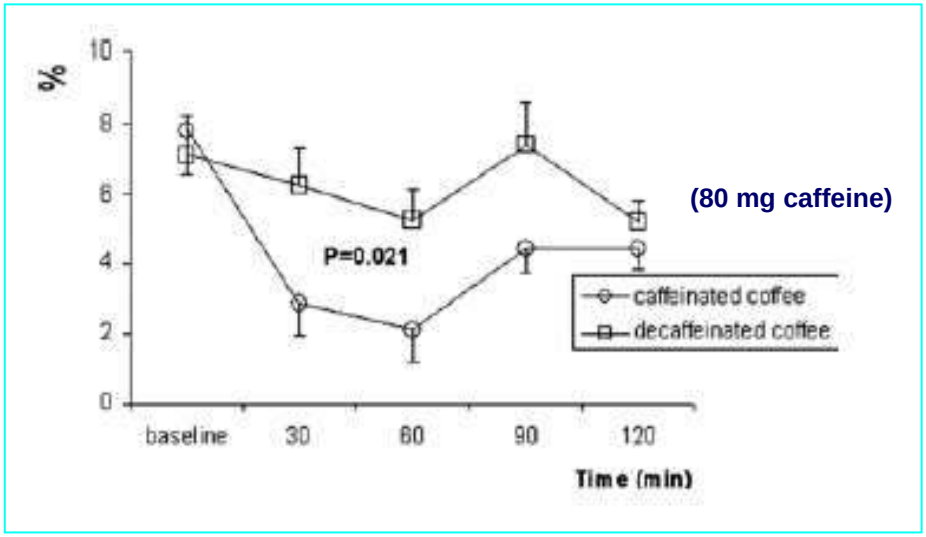
Alexopoulos et al. Eur J Cardiovasc Prev rehabil, 2008



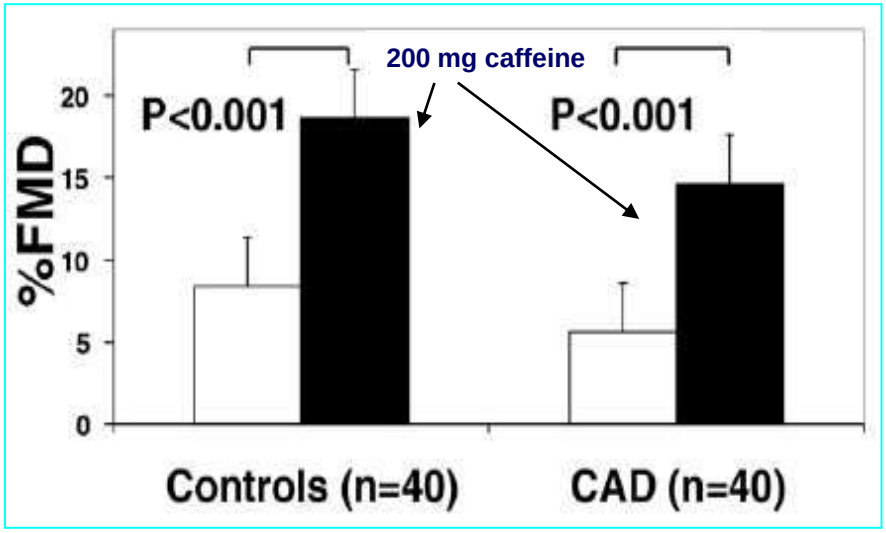
Duffy et al. Circulation 2001



Grassi et al J Hypertension, 2009



Papamichael et al. Clin Science, 2005



NUTRITION RESEARCH 55 (2018) 1–10

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Review Article

Efficacy of tea catechin-rich beverages to reduce abdominal adiposity and metabolic syndrome risks in obese and overweight subjects: a pooled analysis of 6 human trials

	LC group				HC group				
	EM	95% CI		Difference within group	EM	95% CI		Difference within group	Difference between groups [b]
Body weight (kg)	0.03	-0.12	0.18	n.s.	-1.69	-1.84	-1.53	<0.05	<.001
BMI (kg/m^2)	0.01	-0.04	0.07	n.s.	-0.65	-0.70	-0.59	<0.05	<.001
Waist (cm)	-0.17	-0.38	0.04	n.s.	-1.69	-1.90	-1.47	<0.05	<.001
TFA (cm^2)	4.1	0.9	7.4	<0.05	-17.9	-21.1	-14.6	<0.05	<.001
VFA (cm^2)	1.6	-0.2	3.4	n.s.	-7.2	-9.0	-5.4	<0.05	<.001
SFA (cm^2)	2.4	0.1	4.8	<0.05	-10.5	-12.9	-8.1	<0.05	<.001
TG (mg/dL)	-5.4	-12.2	1.4	n.s.	2.0	-4.8	8.9	n.s.	n.s.
HDL (mg/dL)	-0.4	-1.0	0.3	n.s.	-0.5	-1.1	0.1	n.s.	n.s.
FBS (mg/dL)	-1.2	-2.5	0.1	n.s.	-1.4	-2.7	-0.1	<0.05	n.s.
SBP (mmHg)	0.8	-0.2	1.8	n.s.	-1.1	-2.1	-0.1	<0.05	<.01
DBP (mmHg)	-0.3	-1.0	0.3	n.s.	-1.0	-1.6	-0.3	<0.05	n.s.

[a] Abbreviations: BMI: body mass index, CI: confidence intervals, DBP: diastolic blood pressure, EM: estimated mean, FBS: fasting blood sugar, HC: high catechin, HDL: high-density lipoprotein-cholesterol, LC: low catechin, MetS: metabolic syndrome, Pre-MetS: pre-metabolic syndrome, SBP: systolic blood pressure, SFA: subcutaneous fat area, TFA: total fat area, TG: triglycerides, VFA: visceral fat area.

[b] Fixed effect: dose group, sex: Random effect: by trial: Covariates: age, baseline value of each parameter.

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Review Article

Efficacy of tea catechin-rich beverages to reduce abdominal adiposity and metabolic syndrome risks in obese and overweight subjects: a pooled analysis of 6 human trials

Table 4 – Estimated mean changes from baseline among Pre-MetS and MetS subjects [a].

	LC group				HC group				
	EM	95% CI		Difference within group	EM	95% CI		Difference within group	Difference between groups [b]
Body weight (kg)	0.07	-0.18	0.33	n.s.	-1.56	-1.81	-1.31	<0.05	<.001
BMI (kg/m^2)	0.03	-0.06	0.12	n.s.	-0.59	-0.68	-0.50	<0.05	<.001
Waist (cm)	0.06	-0.27	0.40	n.s.	-1.46	-1.79	-1.13	<0.05	<.001
TFA (cm^2)	4.7	-1.0	10.4	n.s.	-21.6	-27.2	-15.9	<0.05	<.001
VFA (cm^2)	0.2	-3.3	3.7	n.s.	-10.5	-14.0	-7.1	<0.05	<.001
SFA (cm^2)	3.7	0.2	7.3	<0.05	-11.4	-14.9	-7.9	<0.05	<.001
TG (mg/dL)	-21.8	-33.8	-9.7	<0.05	-2.0	-13.8	9.8	n.s.	<.05
HDL (mg/dL)	0.4	-0.7	1.4	n.s.	0.4	-0.7	1.4	n.s.	n.s.
FBS (mg/dL)	-0.9	-3.5	1.7	n.s.	-3.2	-5.8	-0.6	<0.05	n.s.
SBP (mmHg)	-0.4	-2.0	1.3	n.s.	-2.1	-3.8	-0.5	<0.05	n.s.
DBP (mmHg)	-0.6	-1.6	0.4	n.s.	-0.9	-1.9	0.0	n.s.	n.s.

BCPT Basic & Clinical Pharmacology & Toxicology

Basic & Clinical Pharmacology & Toxicology, 2015, **117**, 57–64 Doi: 10.1111/bcpt.12360

Dark chocolate + dehydrated red apple + green tea = 425.8 mg/day flavonoids

Dietary Flavonoids Added to Pharmacological Antihypertensive Therapy are Effective in Improving Blood Pressure

Marina María de Jesús Romero-Prado[1,2], Jesús Aarón Curiel-Beltrán[2,3,*], María Viviana Miramontes-Espino[1,2,*], Ernesto Germán Cardona-Muñoz[1], Angeles Rios-Arellano[4] and Lol-Be Balam-Salazar[5]

[1]Department of Physiology, INTEC, Universitary Center of Health Sciences (CUCS), Guadalajara, Jalisco, Mexico, [2]University of Guadalajara, Guadalajara, Jalisco, Mexico, [3]Department of Medical Sciences, Coast Universitary Center (CUCosta), Guadalajara, Jalisco, Mexico, [4]Cardiology Service, Mexican Institute of Health Security, Regional Hospital No. 45, Guadalajara, Jalisco, Mexico and [5]Clinical Analysis Laboratory, IMSS Merida, Yucatan, Mexico

(Received 27 May 2014; Accepted 19 November 2014)

Abstract: Epidemiological studies have suggested that the daily intake of flavonoids is associated with a decreased risk of developing cardiovascular disease. Our purpose was to evaluate the effect of the addition of dietary flavonoids (DF) to antihypertensive treatment (AHT), based on telmisartan (Tms) or captopril (Cpr), on blood pressure (BP), body mass index (BMI), waist/hip ratio, leptin, lipid profile and inflammation in hypertensive young patients. An open-label, randomized, controlled trial was performed among 79 patients aged 20–55 years with grade I or grade II systemic arterial hypertension. The subjects were assigned to one of four groups for AHT plus DF during 6 months: Cpr (n = 14), Cpr + DF (n = 19), Tms (n = 25) and Tms + DF (n = 21). DF consisted of dark chocolate, dehydrated red apple and green tea in an infusion to obtain a daily dose of 425.8 ± 13.9 mg epicatechin equivalents. The BP and anthropometric parameters were measured every 2 weeks. Lipid profile, leptin and hsCRP were determined by standard methods. The combination AHT-DF produced an additional and significant reduction in (i) SBP/DBP of −5/−4 mmHg, being −7/−5 for Cpr + DF and −4/−3 for Tms + DF; (ii) triglyceride levels (−30.6%) *versus* AHT alone (−9.6%); and (iii) leptin: Cpr + DF *versus* Tms + DF ($p < 0.005$). Finally, C-reactive protein plasma levels were reduced significantly in all groups independently of the applied treatment. We conclude that the addition of flavonoids to pharmacological antihypertensive therapy shows additional benefits on BP, lipid profile, leptin, obesity and inflammation.

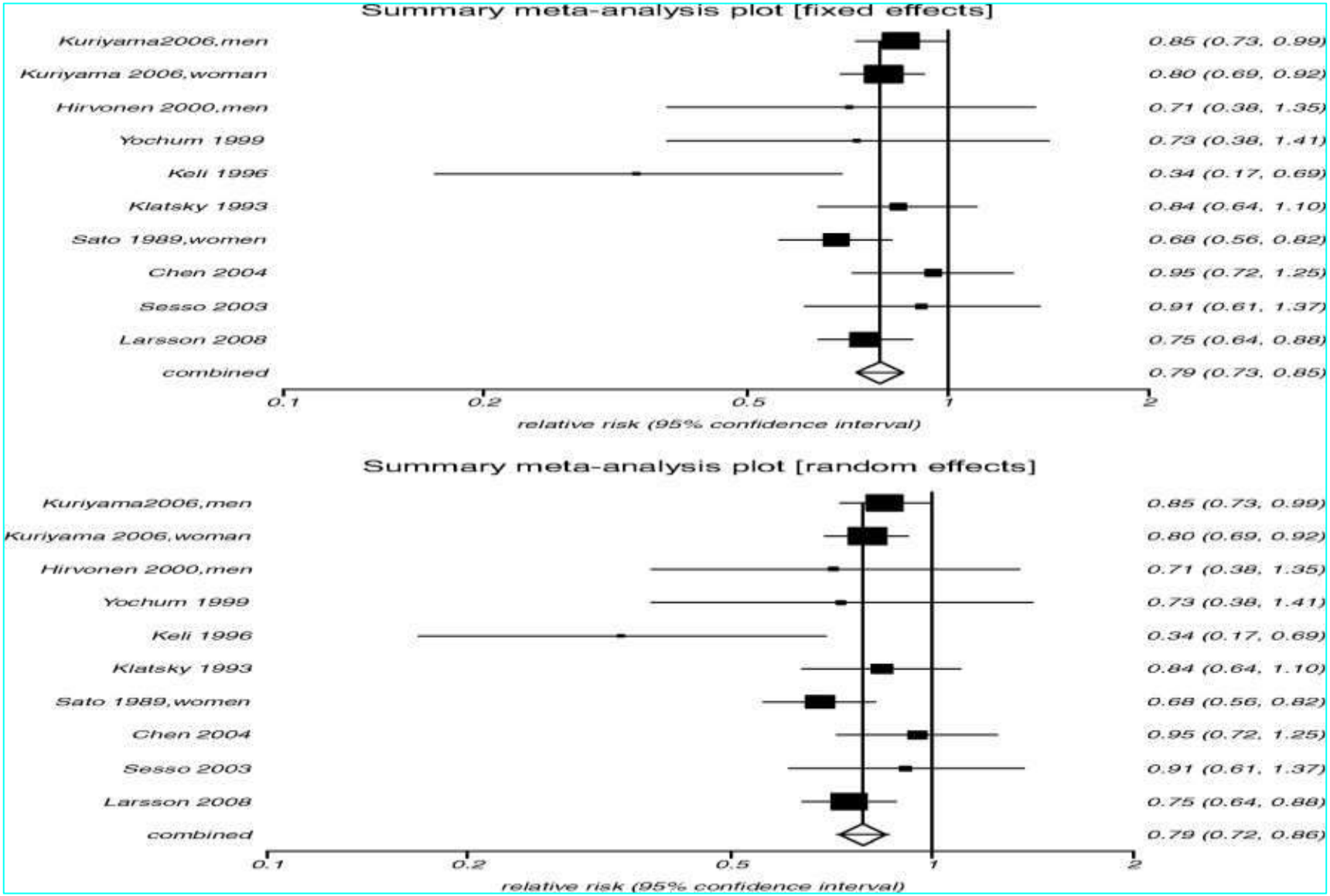
Odds ratio for glucose tolerance status grouped according to the level of *green tea* consumption

GT status		*Green tea* consumption (cups per week)			
	<1	1–15	16–30	>30	
Normal	N	1744	140	87	37
IFG	N	752	25	20	17
Model 1					
(OR,95% CI)		1.00(ref)	0.38 (0.24–0.58)	0.22 (0.11–0.43)	0.38 (0.16–0.86)
p value			<0.001	<0.001	0.02
Model 2					
(OR,95% CI)		1.00(ref)	0.42 (0.27–0.65)	0.23 (0.12–0.46)	0.41 (0.17–0.93)
p value			<0.001	<0.001	0.034
IGT	N	438	50	33	14
Model 1					
(OR,95% CI)		1.00(reference)	1.26 (0.88–1.79)	1.21 (0.78–1.88)	1.46 (0.76–2.79)
p value			0.193	0.385	0.247
Model 2					
(OR,95% CI)		1.00(reference)	1.11 (0.77–1.59)	1.08 (0.69–1.68)	1.19 (0.61–2.30)
p value			0.564	0.731	0.606

Model 1: Adjusted for age, gender, and level of green tea consumption. Model 2: Adjusted for age, gender, level of green tea consumption, dyslipidemia, family history of diabetes, consumption of milk, consumption of soybean milk, smoking status, consumption of alcohol, physical activity, sleep status, BMI, and waist to hip ratio.

Huang H et al PLoS One. 2013;8(11):e79214.

Forest plot of studies of stroke and tea consumption



BEVANDE

Quattro meta-analisi di studi prospettici (Arab 2009, Shen 2012, Peters 2001, Zhang 2015) hanno evidenziato un effetto protettivo del consumo di tè, in particolare tè verde, sul rischio di ictus totale ed ischemico, ma non sul rischio di ictus emorragico. La riduzione del rischio di ictus varia dal 13% al 66% per un consumo superiore a tre tazze di tè al giorno ed è dose-dipendente.

LIVELLO DELL'EVIDENZA 2++

L'effetto protettivo è presumibilmente mediato dall'azione favorevole di antiossidanti, catechine e teanina.

Recenti meta-analisi di studi prospettici (Patra 2010, Ronkslay 2011, Zhang 2014) hanno coerentemente evidenziato che la relazione tra consumo di bevande alcoliche ed incidenza di ictus totale ed ischemico è descritta da un andamento dose-risposta a J, dove per consumi più alti (corrispondenti a più di 3-4 bicchieri di vino al giorno) si ha un aumento del rischio di ictus totale ed ischemico. Le stesse meta-analisi (Patra 2010, Ronkslay 2011, Zhang 2014) hanno confermato anche per l'ictus emorragico un aumento del rischio in presenza di consumi eccessivi di bevande alcoliche. Il consumo moderato di bevande alcoliche è invece associato ad un minor rischio di ictus totale ed ischemico, ma non emorragico.
Per quantità moderata si intende circa una unità alcolica al giorno se donna e due se uomo.

LIVELLO DELL'EVIDENZA 2++

CACAO-CIOCCOLATA

Due meta-analisi ed una revisione sistematica di studi prospettici (Buitrago-Lopez 2011, Larsson 2014) hanno evidenziato che il consumo moderato di cioccolato fondente è associato ad una diminuzione del rischio di ictus totale, pari al 19-29%.

LIVELLO DELL'EVIDENZA 2++

L'effetto protettivo dipende presumibilmente dal contenuto in polifenoli.

SCIENTIFIC OPINION

EFSA Journal

ADOPTED: 14 March 2018

doi: 10.2903/j.efsa.2018.5239

Scientific opinion on the safety of green tea catechins

[…] However, **rare cases of liver injury have been reported after consumption of green tea infusions, most probably due to an idiosyncratic reaction.** Based on the available data on the **potential adverse effects** of green tea catechins on the liver, the Panel concluded that there is evidence from interventional clinical trials that intake of doses **equal or above 800 mg EGCG/day** taken as a food supplement has been shown to induce a statistically significant increase of serum transaminases in treated subjects compared to control.

Complementary Therapies in Medicine 58 (2021) 102689

Contents lists available at ScienceDirect

Complementary Therapies in Medicine

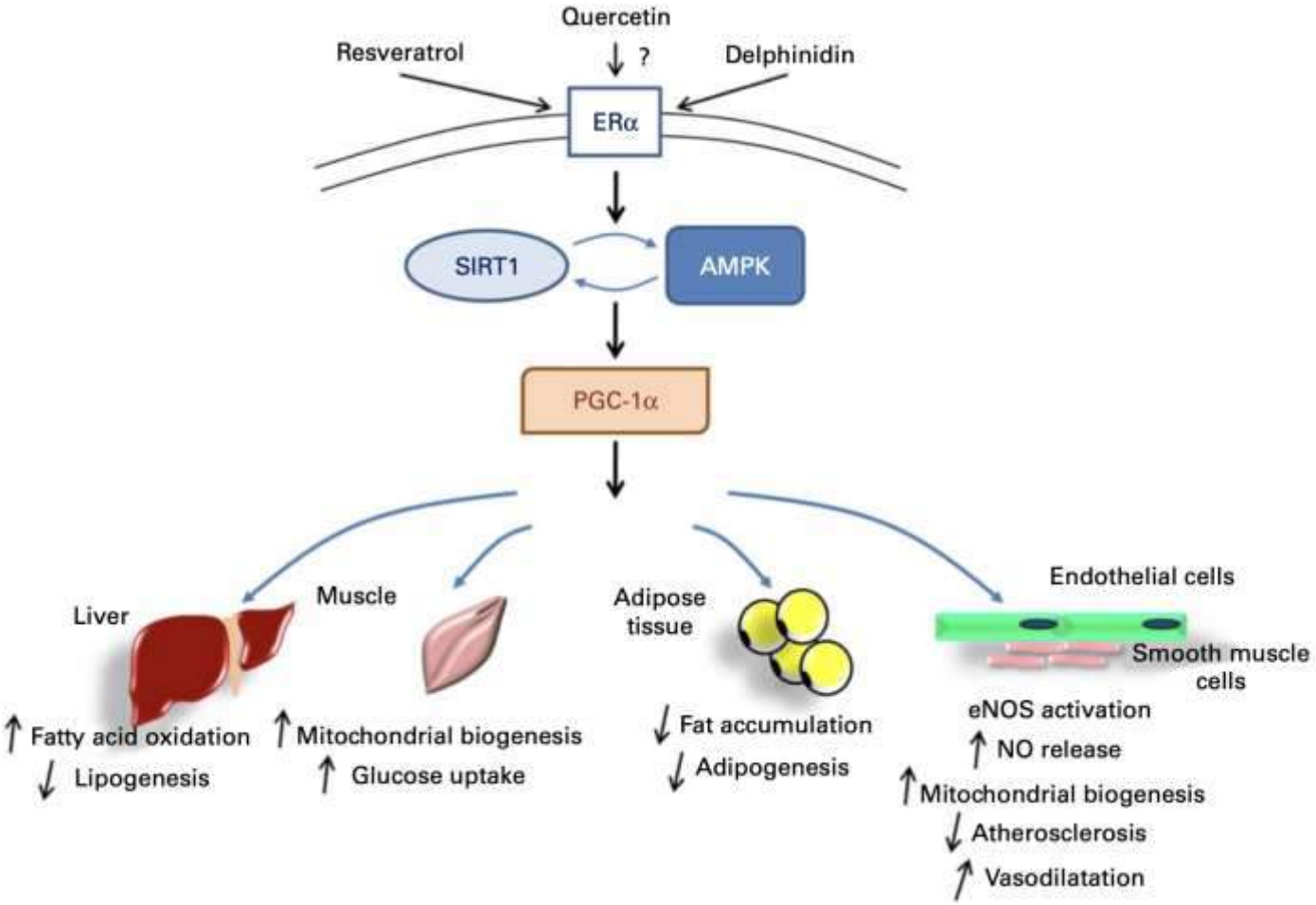
journal homepage: www.elsevier.com/locate/ctim

Effect of French maritime pine bark extract supplementation on metabolic status and serum vascular cell adhesion molecule-1 levels in patients with type 2 diabetes and microalbuminuria

Elham Navval-Esfahlan [a], Maryam Rafraf [b,*], Somayyeh Asghari [c], Hossein Imani [c], Mohammad Asghari-Jafarabadi [d], Sanaz Karimi-Avval [e]

Results: PBE supplementation significantly reduced glycosylated hemoglobin, VCAM-1, total cholesterol, UACR, waist circumference, and waist-to-height ratio compared to the placebo group at the end of the study (all $P < 0.05$). Changes in fasting blood glucose, insulin, triglyceride, low-density lipoprotein cholesterol, and high-density lipoprotein cholesterol were not significant between the two groups (all $P > 0.05$).

Conclusions: The study findings demonstrated some favorable effects of PBE supplementation on glycemic control, serum VCAM-1 and total cholesterol levels, and microalbuminuria, as well as abdominal obesity in patients with T2DM.


Quercetin
?
Resveratrol
Delphinidin
ERα
SIRT1
AMPK
PGC-1α
Liver
Muscle
Adipose tissue
Endothelial cells
Smooth muscle cells
Fatty acid oxidation
Lipogenesis
Mitochondrial biogenesis
Glucose uptake
Fat accumulation
Adipogenesis
eNOS activation
NO release
Mitochondrial biogenesis
Atherosclerosis
Vasodilatation

Review Article

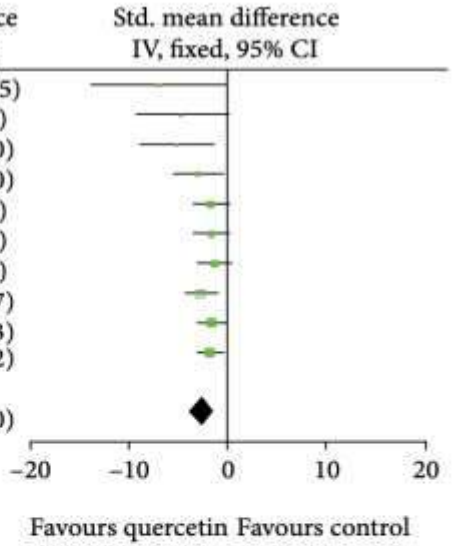
Effect and Mechanisms of Quercetin for Experimental Focal Cerebral Ischemia: A Systematic Review and Meta-Analysis

Chao Guo, Wen-Jun Wang, Yu-Cheng Liao, Chao Zhao, Ying Yin, Min-Na Yao, Yi Ding, and Jing-Wen Wang

Study or subgroup	Quercetin Mean	SD	Total	Control Mean	SD	Total	Weight	Std. mean difference IV, fixed, 95% CI
Fan et al 2020	13.26	1.1	3	33.28	3.08	3	0.7%	−6.93 (−13.80, −0.05)
Park et al 2020a	14.87	1.75	3	26.35	2.25	3	1.6%	−4.56 (−9.24, 0.13)
Park et al 2020b	19.36	2.16	4	32.37	2.34	4	2.5%	−5.02 (−8.75, −1.30)
Zhang et al 2016	24.2	4.6	4	46.8	8.2	4	5.8%	−2.96 (−5.42, −0.50)
Park et al 2018	18.54	4.2	4	28.95	6.48	4	10.9%	−1.66 (−3.45, 0.14)
Yao et al 2012	21.7	6.4	4	36.2	9.6	4	11.5%	−1.55 (−3.29, 0.20)
Park et al 2019	17.61	5	4	27.73	7.94	4	12.7%	−1.33 (−2.99, 0.33)
Yang et al 2021	14.28	4.47	7	25.03	3.09	7	14.6%	−2.62 (−4.17, −1.07)
Wang el al 2020	14.81	6.45	8	24.61	4.66	6	18.5%	−1.61 (−2.98, −0.23)
Shah et al 2018	15.67	5.08	7	25.33	5.5	7	21.2%	−1.71 (−2.99, −0.42)
Total (95% CI)			46			46	100.0%	−1.99 (−2.58, −1.40)

Heterogeneity: $Chi^2 = 8.38$, df = 9 ($P = 0.50$); $I^2 = 0\%$

Test for overall effect: Z = 8.59 ($P < 0.00001$)

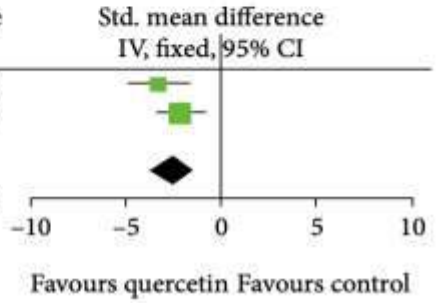


(a)

Study or subgroup	Quercetin Mean	SD	Total	Control Mean	SD	Total	Weight	Std. mean difference IV, fixed, 95% CI
Pandey el al 2011	83.57	27.16	10	225.09	69.44	6	37.7%	−3.26 (−4.91, −1.61)
Ahmed et al 2011	143.94	39.71	8	256.92	61.35	8	62.3%	−2.07 (−3.35, −0.79)
Total (95% CI)			18			14	100.0%	−2.52 (−3.53, −1.50)

Heterogeneity: $Chi^2 = 1.25$, df = 1 ($P = 0.25$); $I^2 = 20\%$

Test for overall effect: Z = 4.88 ($P < 0.00001$)



The forest plots: the effects of quercetin for reducing infarct volume compared with the control group (MCAO) according to (a) percentage calculation and (b) mm.

Meta-Analysis > Phytother Res. 2019 May;33(5):1330-1340. doi: 10.1002/ptr.6334.
Epub 2019 Mar 8.

Effects of quercetin supplementation on glycemic control among patients with metabolic syndrome and related disorders: A systematic review and meta–analysis of randomized controlled trials

In summary, subgroup analysis based on duration of ≥8 weeks and used quercetin in dosages of ≥500 mg/day significantly reduced FPG levels.

Review > Curr Probl Cardiol. 2022 Nov;47(11):101350. doi: 10.1016/j.cpcardiol.2022.101350. Epub 2022 Aug 7.

The Effects of Quercetin Supplementation on Blood Pressure – Meta-Analysis

Joanna Popiolek-Kalisz [1], Emilia Fornal [2]

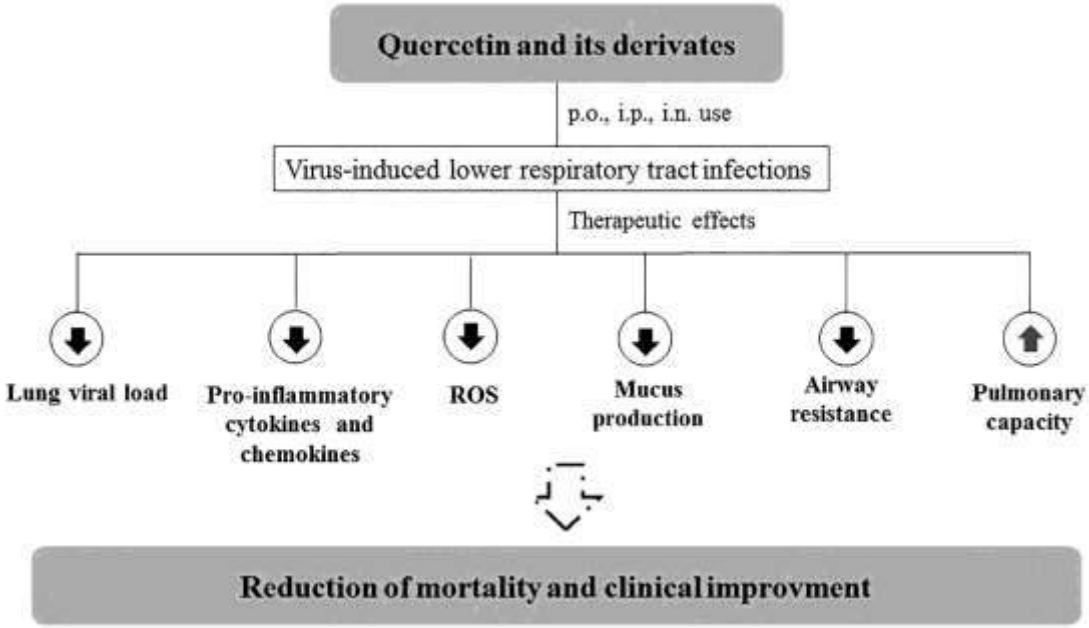
subgroup (MD: -3.14mmHg; 95% CI: -4.44 - -1.84; P < 0.00001). Quercetin supplementation decreases BP in normotensive and (pre)hypertensive patients.

Received: 28 November 2020 | Revised: 15 February 2021 | Accepted: 24 March 2021
DOI: 10.1002/ptr.7122

REVIEW

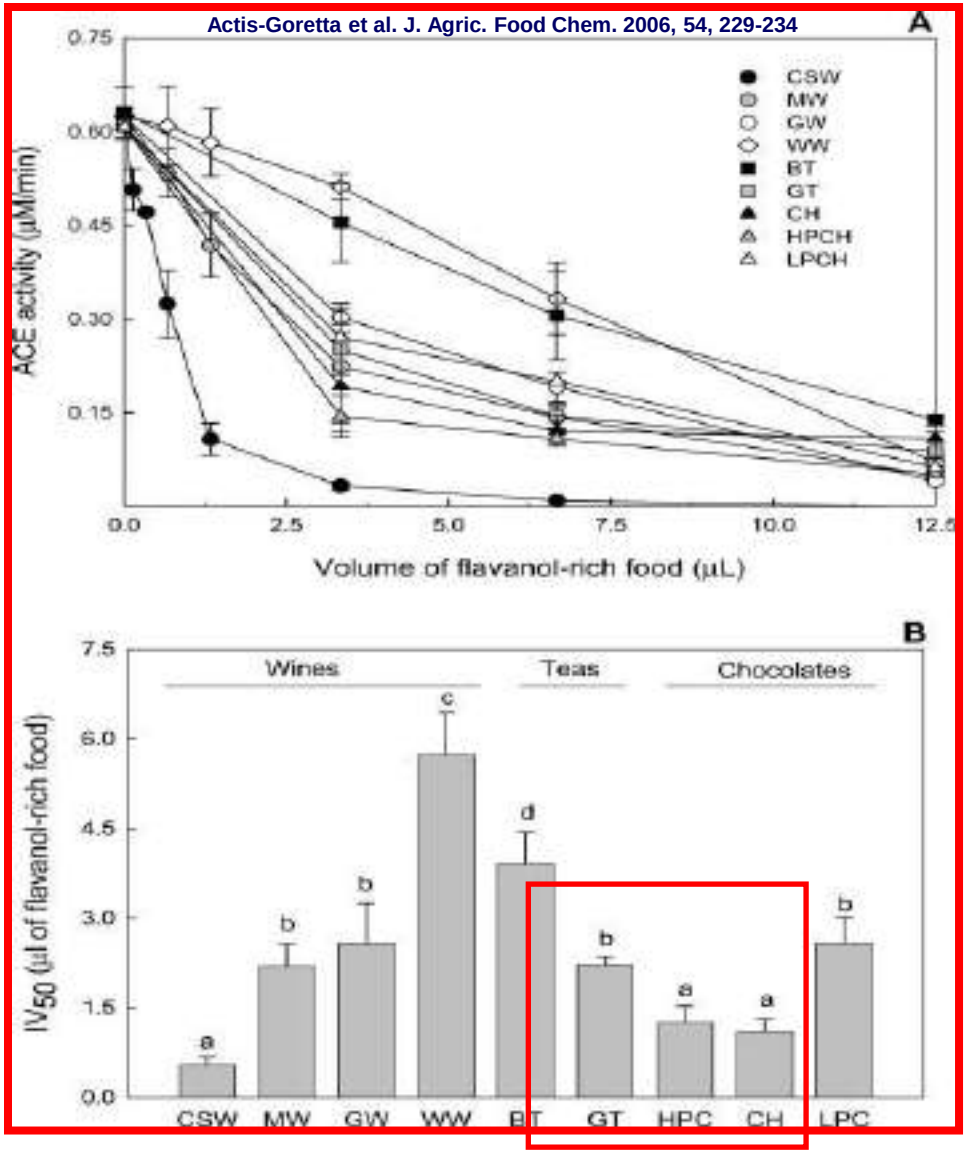
WILEY

Effectiveness of supplementation with quercetin-type flavonols for treatment of viral lower respiratory tract infections: Systematic review and meta-analysis of preclinical studies

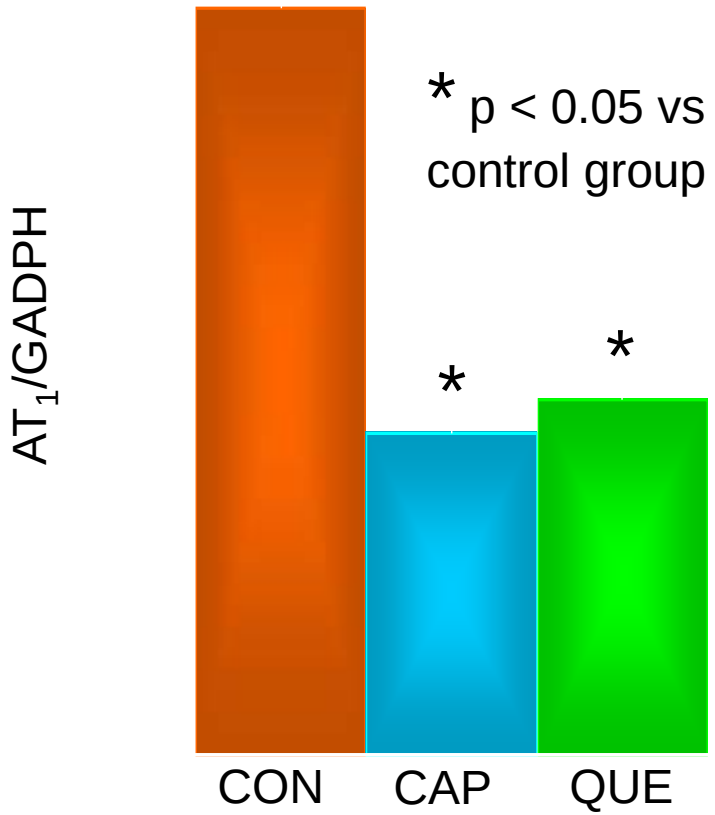


Effect of flavanol-rich foods on ACE activity (A) and Inhibitory volume 50 (IV50) calculated for the inhibition of ACE activity by wines and food extracts (B). Cabernet sauvignon wine (CSW), malbec wine (MW), generic wine (GW), white wine (WW), black tea (BT), green tea (GT), chocolate (CH), high-procyanidin chocolate (HPCH), and low-procyanidin chocolate (LPCH).

Actis-Goretta et al. J. Agric. Food Chem. 2006, 54, 229-234



DSS rats treated with captopril (CAP) and quercetin (QUE) showed downregulation of the AT_1 receptors when compared to the untreated control group (CON).

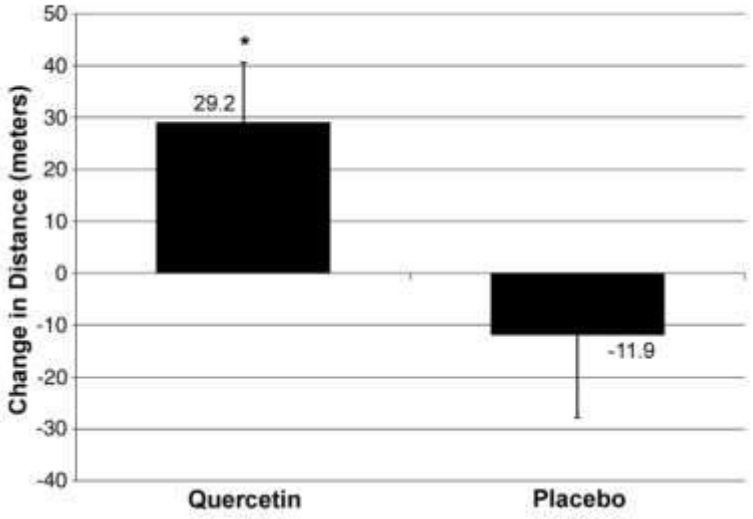


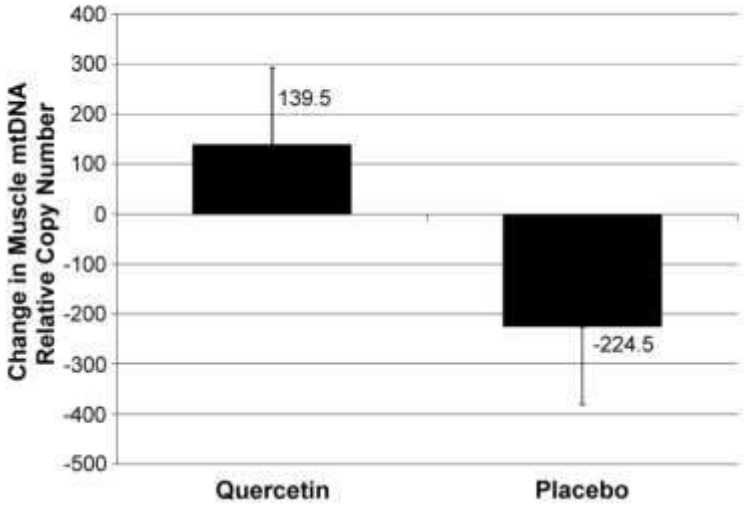
Mackraj et al. J Cardiovasc. Pharmacol. 2008; 51, 239-245

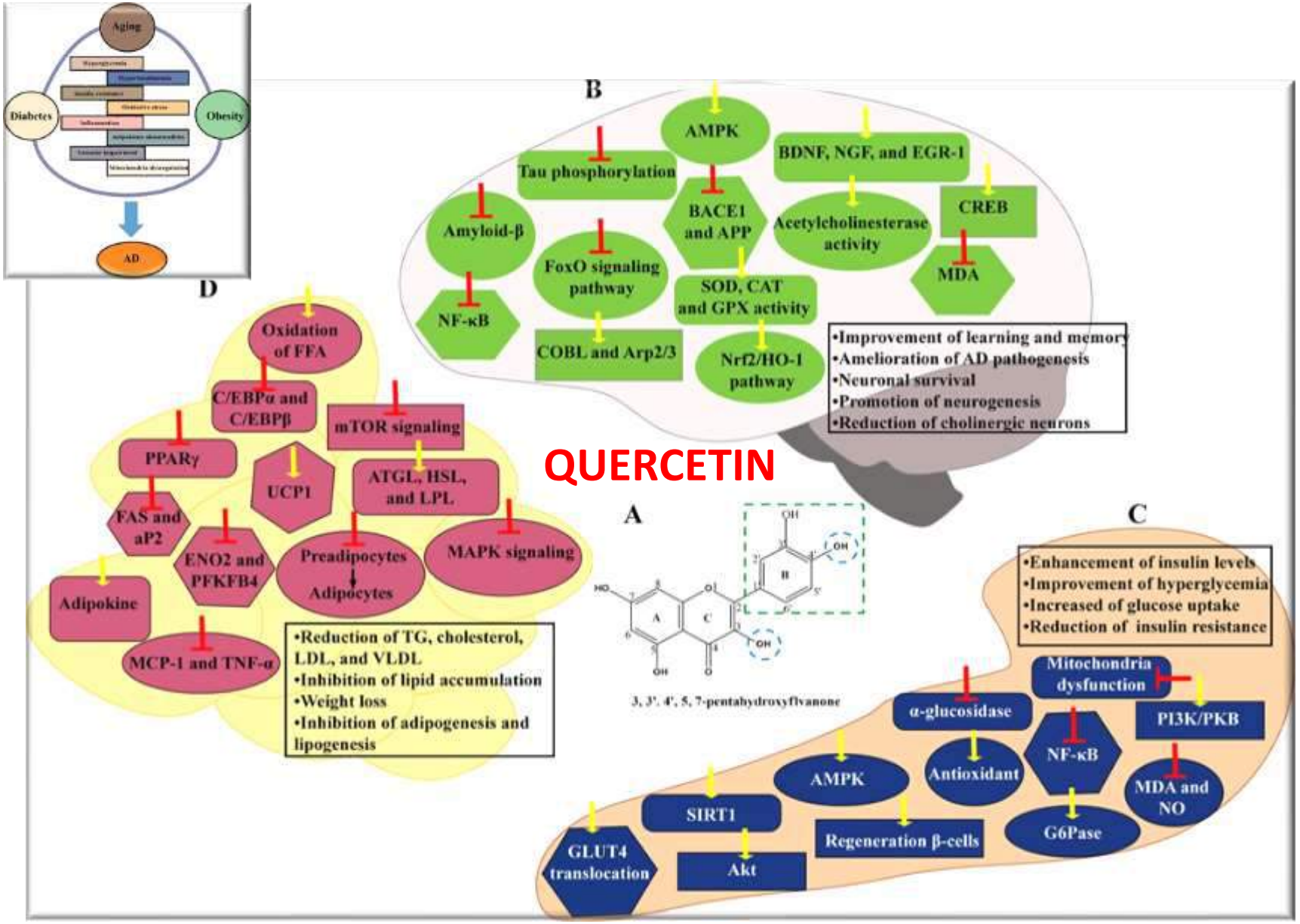
Quercetin's Influence on Exercise Performance and Muscle Mitochondrial Biogenesis

DAVID C. NIEMAN[1,2], ASHLEY S. WILLIAMS[3], R. ANDREW SHANELY[1,2], FUXIA JIN[1,2], STEVEN R. MCANULTY[1], N. TRAVIS TRIPLETT[1], MELANIE D. AUSTIN[1], and DRU A. HENSON[3]

[1]Department of Health, Leisure, and Exercise Science, Appalachian State University, Boone, NC; [2]Human Performance Laboratory, North Carolina Research Campus, Kannapolis, NC; and [3]Department of Biology, Appalachian State University, Boone, NC





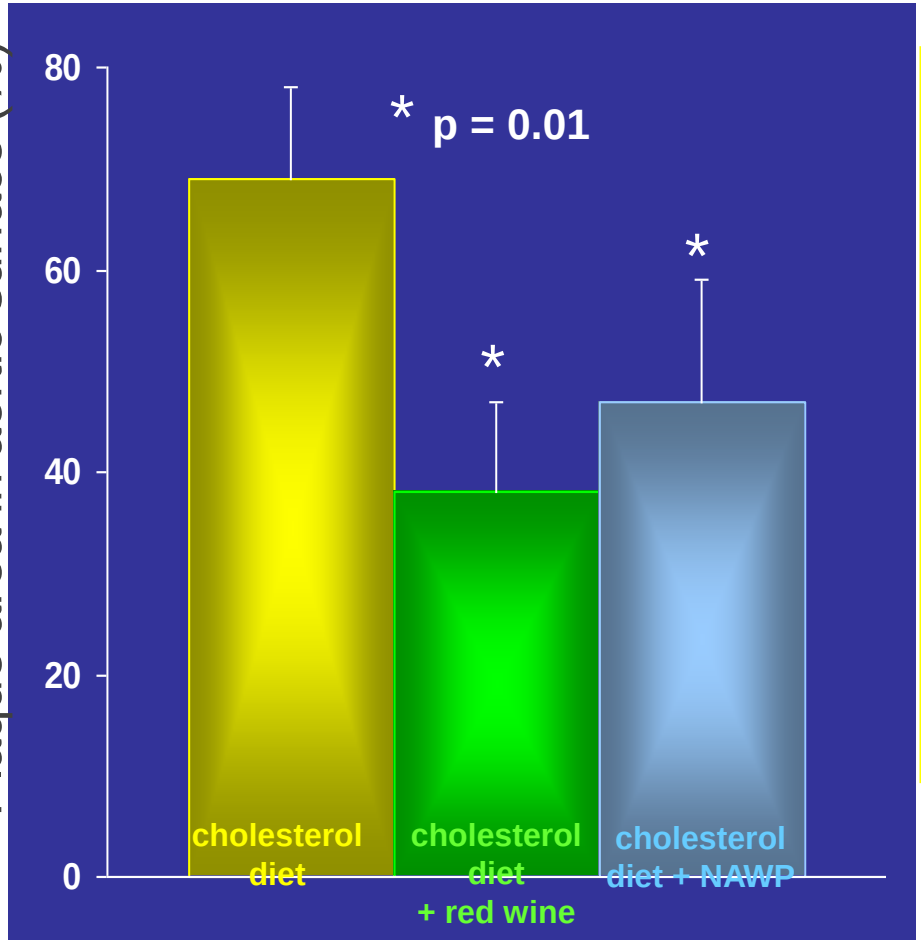

Aging
Diabetes
Obesity
AD
B
AMPK
Tau phosphorylation
BDNF, NGF, and EGR-1
Amyloid-β
BACE1 and APP
Acetylcholinesterase activity
CREB
FoxO signaling pathway
MDA
NF-κB
SOD, CAT and GPX activity
COBL and Arp2/3
Nrf2/HO-1 pathway
•Improvement of learning and memory
•Amelioration of AD pathogenesis
•Neuronal survival
•Promotion of neurogenesis
•Reduction of cholinergic neurons
QUERCETIN
D
Oxidation of FFA
C/EBPα and C/EBPβ
mTOR signaling
PPARγ
UCP1
ATGL, HSL, and LPL
FAS and aP2
ENO2 and PFKFB4
Preadipocytes
Adipocytes
MAPK signaling
Adipokine
MCP-1 and TNF-α
•Reduction of TG, cholesterol, LDL, and VLDL
•Inhibition of lipid accumulation
•Weight loss
•Inhibition of adipogenesis and lipogenesis
A
3, 3', 4', 5, 7-pentahydroxyflvanone
C
•Enhancement of insulin levels
•Improvement of hyperglycemia
•Increased of glucose uptake
•Reduction of insulin resistance
Mitochondria dysfunction
α-glucosidase
PI3K/PKB
NF-κB
AMPK
Antioxidant
MDA and NO
SIRT1
Regeneration β-cells
G6Pase
GLUT4 translocation
Akt

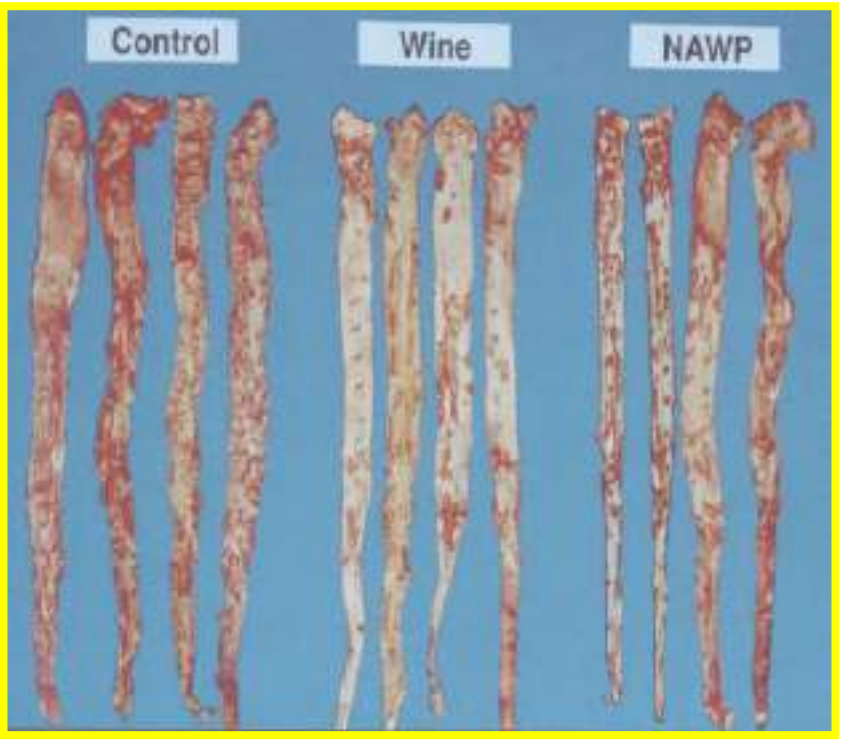
Effect of red wine on atherosclerosis in New Zealand rabbits

After 1% cholesterol diet for 12 weeks

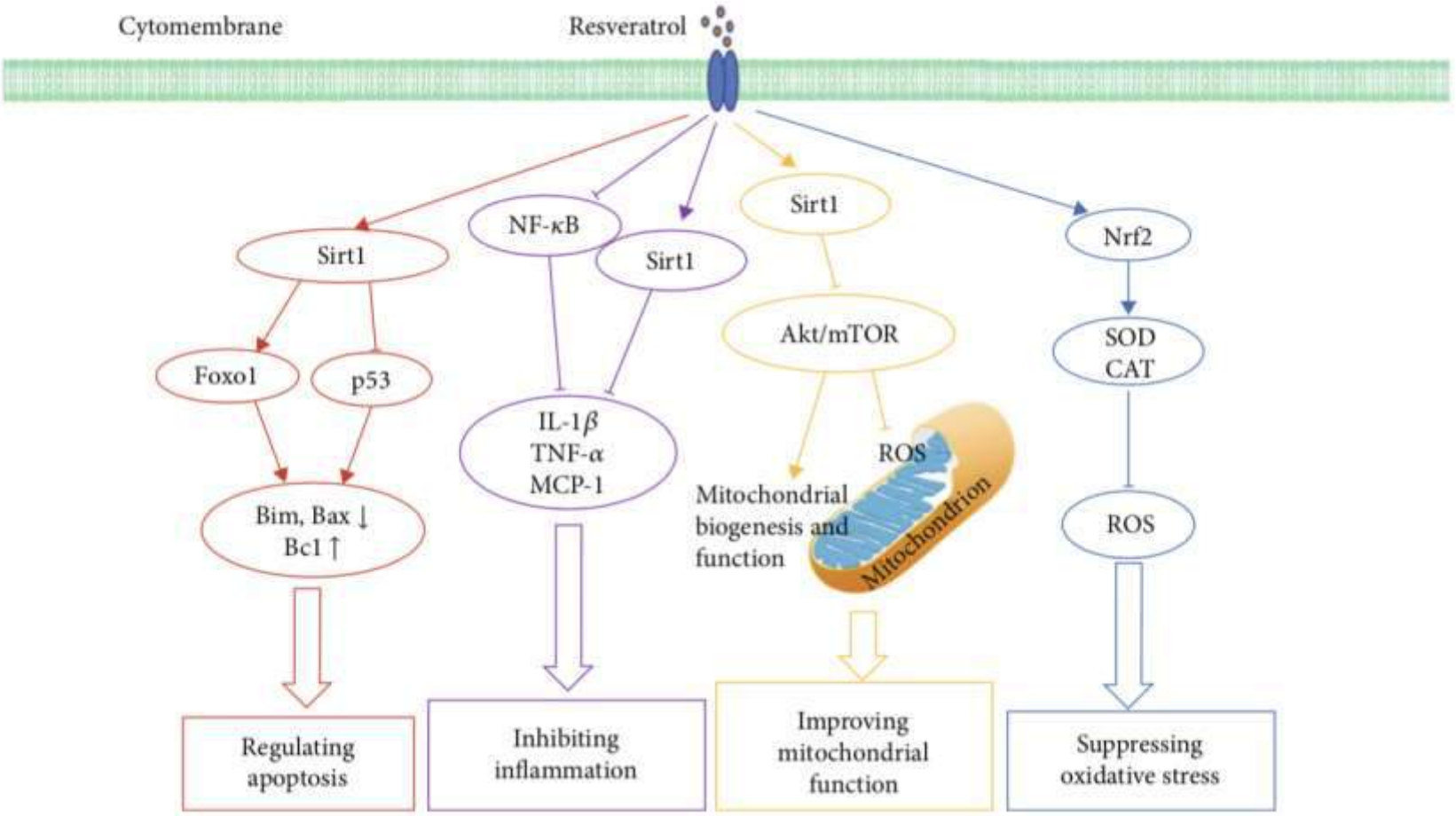
After 1% cholesterol diet + red wine for 12 weeks

After1% cholesterol diet + non alcoholic wine products (NAWP) for 12 weeks





The mechanisms of resveratrol against aging.



Oxidative Medicine and Cellular Longevity Volume 2021, Article ID 9932218,

Biomedicine & Pharmacotherapy 125 (2020) 109767

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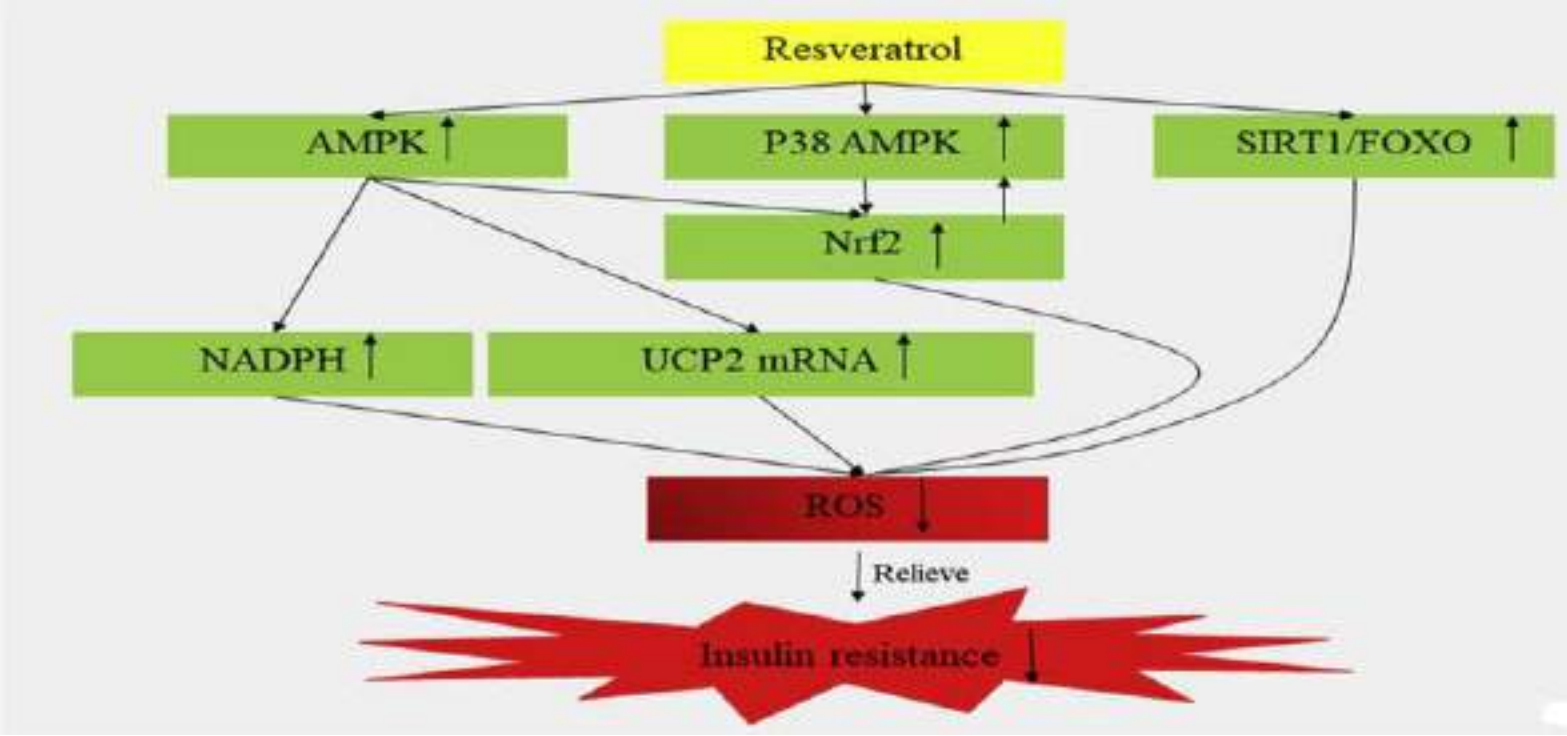
journal homepage: www.elsevier.com/locate/biopha

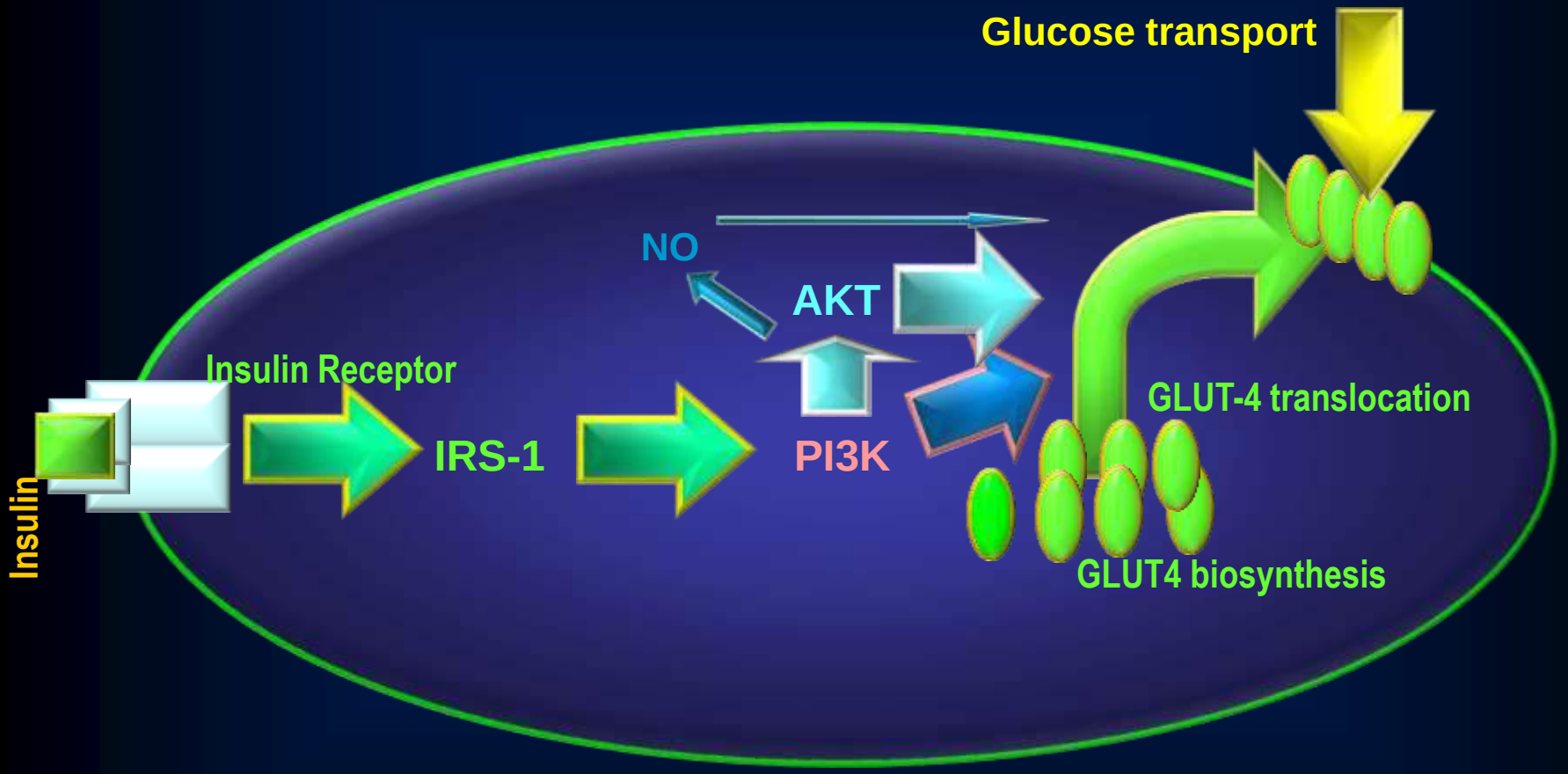
Review

A review on the potential of Resveratrol in prevention and therapy of diabetes and diabetic complications

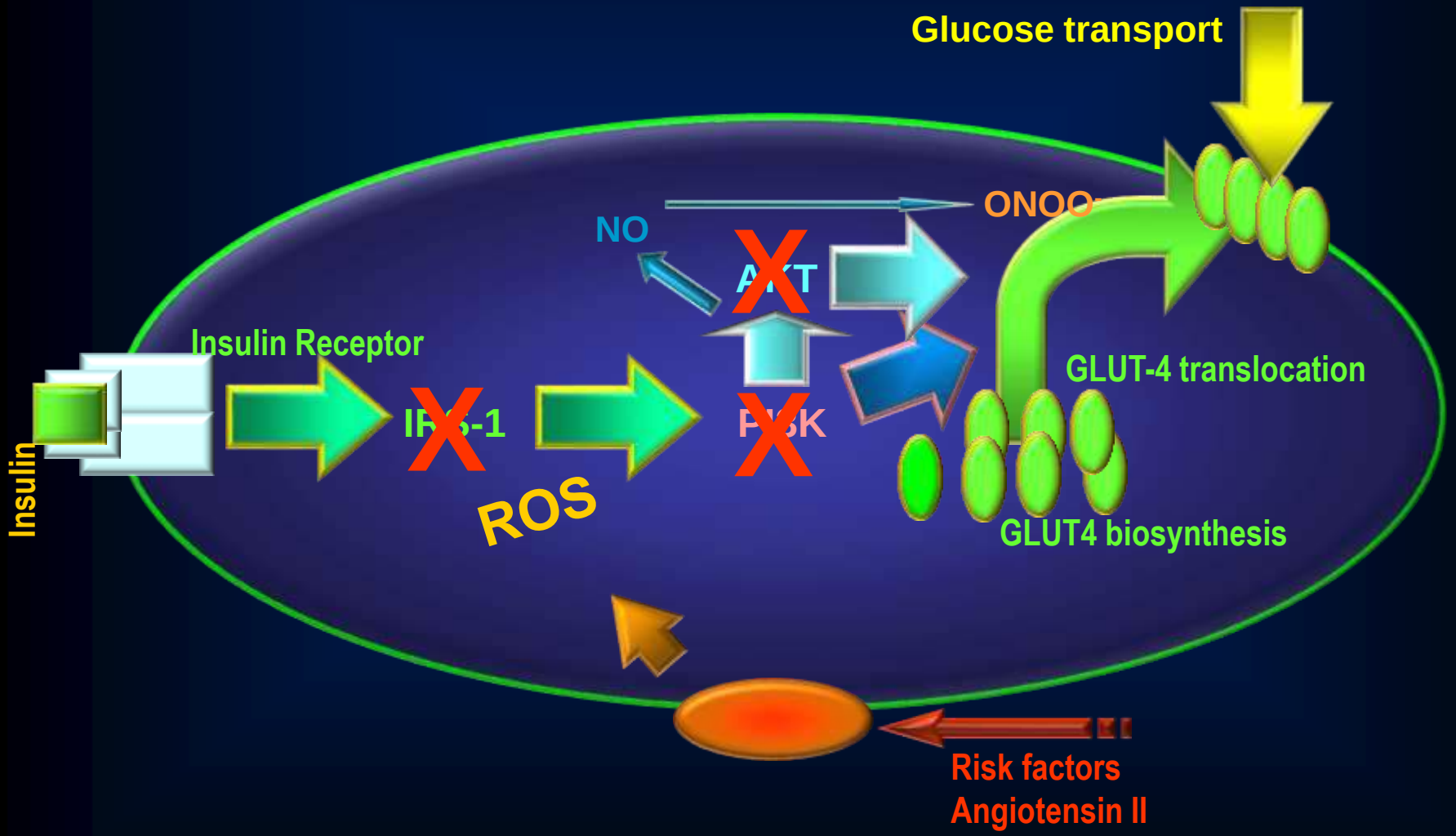
Dan-Dan Huang[a], Guangjiang Shi[a], Yaping Jiang[c], Chao Yao[b], Chuanlin Zhu[d,*]



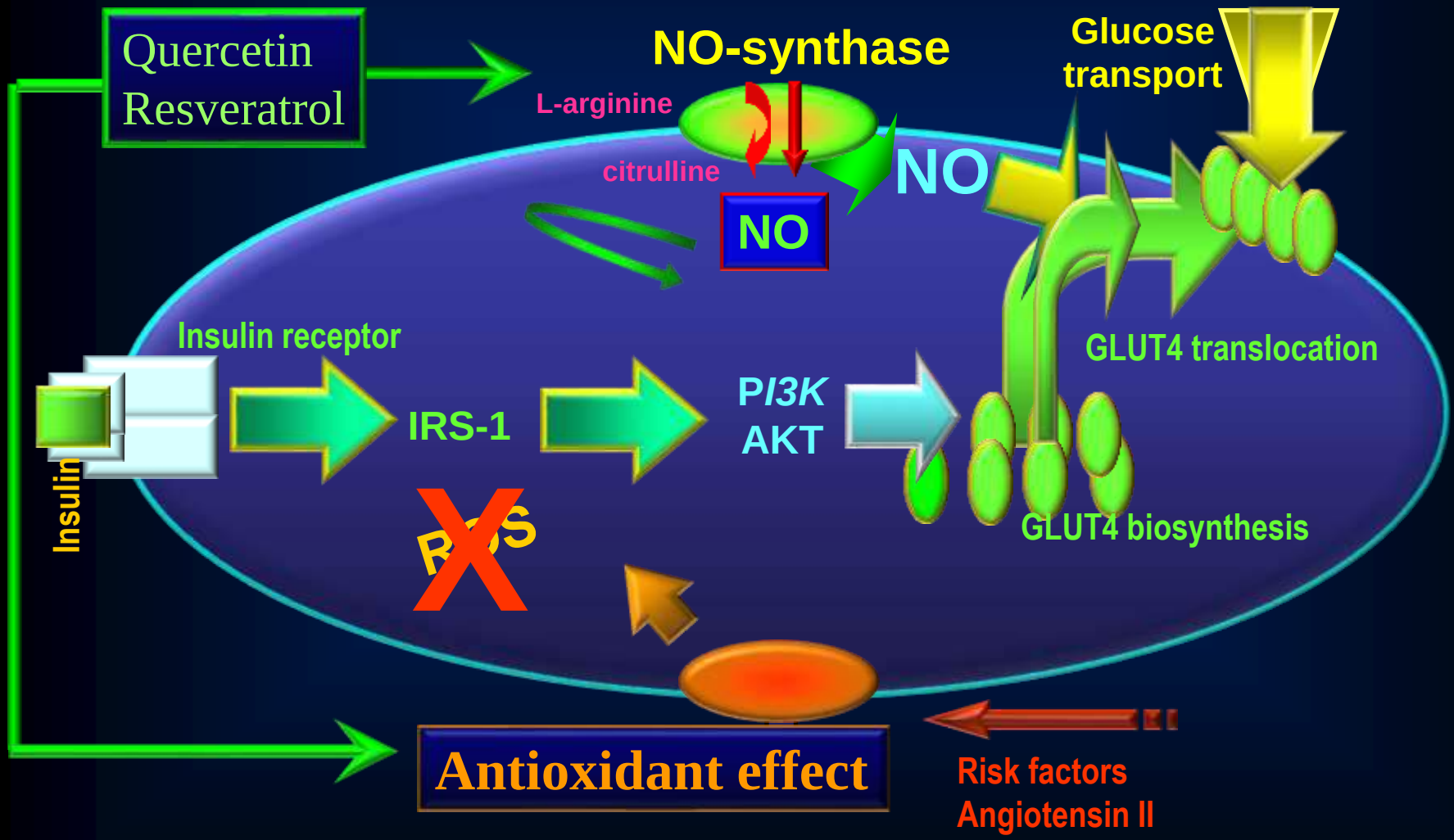
Insulin regulation of glucose uptake:
complexity of the intracellular signalling pathway



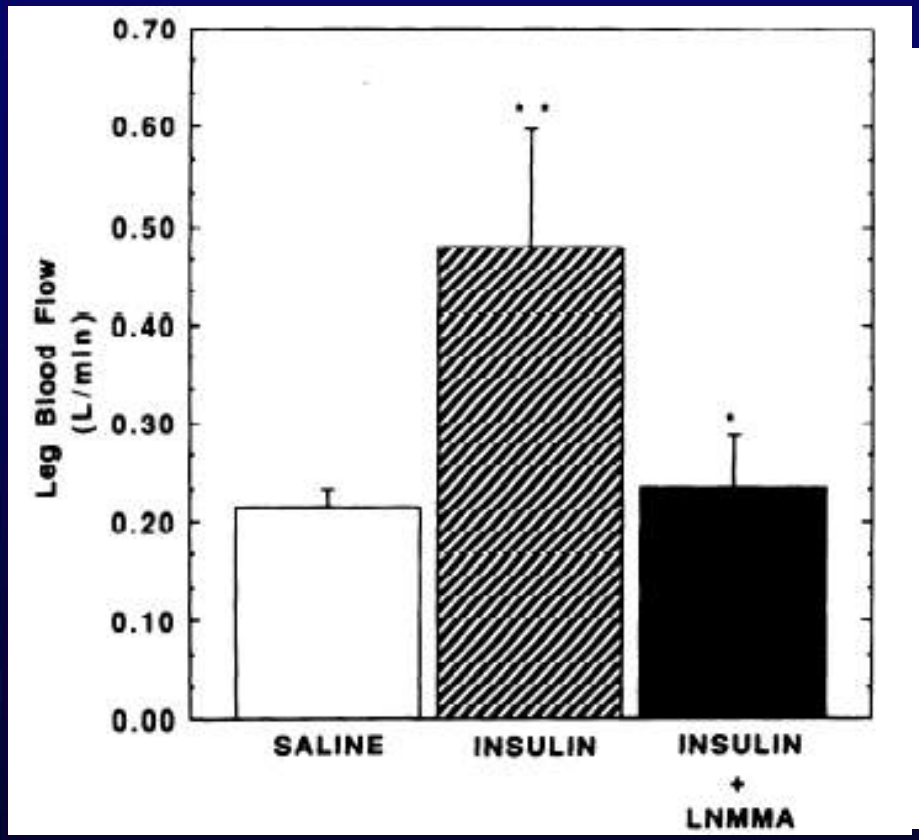
Insulin regulation of glucose uptake:
Detrimental role of cardiovascular risk factors



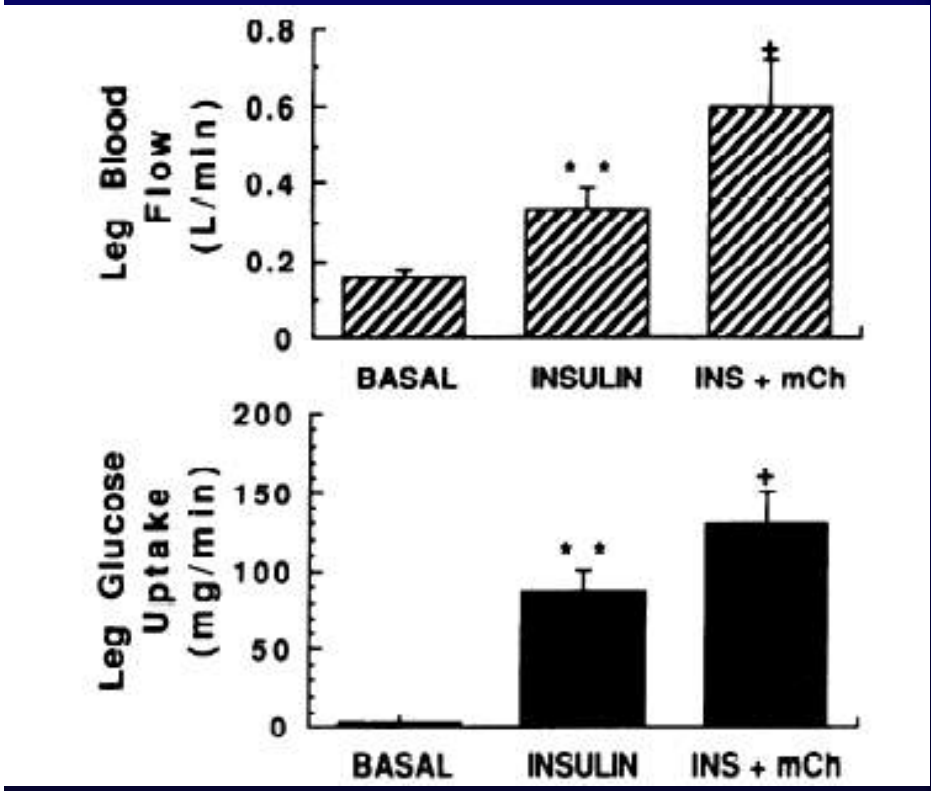
Insulin regulation of glucose uptake: possible actions of flavanols (a subgroup of flavonoids)



Insulin responsiveness is dependent upon insulin-mediated vasodilation. Defective vasodilation could account for -2O-30% of the decrement in insulin action (insulin resistance) When leg blood flow was increased during euglycemic hyperinsulinemia - 40% of leg blood flow was NO- dependent.



Baron et al. J Clin Invest. 1995;96(2):786-92.



0163-769X/07/$20.00/0
Printed in U.S.A.

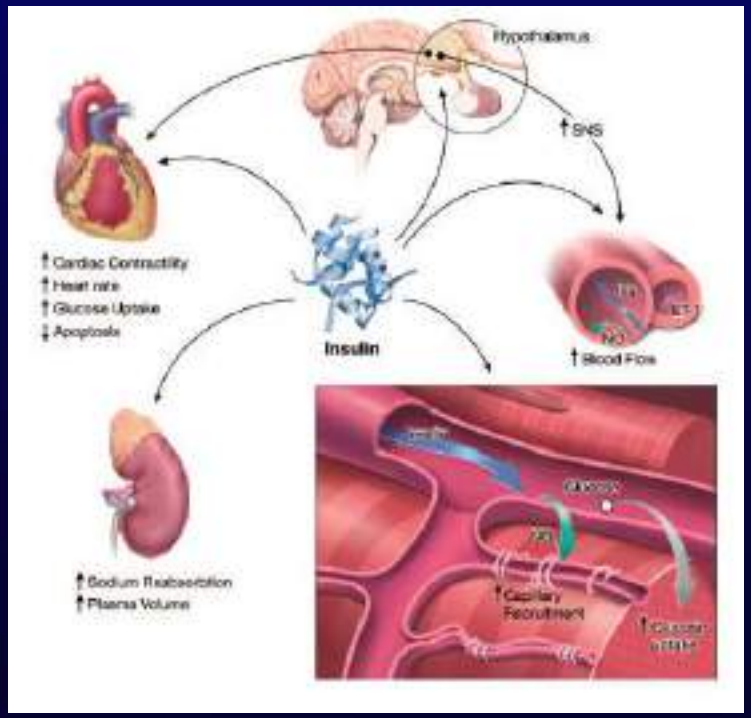
Endocrine Reviews 28(5):463–491

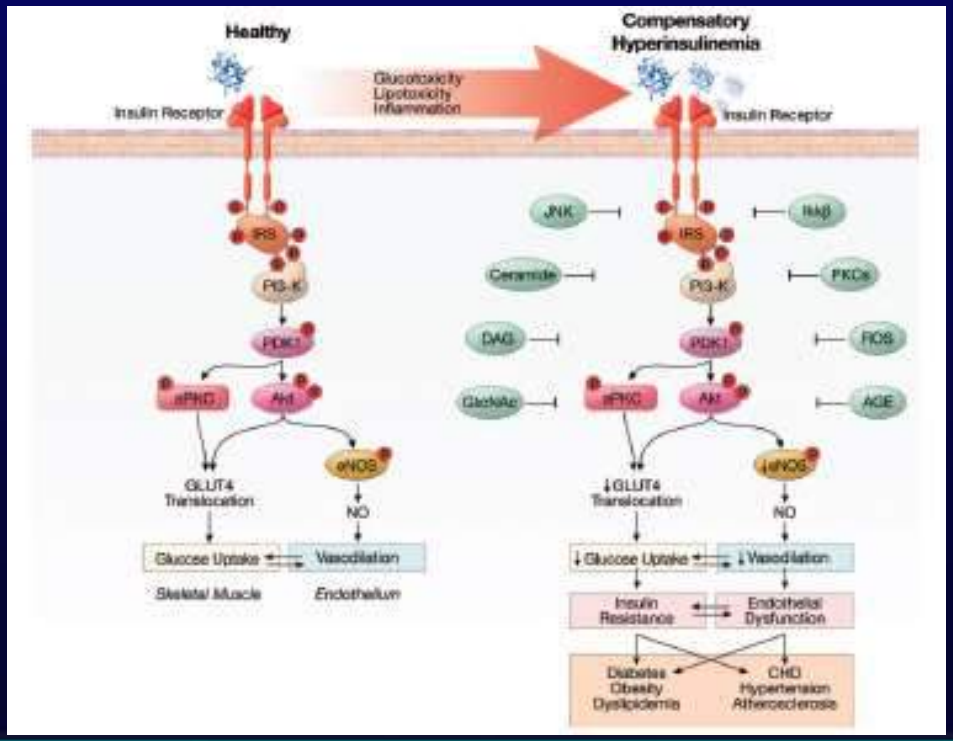
doi: 10.1210/er.2007-0006

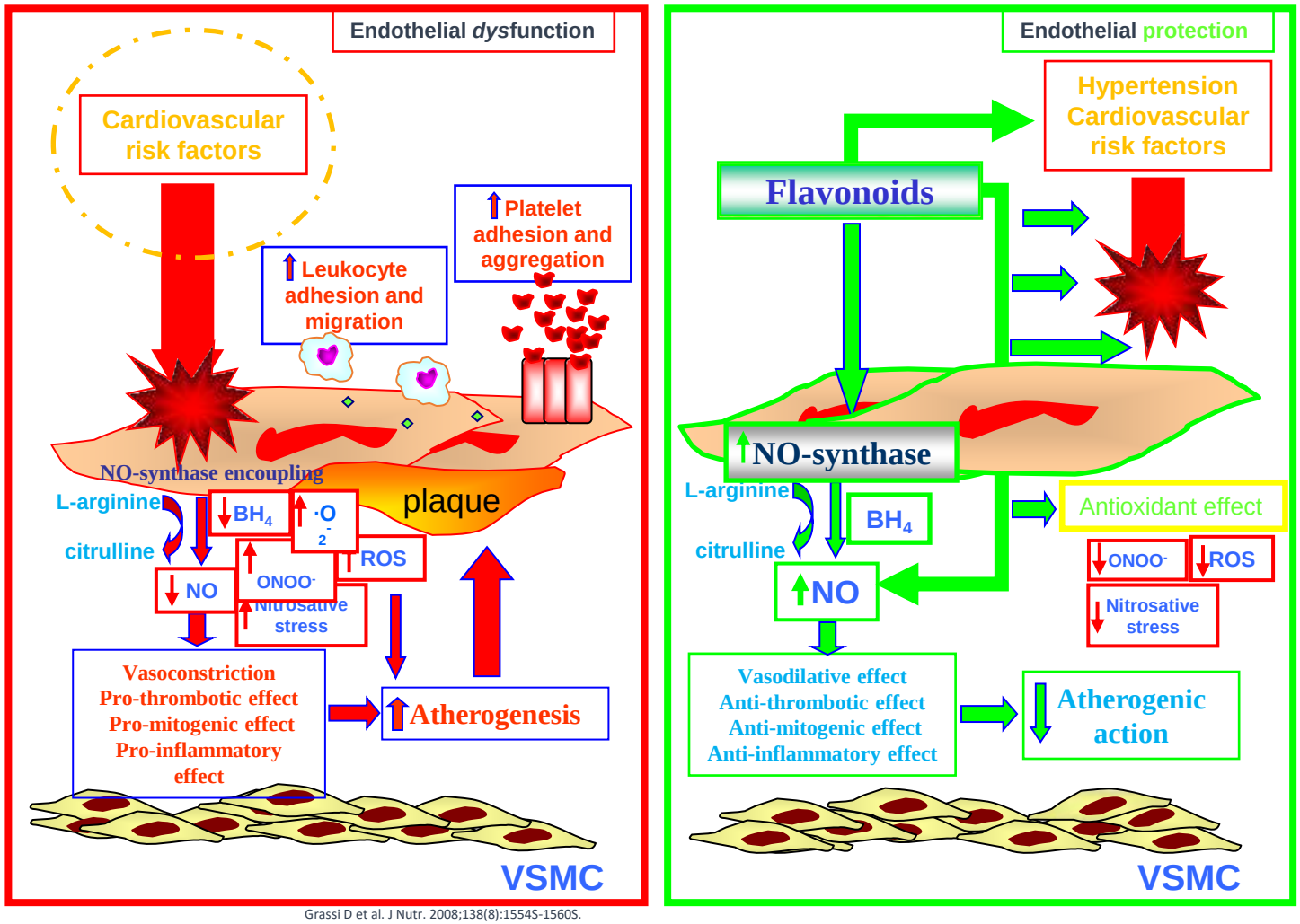
Cardiovascular Actions of Insulin

Ranganath Muniyappa, Monica Montagnani, Kwang Kon Koh, and Michael J. Quon

Diabetes Unit (R.M., M.J.Q.), National Center for Complementary and Alternative Medicine, National Institutes of Health, Bethesda, Maryland 20892; Department of Pharmacology and Human Physiology (M.M.), Section of Pharmacology, University of Bari Medical School, 70124 Bari, Italy; and Division of Cardiology (K.K.K.), Gil Heart Center, Gachon Medical School, Incheon 405760, Korea







Grassi D et al. J Nutr. 2008;138(8):1554S-1560S.

Flavanol effects on the cardiovascular system

POLYPHENOLS

Sirtuins

Blood pressure reduction

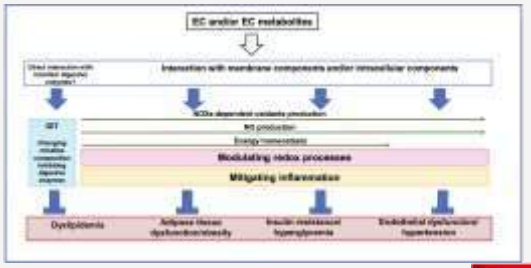
Anti-inflammatory effects

Antioxidant effects

Improvement of endothelial function

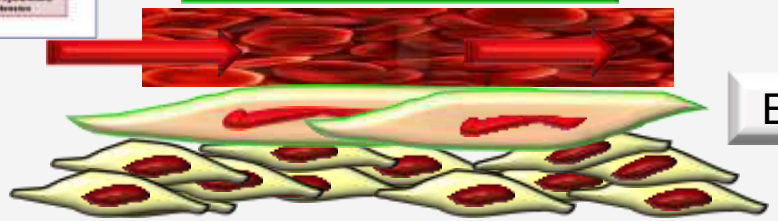
Reduced platelet reactivity

Enzymatic modulation



Vascular protection

Cognitive and physical performance



Modificato da Grassi D., Desideri G., Ferri C. Flavonoids: Antioxidants Against Atherosclerosis. *Nutrients*. 2010; 2(8):889-902.

High Blood Pressure & Cardiovascular Prevention
https://doi.org/10.1007/s40292-018-0266-6

POSITION PAPER

Nutrients and Nutraceuticals for the Management of High Normal Blood Pressure: An Evidence-Based Consensus Document

Arrigo F. G. Cicero[1] · Davide Grassi[2] · Giuliano Tocci[3,4] · Ferruccio Galletti[5] · Claudio Borghi[1] · Claudio Ferri[2]

Tea	IIA	A	2–6 cups	SBP: − 2 mmHg DBP: − 1.2 mmHg	↓ oxidized LDL; ↓ NADH; ↓ insulin resistance; ↓ hsPCR	↑ FMD
Karkadè tea	IIA	A	2–6 cups	SBP: − 7.5 mmHg DBP: − 3.5 mmHg	Not known	Not known
Beetroot juice/ NO donors	IIa	A	70–500 ml	SBP: − 3.5 mm Hg DBP: −1.3 mm Hg	↓ hsCRP, ↓ TNF alpha, ↓ VCAM-1 and other adhesion molecules	↑ FMD
Cocoa flavonoids	IIb	A	200 mg	SBP: − 2 mmHg	↓ TG, ↑ HDL-C, ↓ Fasting insulin, ↓ HOMA index, ↓ hsCRP, ↓ VCAM-1	↑ FMD
Pomegranate juice	IIb	A	240 ml	SBP: − 5 mmHg DBP: − 2 mmHg	↓ ACE activity, ↓ NFκ-B pathway	↑ FMD
Non roasted green coffee	IIb	B	40 mg	SBP: − 2.6 mmHg DBP: − 3.1 mmHg	↓ cortisol levels; ↓ insulin resistance	Not clear
Sesame seeds	IIB	C	60 gr (sesamin)	SBP: − 4 mmHg DBP: − 2 mmHg	↓ oxidative stress biomarkers (malondialdehyde), ↓ TG	Not investigated

Hypertension. 2020;75:1334-1357.

Clinical Practice Guidelines

2020 International Society of Hypertension Global Hypertension Practice Guidelines

Thomas Unger, Claudio Borghi, Fadi Charchar, Nadia A. Khan, Neil R. Poulter, Dorairaj Prabhakaran, Agustin Ramirez, Markus Schlaich, George S. Stergiou, Maciej Tomaszewski, Richard D. Wainford, Bryan Williams, Aletta E. Schutte

Lifestyle Modifications

Salt reduction	There is strong evidence for a relationship between high salt intake and increased blood pressure.[47] Reduce salt added when preparing foods, and at the table. Avoid or limit consumption of high salt foods such as soy sauce, fast foods and processed food including breads and cereals high in salt.
Healthy diet	Eating a diet that is rich in whole grains, fruits, vegetables, polyunsaturated fats and dairy products and reducing food high in sugar, saturated fat and trans fats, such as the DASH diet (http://www.dashforhealth.com).[48] Increase intake of vegetables high in nitrates known to reduce BP, such as leafy vegetables and beetroot. Other beneficial foods and nutrients include those high in magnesium, calcium and potassium such as avocados, nuts, seeds, legumes and tofu.[49]
Healthy drinks	Moderate consumption of coffee, green and black tea.[50] Other beverages that can be beneficial include karkadé (hibiscus) tea, pomegranate juice, beetroot juice and cocoa.[49]
Moderation of alcohol consumption	Positive linear association exists between alcohol consumption, blood pressure, the prevalence of hypertension, and CVD risk.[51] The recommended daily limit for alcohol consumptions is 2 standard drinks for men and 1.5 for women (10 g alcohol/standard drink). Avoid binge drinking.
Weight reduction	Body weight control is indicated to avoid obesity. Particularly abdominal obesity should be managed. Ethnic-specific cut-offs for BMI and waist circumference should be used.[52] Alternatively, a waist-to-height ratio <0.5 is recommended for all populations.[53,54]
Smoking cessation	Smoking is a major risk factor for CVD, COPD and cancer. Smoking cessation and referral to smoking cessation programs are advised.[55]
Regular physical activity	Studies suggest that regular aerobic and resistance exercise may be beneficial for both the prevention and treatment of hypertension.[56–58] Moderate intensity aerobic exercise (walking, jogging, cycling, yoga, or swimming) for 30 minutes on 5–7 days per week or HIIT (high intensity interval training) which involves alternating short bursts of intense activity with subsequent recovery periods of lighter activity. Strength training also can help reduce blood pressure. Performance of resistance/strength exercises on 2–3 days per week.
Reduce stress and induce mindfulness	Chronic stress has been associated to high blood pressure later in life.[59] Although more research is needed to determine the effects of chronic stress on blood pressure, randomized clinical trials examining the effects of transcendental meditation/mindfulness on blood pressure suggest that this practice lowers blood pressure.[60] Stress should be reduced and mindfulness or meditation introduced into the daily routine.
Complementary, alternative or traditional medicines	Large proportions of hypertensive patients use complementary, alternative or traditional medicines (in regions such as Africa and China)[61,62] yet large-scale and appropriate clinical trials are required to evaluate the efficacy and safety of these medicines. Thus, use of such treatment is not yet supported.
Reduce exposure to air pollution and cold temperature	Evidence from studies support a negative effect of air pollution on blood pressure in the long-term.[63,64]

https://doi.org/10.1007/s00424-021-02640-0

INVITED REVIEW

(−)-Epicatechin and cardiometabolic risk factors: a focus on potential mechanisms of action

Ezequiel J. Hid[1,2] · Juana I. Mosele[1,2] · Paula D. Prince[1,2] · Cesar G. Fraga[1,2,3] · Monica Galleano[1,2]

Subjects/patients	EC treatment (dose, length)	Relevant outcomes associated with EC treatment	Ref
Hypertriglyceridemic	100 mg/d, 4 w	↓ plasma TG, TG/HDL, high-sensitivity CRP, ↓ body temperature, ↓ glycemia (dysglycemic), = BP	[48]
(Pre)-hypertensive	100 mg/d, 4 w	= FMD, BP, arterial stiffness, NO, ET1, blood lipid profile and glycemia, ↑ fasting plasma insulin, insulin resistance	[26]
(Pre)-hypertensive	100 mg/d, 4 w	↓ soluble E-selectin, = soluble ICAM1, soluble VCAM1, von Willebrand factor, MCP1, TNFα, CRP, serum amyloid A, IL1β, IL6, IL8	[25]
Healthy	130–20 mg/d[a], 4 w	↑ FMD, ↓ BP, total cholesterol	[95]
Healthy	1–2 mg/kg bw, 1–4 h	↑ FMD ↓peripheral artery tonometry, ↑ plasma nitroso species	[100]
Normal and overweight	1 mg/kg bw, 30 min	↑ fat oxidation, ↓ glycemia (overweight) and plasma TG	[47]
(Pre)-hypertensive	100 mg/d, 4 w	↓ glycemia, plasma insulin, HOMA, = BP ↑ gene sets involved in transcription and tubulin folding ↓ gene sets involved in inflammation, PPAR signaling and adipogenesis	[28]
Overweight-to-obese	0.33 mg/kg bw/d, 2 w	= BP, blood lipid profile, glycemia, serum insulin, HOMA	[58]
Healthy	3.3 mg/kg bw, 2 h (blood) -5 h (urine)	↑ plasma nitroso species and nitrites, urinary nitrates, ↓ plasma ET1, = F2-isoprostanes in plasma and urine	[65]

[a] plus 560 mg procyanidins

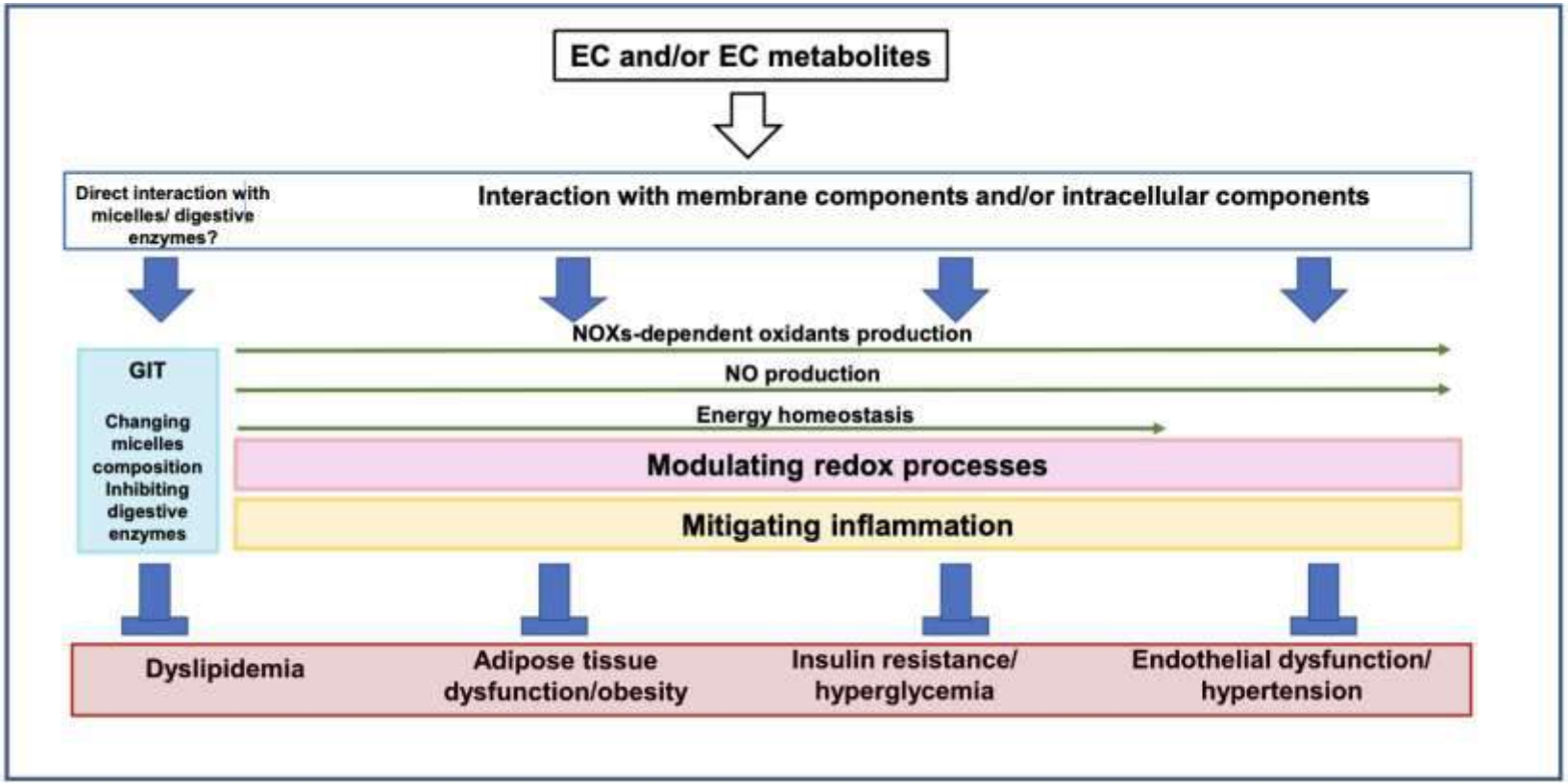
Human studies using pure EC

https://doi.org/10.1007/s00424-021-02640-0

INVITED REVIEW

(−)-Epicatechin and cardiometabolic risk factors: a focus on potential mechanisms of action

Ezequiel J. Hid[1,2] · Juana I. Mosele[1,2] · Paula D. Prince[1,2] · Cesar G. Fraga[1,2,3] · Monica Galleano[1,2]



EATING LAB

Can chocolate be a health food? What to look for in your favorite candy.

By Marlene Cimons

February 13, 2024 at 7:30 a.m. EST

PERSPECTIVE

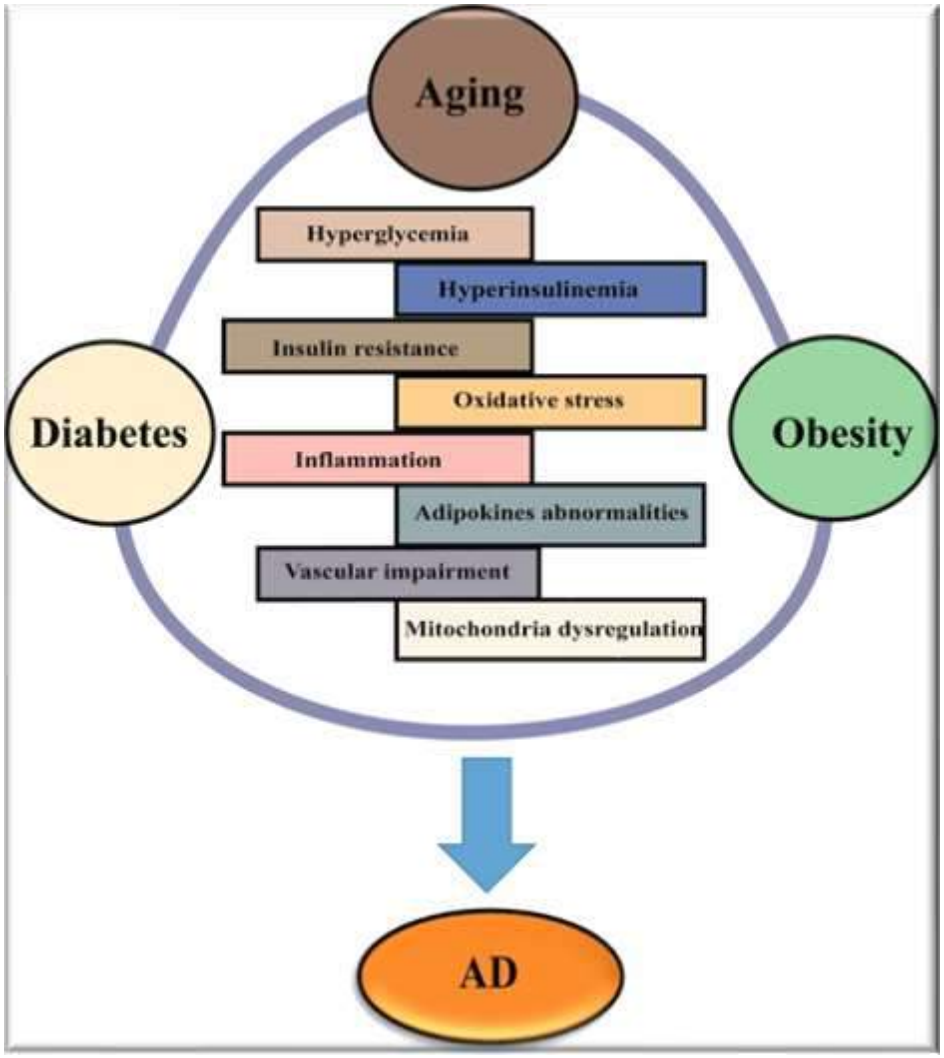
Perspective: Flavan-3-ols and Cardiometabolic Health: First Ever Dietary Bioactive Guideline

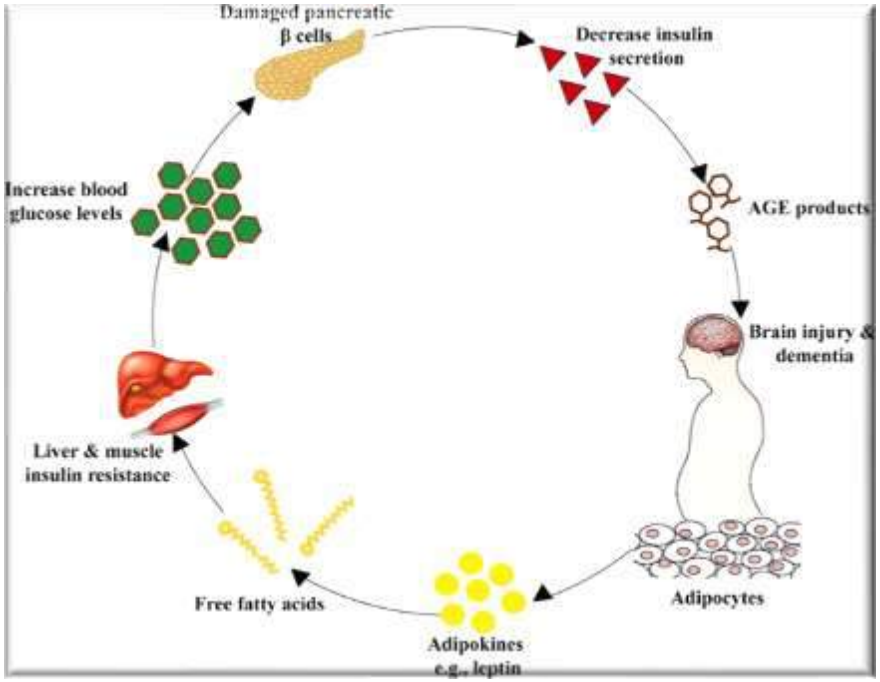
Kristi M Crowe-White,[1] Levi W Evans,[2] Gunter GC Kuhnle,[3] Dragan Milenkovic,[4] Kim Stote,[5] Taylor Wallace,[6,7] Deepa Handu,[8] and Katelyn E Senkus[1]

[1]Department of Human Nutrition, The University of Alabama, Tuscaloosa, AL, USA; [2]USDA-ARS, Western Human Nutrition Research Center, Davis, CA, USA; [3]Department of Food and Nutritional Sciences, University of Reading, Reading, United Kingdom; [4]Department of Nutrition, University of California Davis, Davis, CA, USA; [5]State University of New York, Empire State College, Saratoga Springs, NY, USA; [6]Department of Nutrition and Food Studies, George Mason University, Washington, DC, USA; [7]Produce for Better Health Foundation, Washington, DC, USA.; and [8]Academy of Nutrition and Dietetics, Chicago, IL, USA

ABSTRACT

Guideline recommendation for a plant bioactive such as flavan-3-ols is a departure from previous recommendations because it is not based on deficiencies but rather improvement in health outcomes. Nevertheless, there is a rapidly growing body of clinical data reflecting benefits of flavan-3-ol intake that outweigh potential harms. Thus, the objective of the Expert Panel was to develop an intake recommendation for flavan-3-ols and cardiometabolic outcomes to inform multiple stakeholders including clinicians, policymakers, public health entities, and consumers. Guideline development followed the process set forth by the Academy of Nutrition and Dietetics, which includes use of the Evidence to Decision Framework. Studies informing this guideline (157 randomized controlled trials and 15 cohort studies) were previously reviewed in a recently published systematic review and meta-analysis. Quality and strength-of-evidence along with risk-of-bias in reporting was reviewed. In drafting the guideline, data assessments and opinions by authoritative scientific bodies providing guidance on the safety of flavan-3-ols were considered. Moderate evidence supporting cardiometabolic protection resulting from flavan-3-ol intake in the range of 400–600 mg/d was supported in the literature. Further, increasing consumption of dietary flavan-3-ols can help improve blood pressure, cholesterol concentrations, and blood sugar. Strength of evidence was strongest for some biomarkers (i.e., systolic blood pressure, total cholesterol, HDL cholesterol, and insulin/glucose dynamics). It should be noted that this is a food-based guideline and not a recommendation for flavan-3-ol supplements. This guideline was based on beneficial effects observed across a range of disease biomarkers and endpoints. Although a comprehensive assessment of available data has been reviewed, evidence gaps identified herein can inform scientists in guiding future randomized clinical trials. *Adv Nutr* 2022;13:2070–2083.


Aging
Hyperglycemia
Hyperinsulinemia
Insulin resistance
Oxidative stress
Inflammation
Adipokines abnormalities
Vascular impairment
Mitochondria dysregulation
Diabetes
Obesity
AD


Damaged pancreatic β cells
Decrease insulin secretion
AGE products
Brain injury & dementia
Adipocytes
Adipokines e.g., leptin
Free fatty acids
Liver & muscle insulin resistance
Increase blood glucose levels

Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017