Pflanzeninhaltsstoffe – die neuen Vitamine

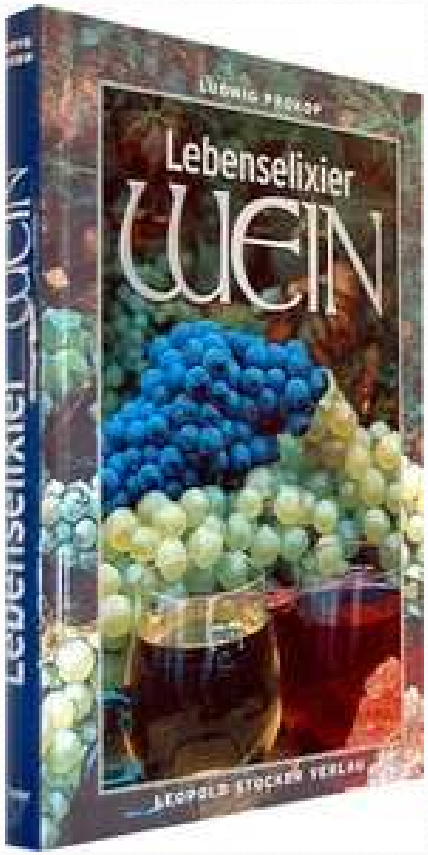
Prof. Dr. Markus M. Mekta

anno dazumal…

seit 1959

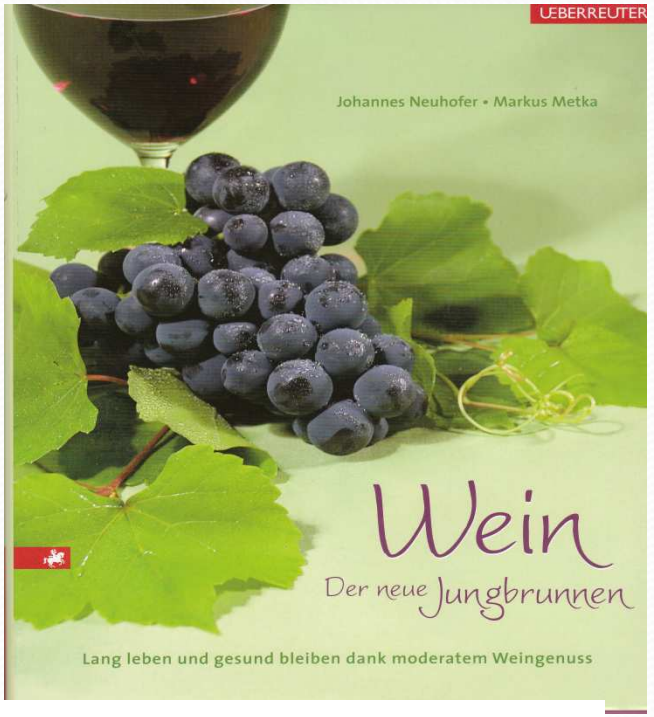
Inhaltsstoffe

VITAMINE	
Vitamin A	3.333 I.E.
Vitamin B_1	4,013 mg
Vitamin B_2	5,1 mg
Vitamin B_6	6 mg
Vitamin B_{12}	6 µg
Vitamin C	180 mg
Vitamin D_3	200 I.E.
Vitamin E	14,9 mg
Nicotinamid	57 mg
Folsäure	0,2 mg
Biotin	0,3 mg
Pantothensäure	21 mg
MINERALSTOFFE	
Eisen	3,6 mg
Kalzium	50 mg
Magnesium	40 mg
Phosphor	50 mg
SPURENELEMENTE	
Chrom	0,01 mg
Kupfer	0,4 mg
Mangan	0,5 mg
Zink	3 mg



1999

Heute

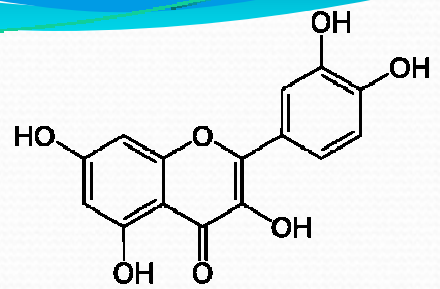


Impact of mitochondriotropic quercetin derivatives on mitochondria

Lucia Biasutto [a,b], Nicola Sassi [a], Andrea Mattarei [b], Ester Marotta [b], Paola Cattelan [c], Antonio Toninello [c], Spiridione Garbisa [a], Mario Zoratti [a,d,*], Cristina Paradisi [b]

[a] *Department of Biomedical Sciences, University of Padova, Padova, Italy*
[b] *Department of Chemical Sciences, University of Padova, Padova, Italy*
[c] *Department of Biological Chemistry, University of Padova, Padova, Italy*
[d] *CNR Institute of Neuroscience, Padova, Italy*

Polyphenole



Phenolsäuren: Ellagsäure, Ferulsäure, Gallusäure *(Tee, Kaffee, Früchte, Grünkohl, Weizenvollkorn)*

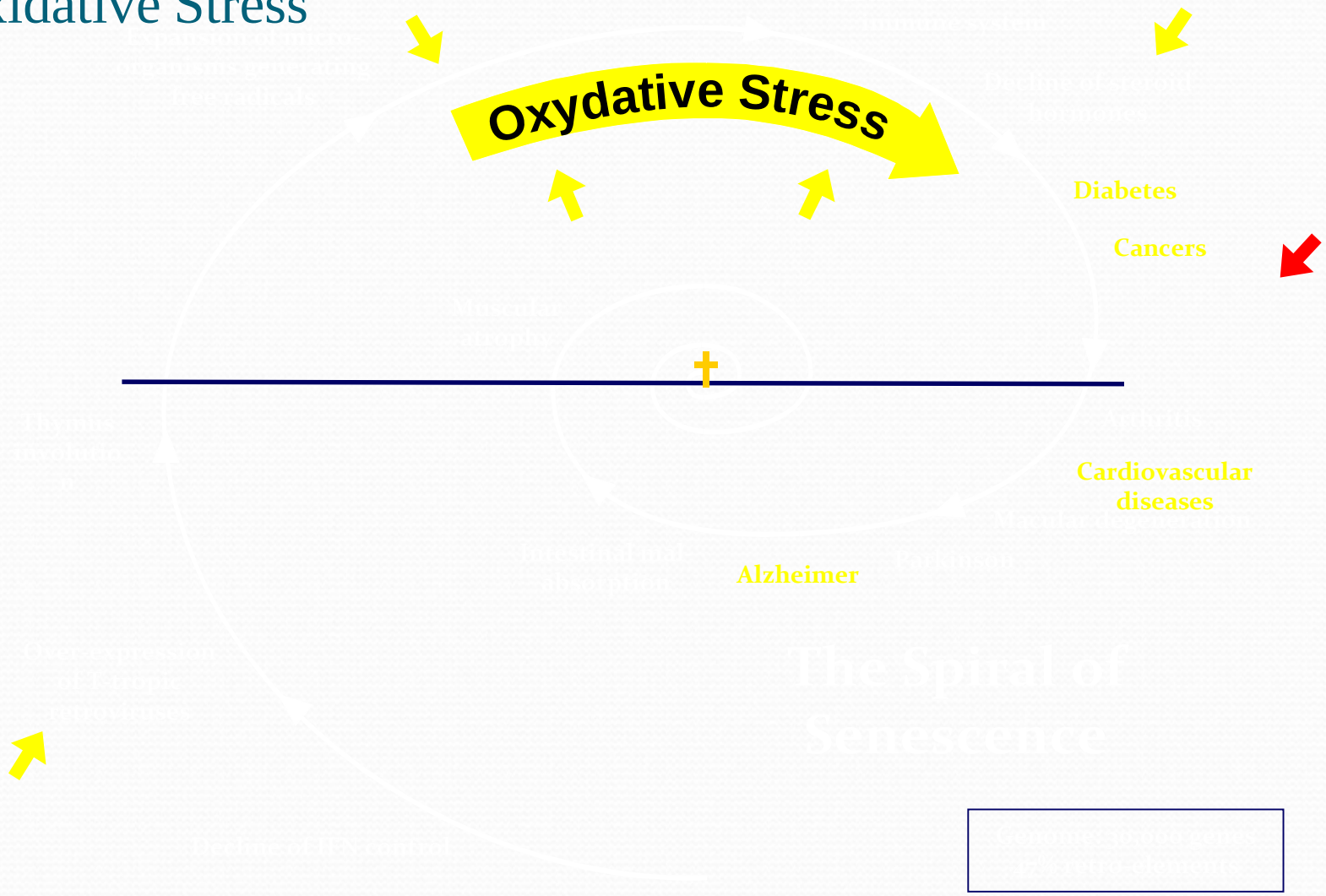
Flavonoide:

Anthocyane:	Malvidin, Cyanidin *(Beerenfrüchte, Steinobst)*
Flavanole:	Epicatechingallate *(Rotwein)*
	Epigallocatechin *(Grün und Schwarztee)*
Flavanone:	Naringin *(Grapefruit)*
	Herperidin *(Organe)*
Flavone:	Apigenin *(Sellerie)*
Flavonole:	Quercetin *(Apfel, Quitten, Zwiebeln)*
Isoflavonoide:	Genistein, Daidzein *(Sojabohnen, Rotklee)*

- Risk of inflammatory stress
- Risk of oxidative stress

Anti-inflammatory diet

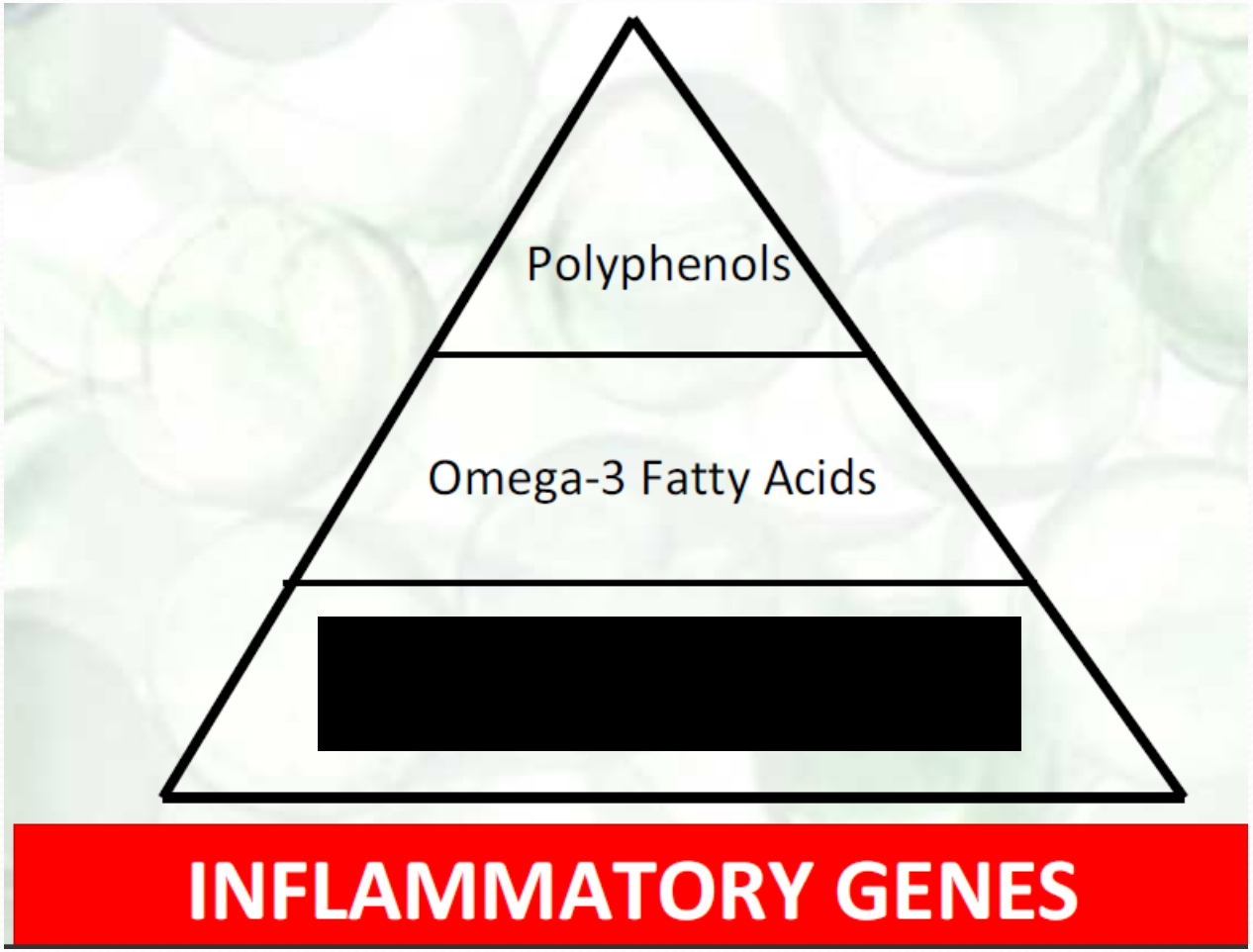
Oxidative Stress



Inflammatory Stress

Atherosclerosis - An Inflammatory Disease

(Russell Ross,
N Engl J Med 1999)


Polyphenols
Omega-3 Fatty Acids
INFLAMMATORY GENES

Outline

- Inflammation and obesity
- The Peroxisome-proliferator activated receptors (PPAR)
- Methodology to test anti-inflammatory compounds in food
- The PPAR dependent and PPAR indpendet anti-inflammatory food compounds
- Ellagic acid and reverse cholesterol transport
- Conclusions

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Inflammation

- During an inflammatory response, pro-inflammatory cytokines released:
  - interleukin IL-1,
  - tumor necrosis factor (TNF),
  - interferon (INF)-γ,
  - IL-6,
  - IL-12,
  - IL-18
  - granulocyte-macrophage colony-stimulating factor

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Anti-inflammatory response

- Anti-inflammatory cytokines
  - IL-4,
  - IL-10,
  - IL-13,
  - IFN-α
  - transforming growth factor.
- Nuclear factor-κB (NF-κB) transcription factor regulating the expression of various genes encoding
  - pro-inflammatory cytokines,
  - adhesion molecules,
  - chemokines,
  - growth factors,
  - cyclooxygenase 2 (COX-2)

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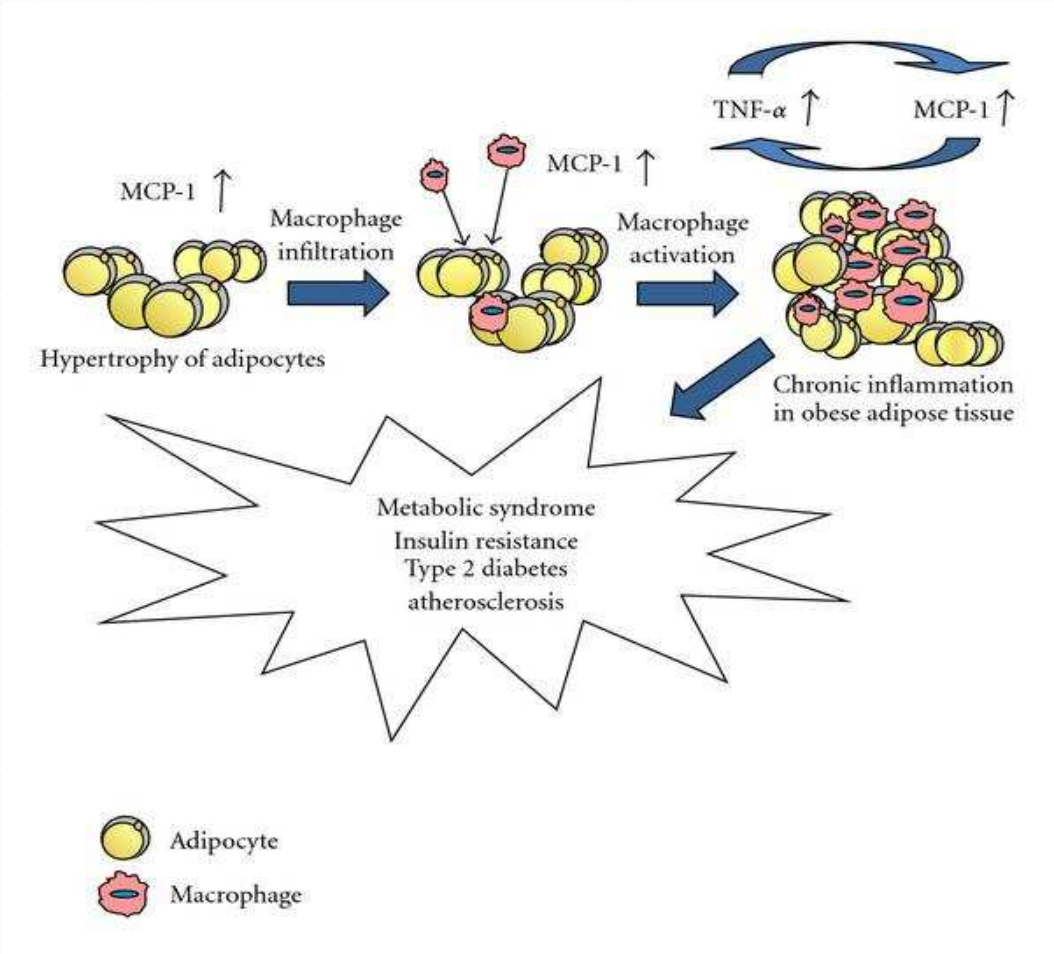
Inflammation and metabolic syndrome



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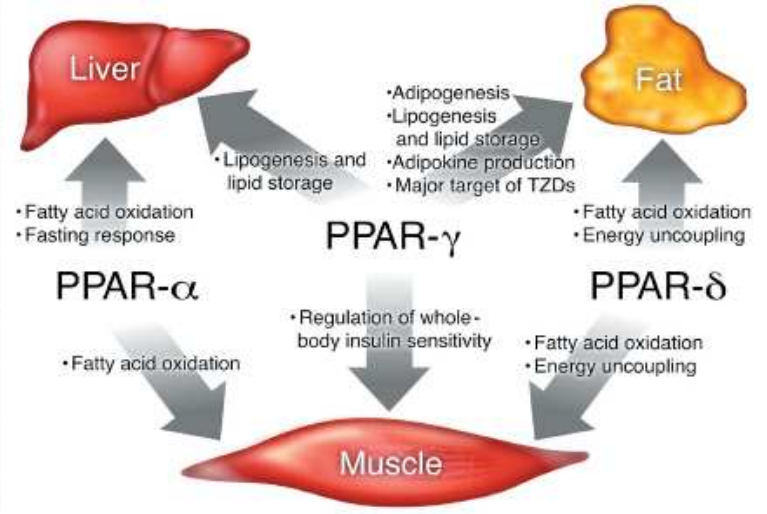
Peroxisome-proliferator activated receptors (PPARs)



Evans et al., Nat. Med. 2004

source: www.kc-pharma.com

source: www.bestdrugsnow.com

- PPARs are nuclear receptors
- PPAR γ: drug target for diabetes → glitazones
- PPAR α: drug target for dyslipidemia → fibrates
- PPAR β/δ: drug target for obesity

→ Treatment of risk factors individually: fibrates, glitazones, hypotensive drugs

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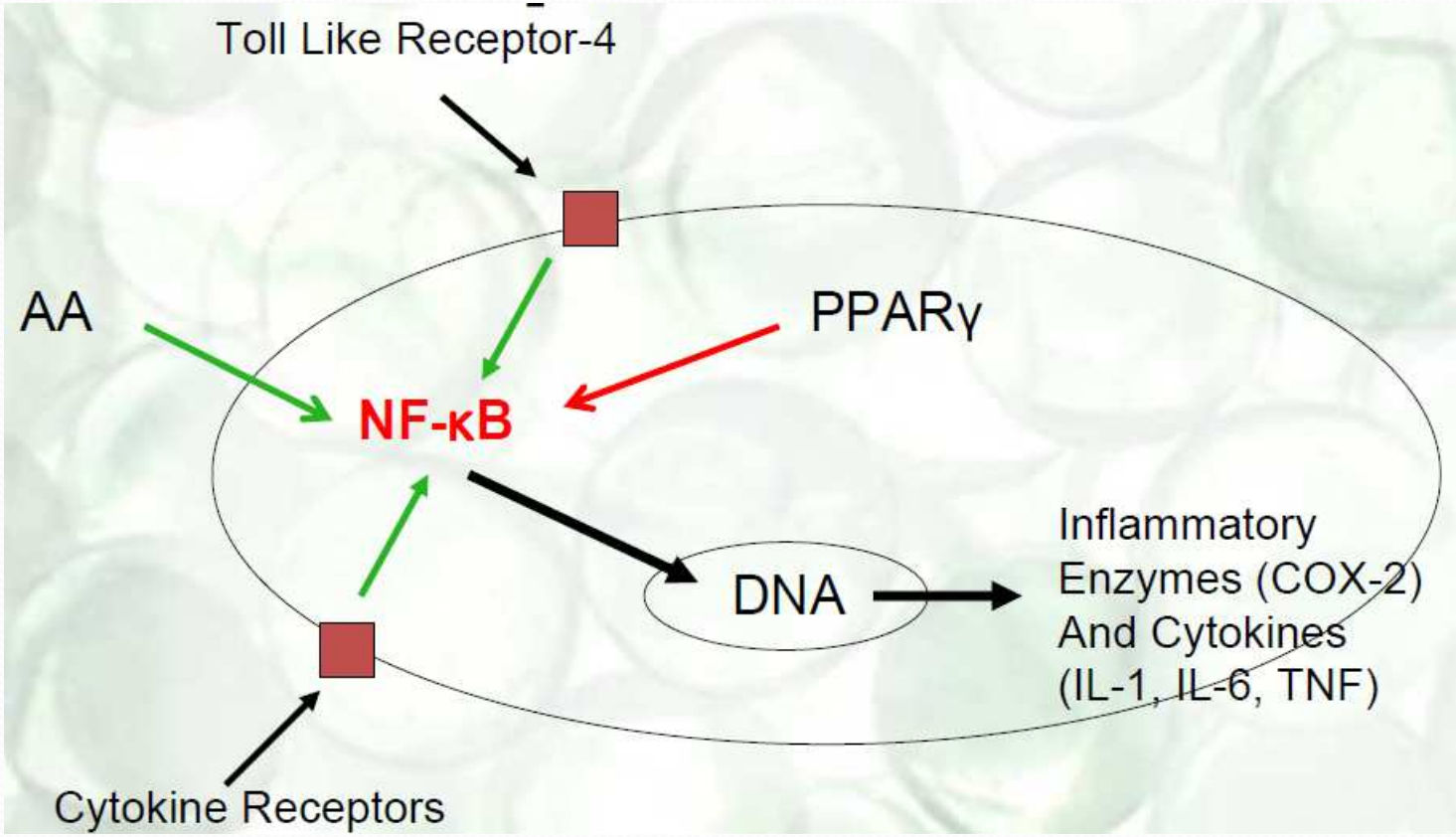
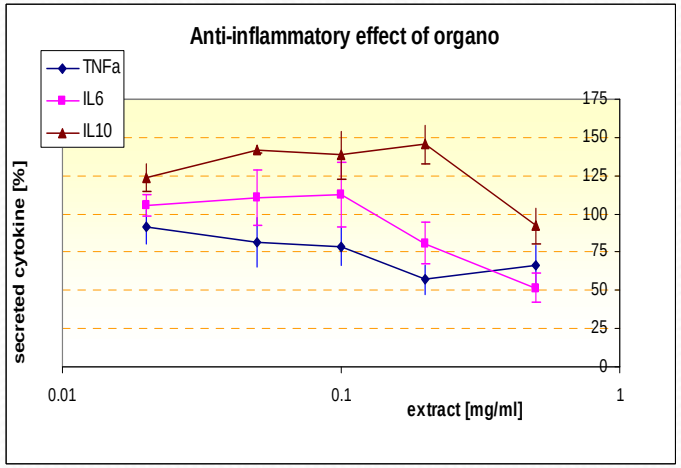
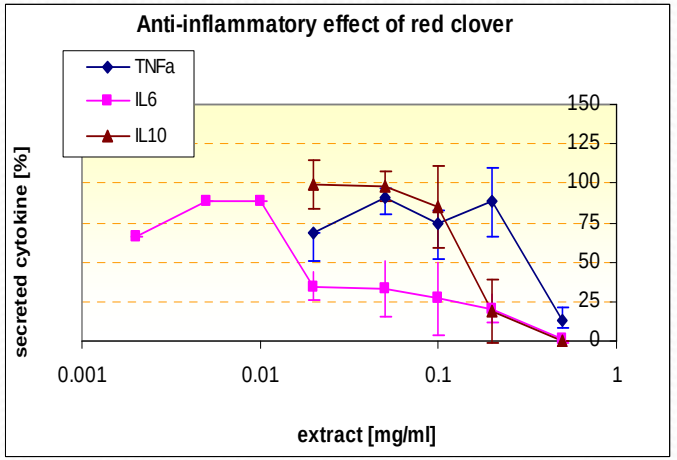
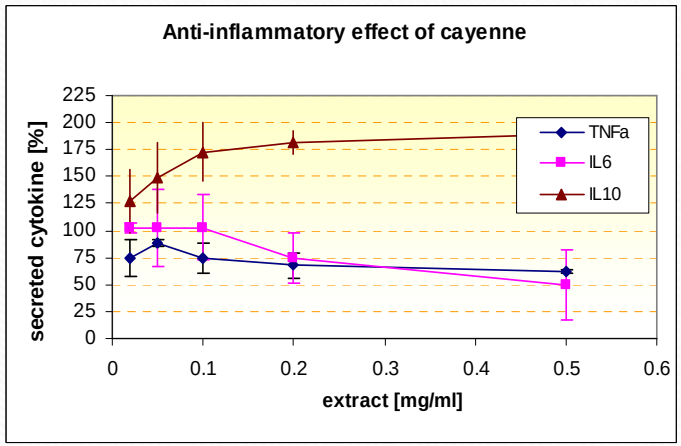
Diet-induced silent inflammation made simple

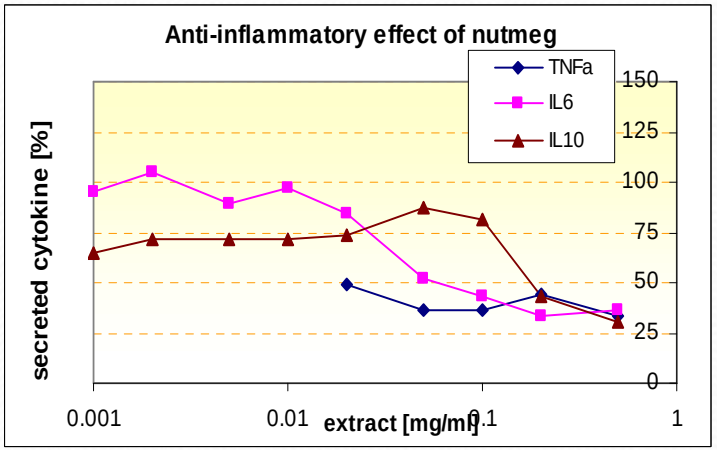


Anti-inflammatory activity of plant extracts









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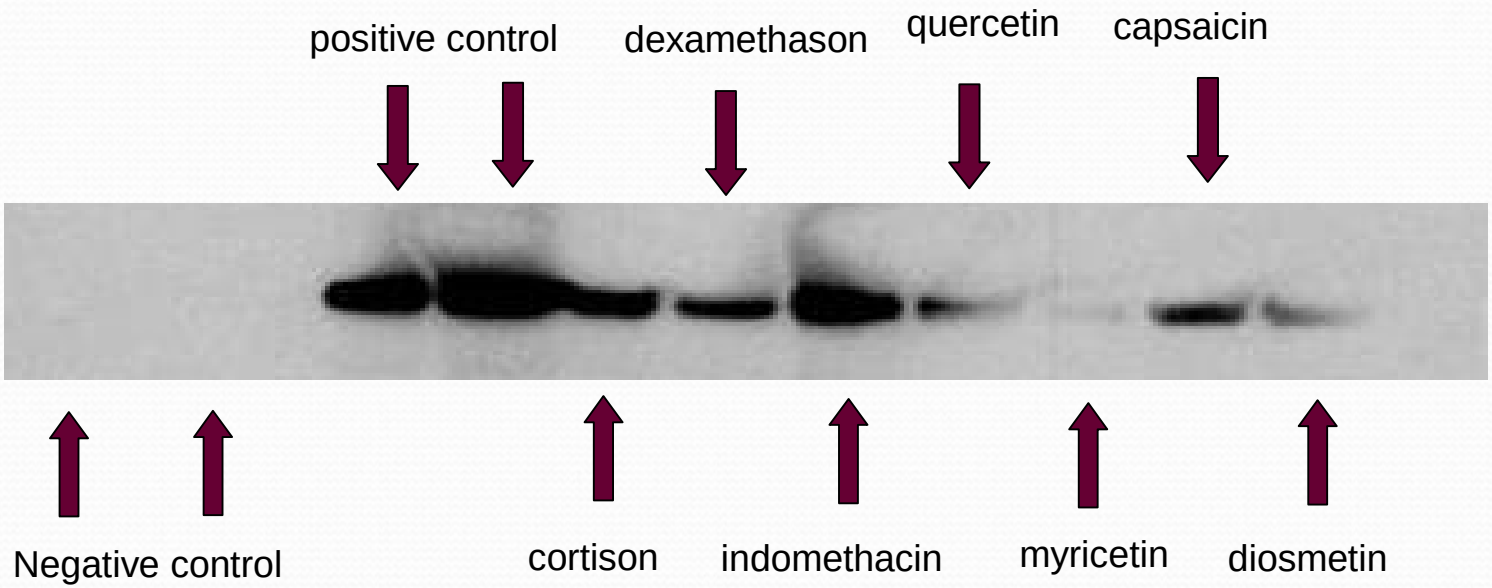
COX-2 induction



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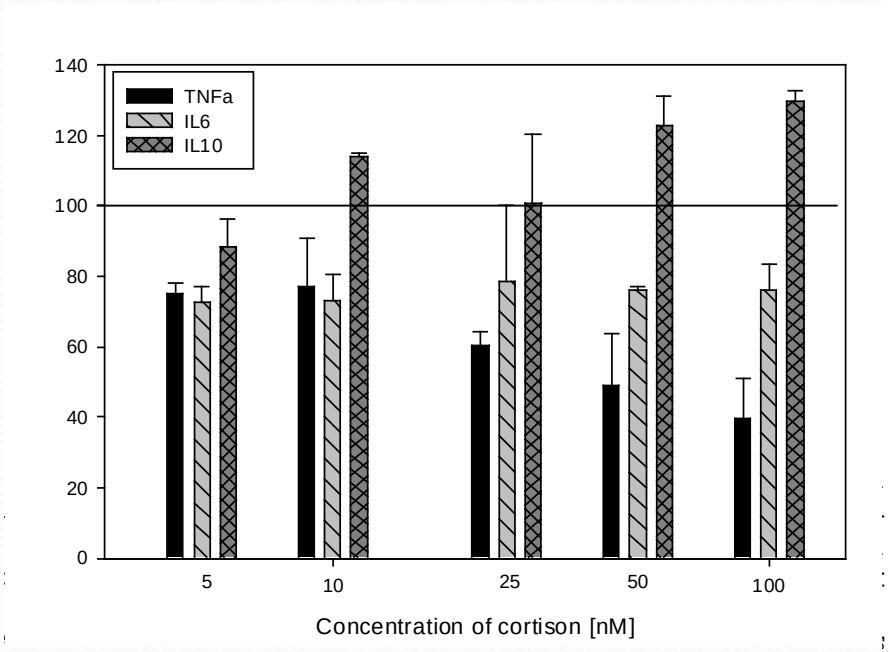
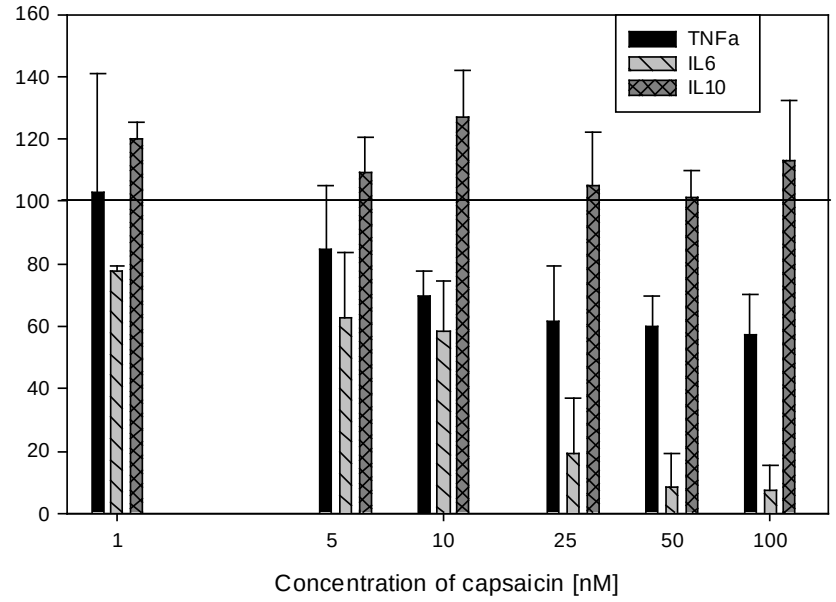
Capsaicin and cortison





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Plant Extract/ ratio of extraction (Standardization)	Species	Plant part	IL-6 [%]	TNF-α [%]	IL-10 [%]	COX-2 [%]	iNOS [%]
Allspice	*Pimenta officinalis*	fruit	59	166	129	132	24
			74	144	133		
Anise	*Pimpinella anisum*	fruit	109	120	59	85	92
			110	132	92		
Apple 2001 (65% quercetin, 30% phloridzin)	*Malus domestica* Borkh.	fruit	15	102	5	81	101
			32	89	10		
Basil	*Ocimum basilicum*	leaves	43	124	154	81	67
			55	102	136		
Bay leaves	*Laurus nobilis*	leaves	5	34	0	67	112
			19	85	0		

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Plant Extract/ ratio of extraction (Standardisation)	Species	Plant part	IL-6 (%)	TNF-α (%)	IL-10 (%)	COX-2 (%)	iNOS (%)
Ginseng (11% ginsenosides)	*Panax ginseng*	root	88 87	89 88	121 126	102	107
Green Coffee (45 % phenolic compounds)	*Coffea arabica*	seed	97 103	96 93	121 114	91	99
Holy basil (L.)	*Ocimum sanctum*	plant	15 25	109 112	37 85	123	43
Lemon grass	*Cymbopogon citratus*	leaves	101 99	151 105	111 105	115	66
Liquorice	*Glycyrrhiza glabra*	root	45 59	72 80	21 71	99	0
Marjoram	*Origanum majorana*	leaves	80 83	101 107	114 130	107	34
Nutmeg	*Myristica fragrans*	fruit	30 34	33 40	18 44	87	106
Oregano	*Origanum vulgare*	leaves	51 81	66 67	92 146	102	0
Paprika	*Capsicum annuum*	fruit	71 70	98 100	147 128	117	21
Rooibos tea	*Aspalathus linearis*	leaves	73 80	112 113	67 79	134	93

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Food Chemistry 122 (2010) 987–996

Contents lists available at ScienceDirect

Food Chemistry

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

Anti-inflammatory activity of extracts from fruits, herbs and spices

Monika Mueller, Stefanie Hobiger, Alois Jungbauer *

Christian Doppler Laboratory for Receptor Biotechnology, Department of Biotechnology, University of Natural Resources and Applied Life Sciences, Muthgasse 18, A-1190 Vienna, Austria

Food Chemistry 117 (2009) 660–667

Contents lists available at ScienceDirect

Food Chemistry

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

Culinary plants, herbs and spices – A rich source of PPARγ ligands

Monika Mueller, Alois Jungbauer *

Christian Doppler Laboratory for Receptor Biotechnology, Department of Biotechnology, University of Natural Resources and Applied Life Sciences, Muthgasse 18, A-1190 Vienna, Austria

Plants with high antiinflammatory activity

Chili pepper

Allspice

Basil

Bay leaves

Black pepper

Christian Doppler Forschungsgesellschaft

Plants with high antiinflammatory activity

Chili pepper

Allspice

Basil

Bay leaves

Black pepper

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Compounds with antiinflammatory activity

Compound	*Fruit/herb*	*PPAR*
Anthocyans	Red purplish fruit 	☒
Apigenin	Celery Chamomile 	☑
Capsaicin	Chilli 	☑ ☑ ☑
Chrysin	Passion flower 	☑
Diosmetin	Citrus peel 	☑

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Compounds with antiinflammatory activity

Compound	*Fruit/herb*	*PPAR*
Ellagic acid	Pomegranate Wine	☑
6-Gingerol	Ginger	☒
Isohumulone	Hop	☑
Kämpferol	Wine	☑
Luteolin,	Basil	☑ ☒





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Compounds with antiinflammatory activity

Compound	*Fruit/herb*	*PPAR*
Naringenin	Citrus peel Grapefruit 	☒
Quercetin	Apple, onion broccoli 	☒
Resveratrol	Wine, peanuts 	☒

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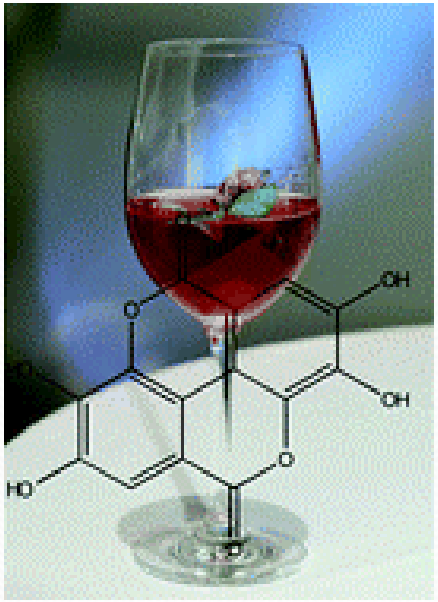
PAPER www.rsc.org/foodfunction | Food & Function

Red wine: A source of potent ligands for peroxisome proliferator-activated receptor γ

Alfred Zoechling,[ab] Falk Liebner[c] and Alois Jungbauer*[ab]

Received 19th July 2010, Accepted 21st October 2010
DOI: 10.1039/c0fo00086h



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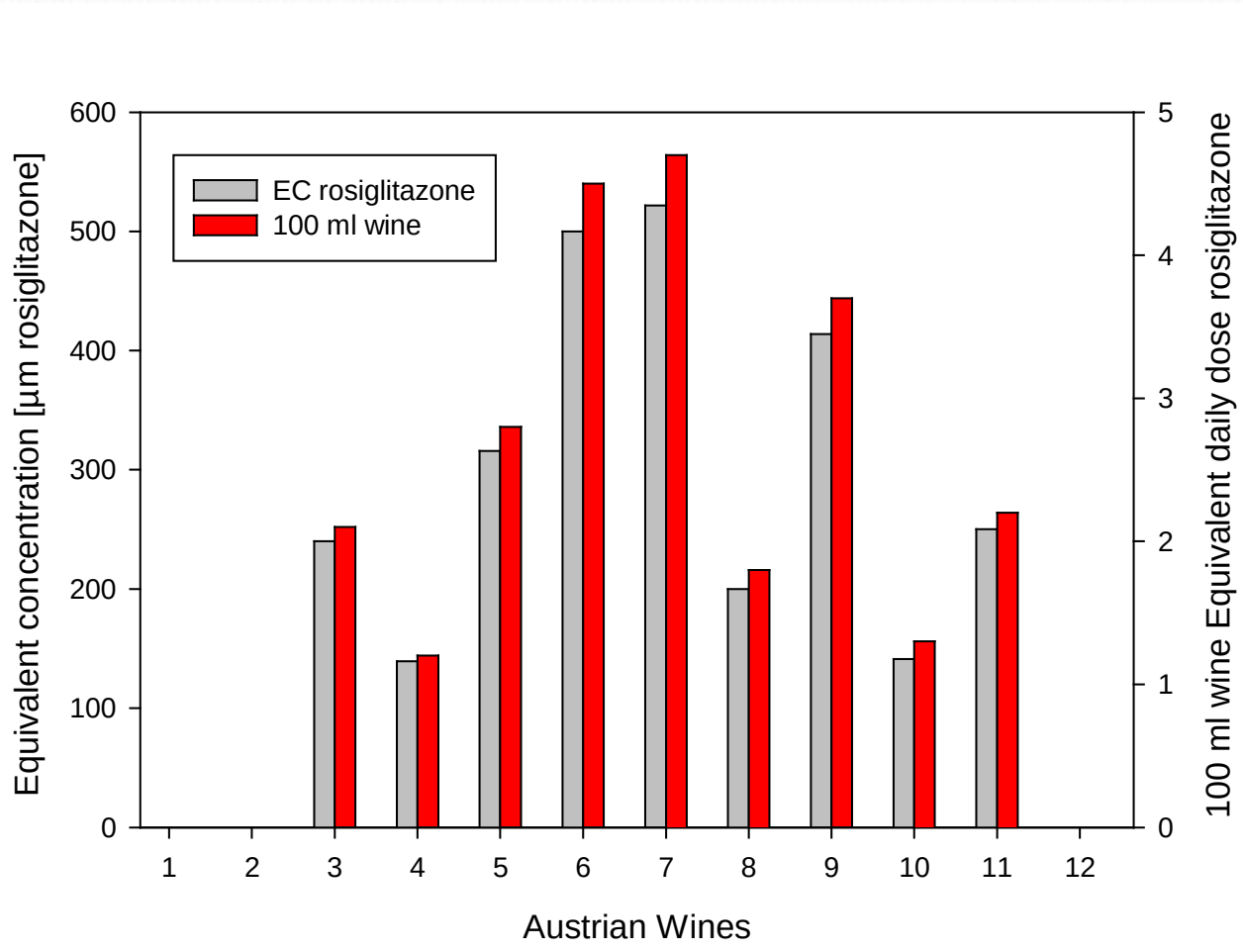
PPAR γ activity in 100 ml wine



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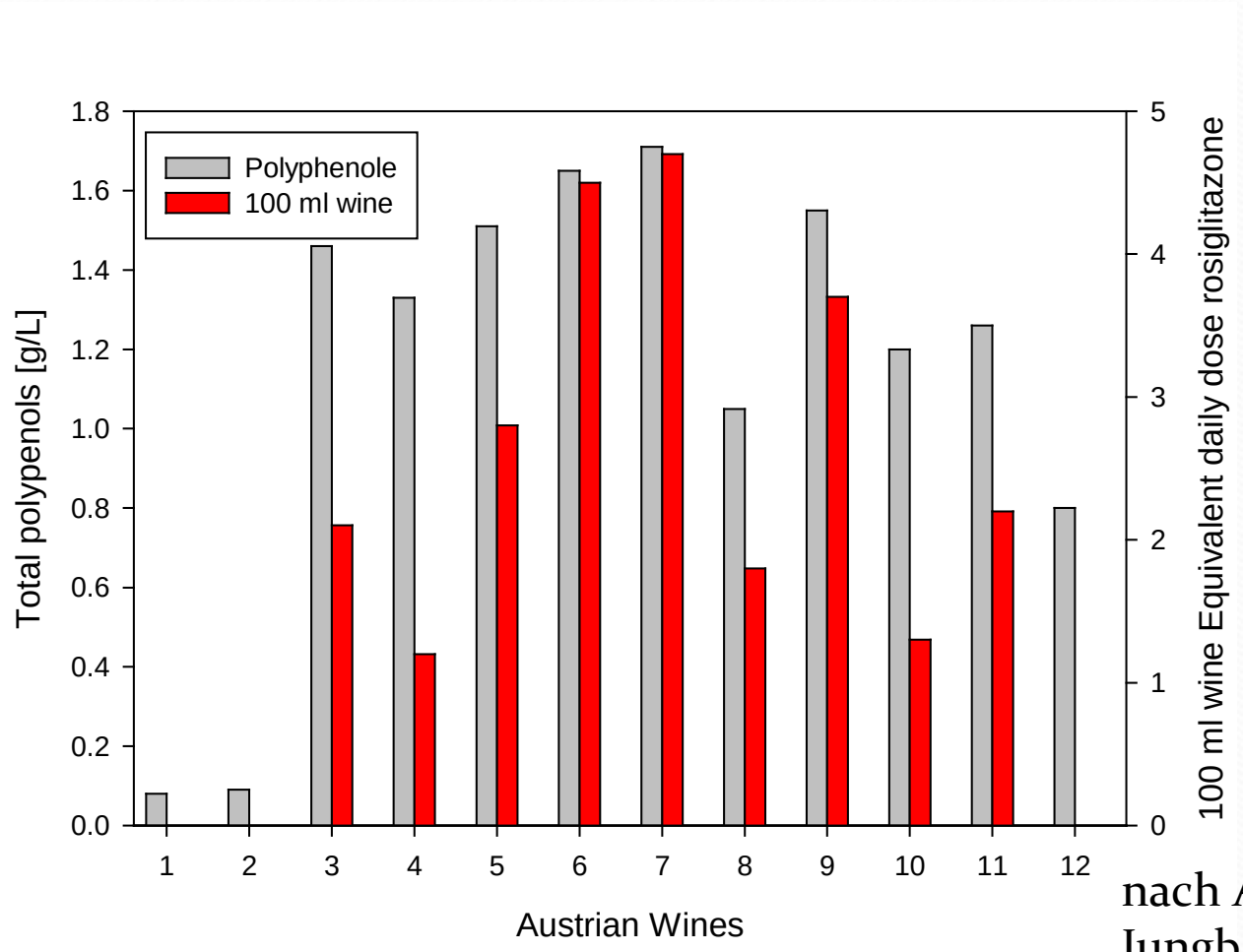
PPARγ activity in 100 ml wine



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www.thieme.de/fz/plantamedica | www.thieme-connect.com/ejournals

Planta Medica

Journal of Medicinal Plant and Natural Product Research

PPARα Activation by Culinary Herbs and Spices

Authors **Monika Mueller, Verena Beck, Alois Jungbauer**

Affiliation Christian Doppler Laboratory for Receptor Biotechnology, Department of Biotechnology, University of Natural Resources and Life Sciences, Vienna, Austria

Bibliography
DOI http://dx.doi.org/10.1055/s-0030-1250435
Published online October 18, 2010

ISSN 0032-0943

Plants with high PPAR-α

Caraway

Chili pepper

Coriander

Black pepper

Nutmeg

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Plants with high PPAR-α

Paprika

Saffron

Stevia

Red wine shows

- High binding to PPAR γ 100 ml of a medium potent red wine exhibit an equivalent rosiglitazone activity of up to four daily doses.
- Grape and oak derived compounds are responsible for this activity.
- Ellagic acid has effect on RCT.

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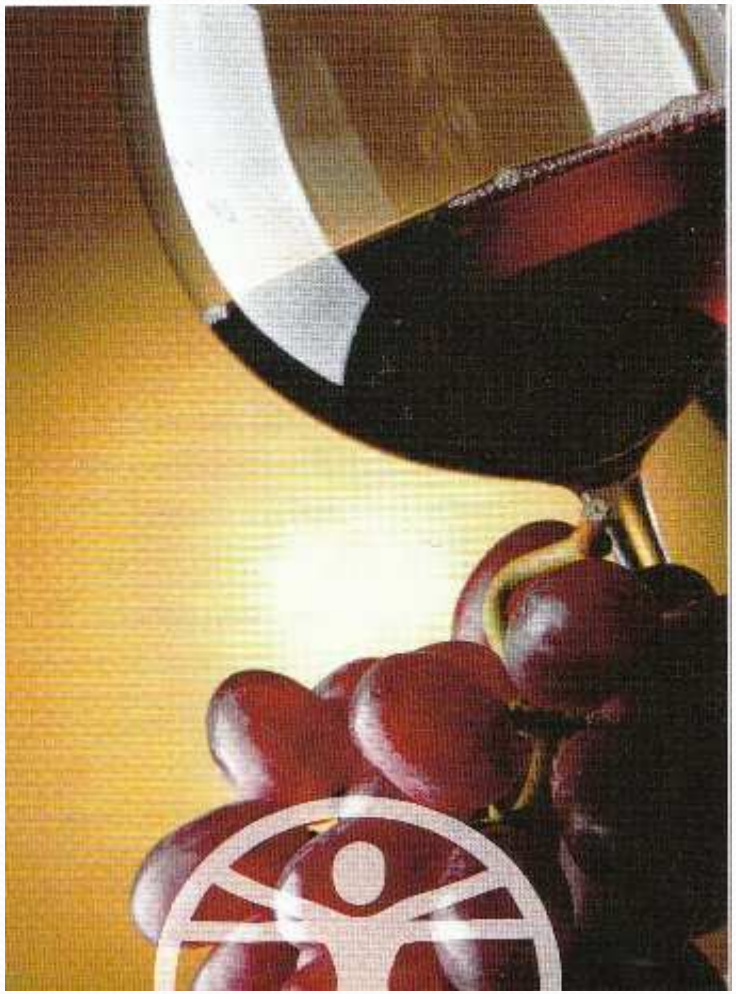
- „Polypill“
- „Polymeal“

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Alles Gute auf einen Griff: 4000 Jahre
Anti-Aging-Medizin aus Ost und West
Das erste Chrono-Breitband-Antiagikum: All-in-One

Am Morgen

1 Kps «Superfruits» (orange/weiß)	**pro Kapsel**
Acai-Beeren-Extrakt	200 mg
Goji-Beeren-Extrakt	150 mg
Mangostan-Extrakt	100 mg
Noni-Extrakt	100 mg
Granatapfel-Extrakt	100 mg
Früchte-Extrakte (Apfel, Orange, Ananas, Wassermelone, Grapefruit, Erdbeere, Pfirsich, Papaya, Birne, Limone, Kirsche, Pflaume, Blaubeere, Weintraube, Warzenmelone, Himbeere)	150 mg

1 Kps «Grüner Zellschutz» (grün/weiß)	**pro Kapsel**
Katechine (aus Grüntee)	300 mg
L-Glutathion	50 mg
Gemüse-Extrakte (Brokkoli, Blumenkohl, Grünkohl, Rosenkohl, Spinat, Rettich, Karotte, Rote Beete, Tomate, Sellerie, Zwiebel, Lauch)	200 mg

Am Morgen

1 Kps «Anti-Inflammation» (beige/weiß)	pro Kapsel
MSM	300 mg
Enzym-Komplex (anti-entzündlich)	25 mg
Traubenkern-Extrakt	6 mg
Coral Calcium®	25 mg
Beta-1.3-Glucan	100 mg

1 Kps «Multivitamin AM» (gelb/weiß)	pro Kapsel
Betakarotin	18 mg
Vitamin D	800 IU
Vitamin E	100 IU
Cholin (Bitrat)	45 mg
Vitamin B6	20 mg
Inositol	45 mg
Vitamin C	350 mg
Vitamin K	100 mcg
Chrom (Cr)	200 mcg
Lycopen	6 mg
Bioperine®	2,5 mg

Am Abend

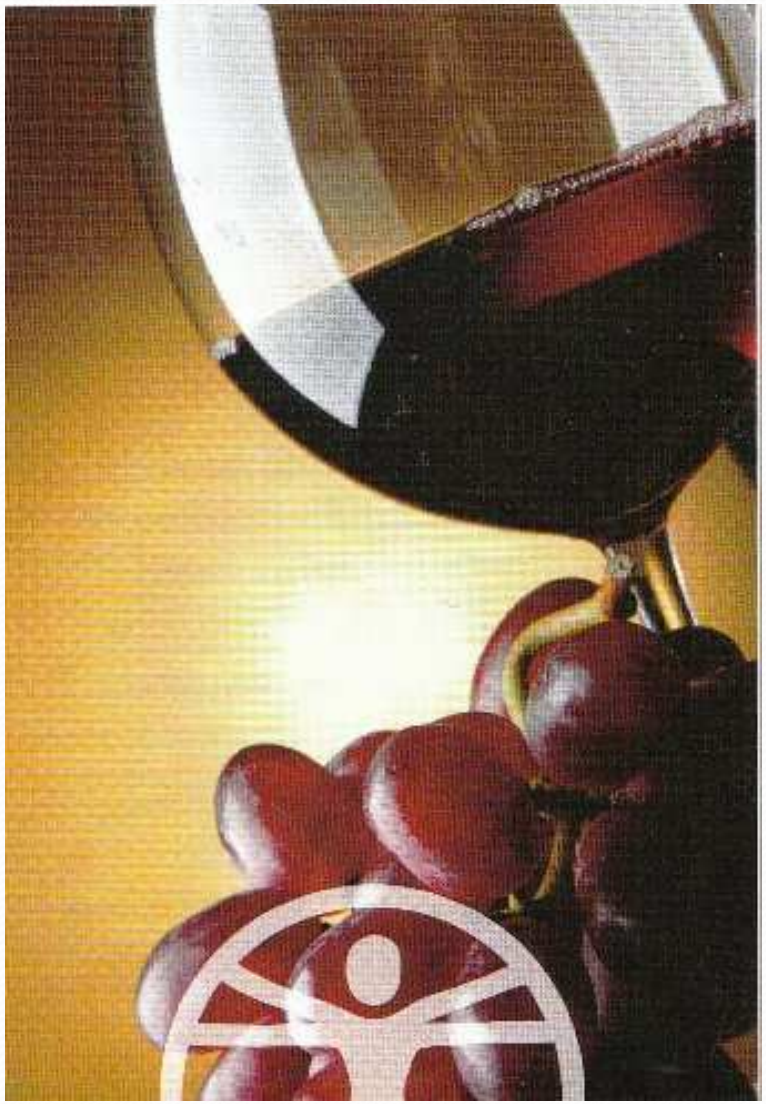
1 Kps «Rotwein-Komplex» (rot/weiß)	pro Kapsel
Resveratrol	120 mg
Quercetin	50 mg
Katechine	30 mg
OPC	30 mg

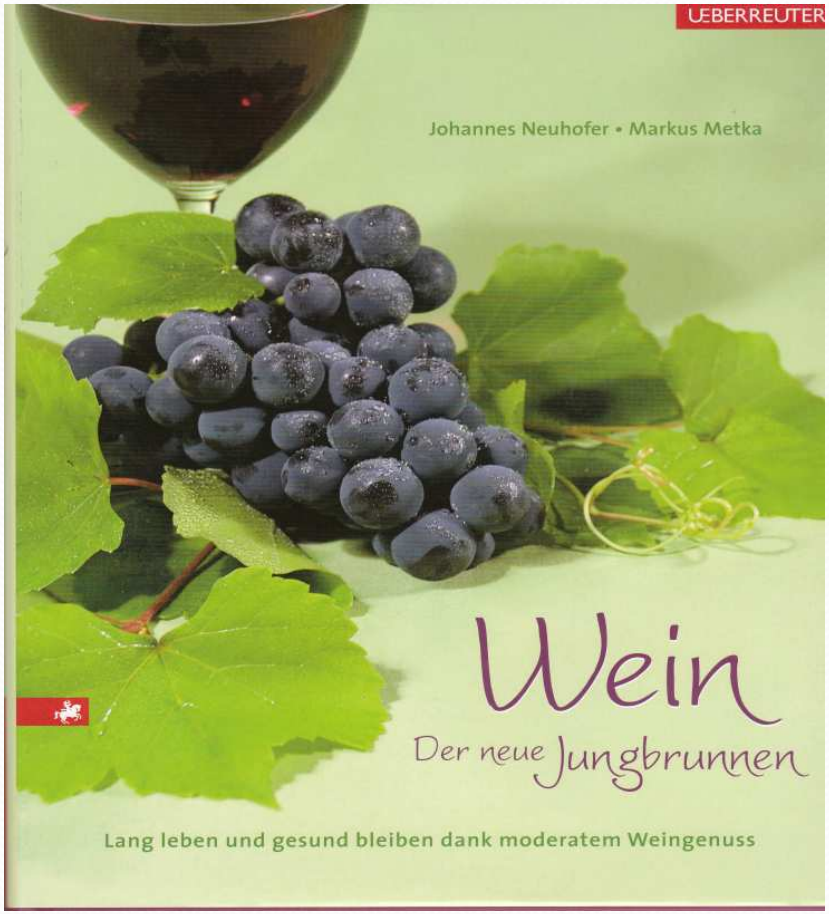
1 Kps Softgel «Omega 3»	pro Softgel
Omega 3-Komplex (Omega 600 USP®, enthaltend DHA, EPA, D-Alpha-Tocopherol, etc.)	600 mg

1 Kps «Multivitamin PM» (blau/weiß)	pro Kapsel
Vitamin B1	15 mg
Vitamin B2	15 mg
Niacinamid	40 mg
Pantothensäure	60 mg
Biotin	300 mcg
Folsäure	400 mcg
Vitamin B12	100 mcg
Magnesium (Mg)	200 mg
Gelée Royale	200 mg
Bioperine®	2,5 mg

Am Abend

2 Kps «Anti-Inflammation» (beige/weiß)	**pro Kapsel**
MSM	300 mg
Enzym-Komplex (anti-entzündlich)	25 mg
Traubenkern-Extrakt	6 mg
Coral Calcium®	25 mg
Beta-1,3-Glucan	100 mg




UEBERREUTER
Johannes Neuhofer • Markus Metka
Wein
Der neue Jungbrunnen
Lang leben und gesund bleiben dank moderatem Weingenuss

Resveratrol

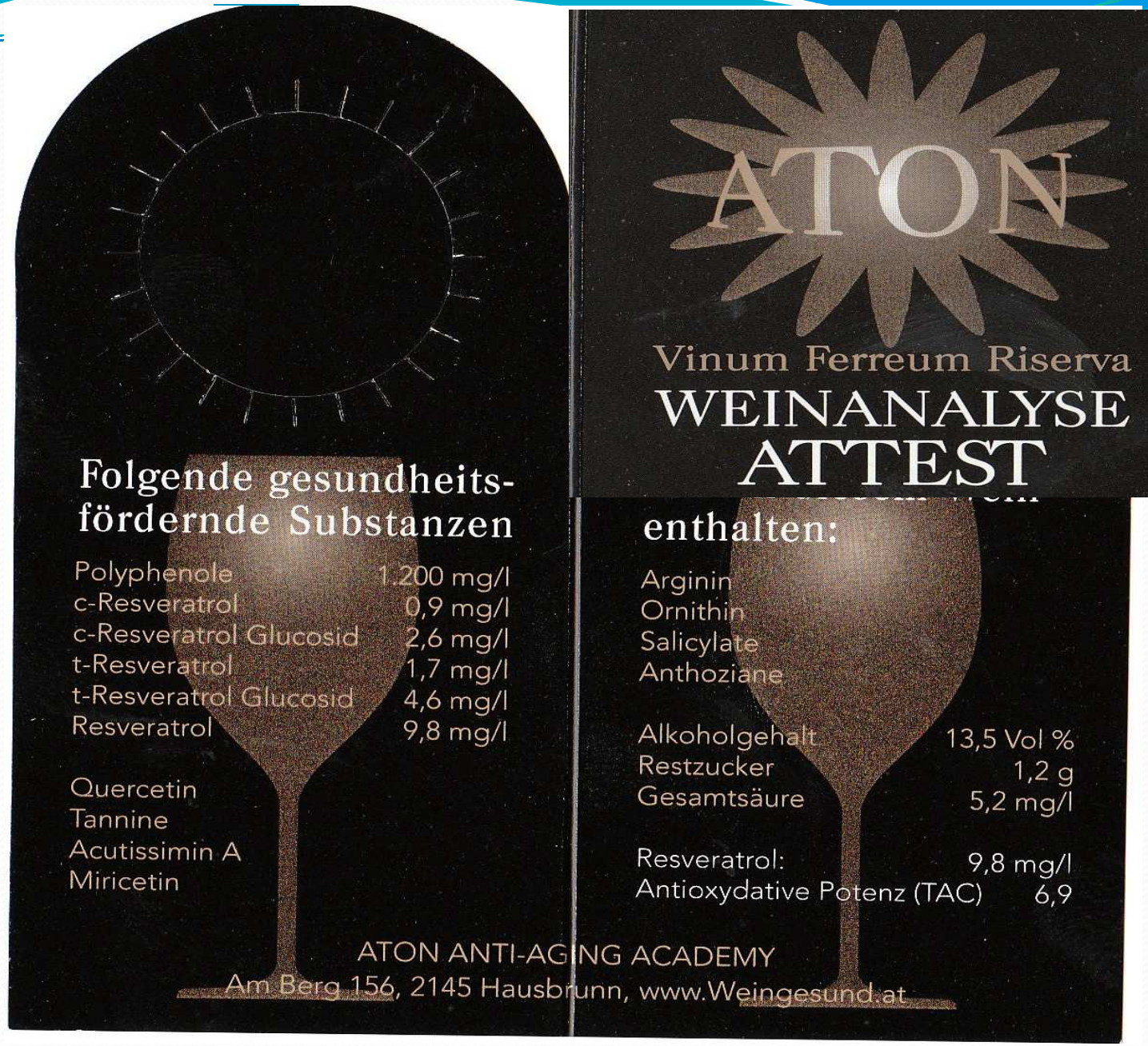
Can red wine really be a fountain of youth?

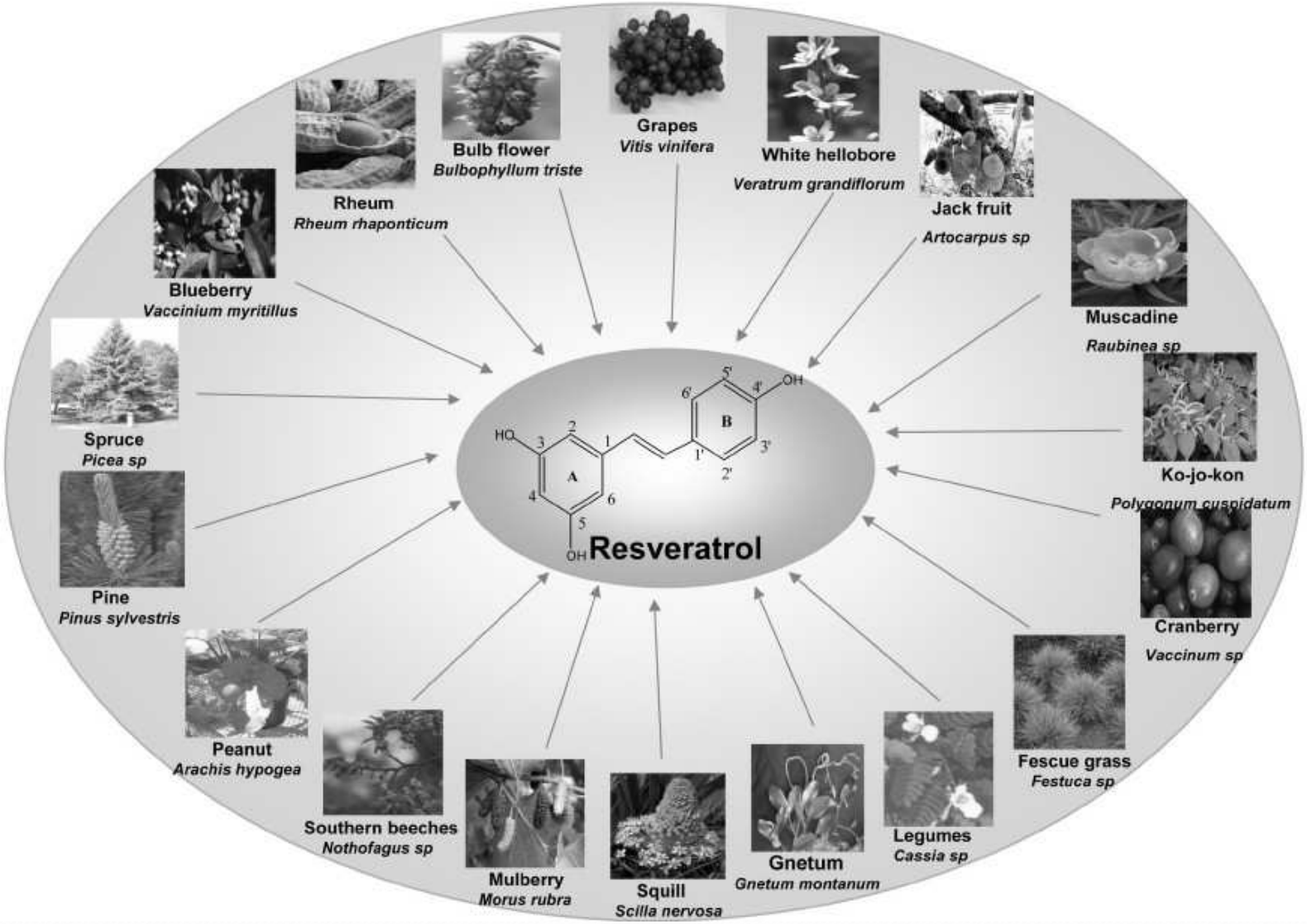
By Nicholas Wade

als have not yet been tested even in Technology, one of the pioneers of the Scientists hope, but do not yet know.

Antioxidative Potenz

1 Glas Rotwein = 2 Tassen Grüner Tee = 5 (1/4 l) Orangensaft


ATON
Vinum Ferreum Riserva
WEINANALYSE
ATTEST
Folgende gesundheits-
fördernde Substanzen
Polyphenole 1.200 mg/l
c-Resveratrol 0,9 mg/l
c-Resveratrol Glucosid 2,6 mg/l
t-Resveratrol 1,7 mg/l
t-Resveratrol Glucosid 4,6 mg/l
Resveratrol 9,8 mg/l
Quercetin
Tannine
Acutissimin A
Miricetin
enthalten:
Arginin
Ornithin
Salicylate
Anthoziane
Alkoholgehalt 13,5 Vol %
Restzucker 1,2 g
Gesamtsäure 5,2 mg/l
Resveratrol: 9,8 mg/l
Antioxydative Potenz (TAC) 6,9
ATON ANTI-AGING ACADEMY
Am Berg 156, 2145 Hausbrunn, www.Weingesund.at

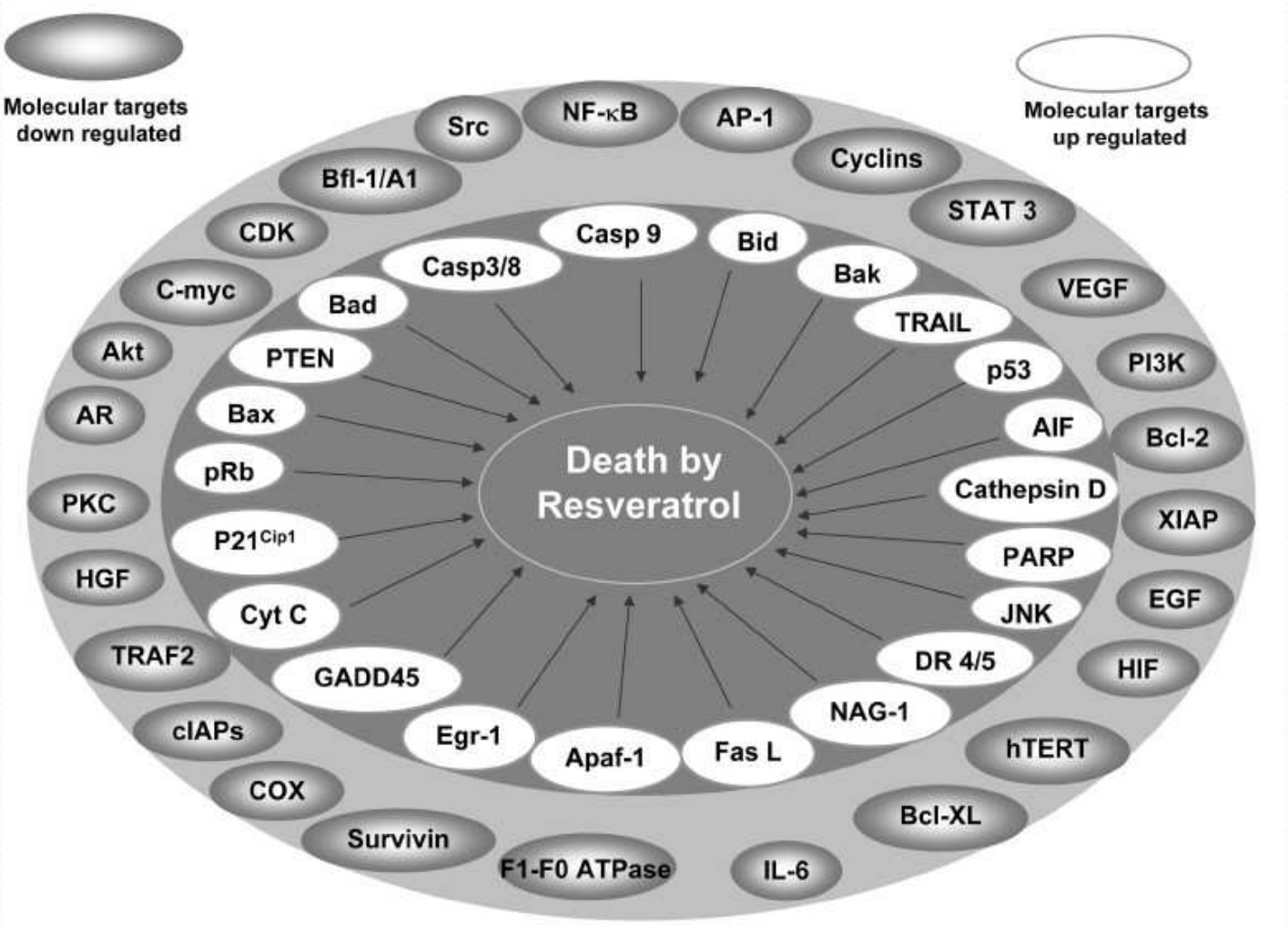

Grapes
Vitis vinifera
Bulb flower
Bulbophyllum triste
White hellobore
Veratrum grandiflorum
Rheum
Rheum rhaponticum
Jack fruit
Artocarpus sp
Blueberry
Vaccinium myritillus
Muscadine
Raubinea sp
Spruce
Picea sp
Ko-jo-kon
Polygonum cuspidatum
Pine
Pinus sylvestris
Cranberry
Vaccinum sp
Peanut
Arachis hypogea
Fescue grass
Festuca sp
Southern beeches
Nothofagus sp
Legumes
Cassia sp
Mulberry
Morus rubra
Gnetum
Gnetum montanum
Squill
Scilla nervosa
Resveratrol

Mol. Nutr. Food Res. 2009, *53*, 115–128 DOI 10.1002/mnfr.200800148

Review

Resveratrol addiction: To die or not to die

Mehdi Shakibaei[1], Kuzhuvelil B. Harikumar[2] and Bharat B. Aggarwal[2]


Molecular targets down regulated
Molecular targets up regulated
Death by Resveratrol
Src
NF-κB
AP-1
Cyclins
Bfl-1/A1
STAT 3
CDK
Casp 9
Bid
Casp3/8
Bak
VEGF
C-myc
Bad
TRAIL
Akt
PTEN
p53
PI3K
AR
Bax
AIF
Bcl-2
pRb
Cathepsin D
PKC
P21Cip1
XIAP
PARP
HGF
JNK
EGF
Cyt C
DR 4/5
TRAF2
GADD45
HIF
NAG-1
cIAPs
Egr-1
Apaf-1
Fas L
hTERT
COX
Bcl-XL
Survivin
F1-F0 ATPase
IL-6

Matcha


抹茶ヨーグルトゼリー
Matcha Yoghurt Jelly


抹茶フォーチュンクッキー
Matcha Fortune Cookie


抹茶ミルク
Matcha Milk


抹茶クリームケーキ
Matcha Cream Cake


抹茶パスタ
Matcha Pasta


抹茶トリュフチョコレート
Matcha Truffe Chocolates


抹茶アイス
Matcha Ice Cream

広がる抹茶の世界

抹茶はお菓子、アイスクリーム、飲料と組み合わせることにより、「伝統的」「作法」などイメージから誰でも気軽に手にとっていただける食材として年々人気が高まっています。抹茶は本来「和」の食材でありながら、「洋」の魅力をさらに引き出し、最近では抹茶、緑茶をアイテムに加えた和風カフェや、コンビニなどでおなじみのお菓子、ペットボトルも大人気。さらに消臭剤やサプリメントへの利用も注目され、全く新しい「茶」の姿も登場しています。

Taking Matcha Out of the Tea Bowl

Although Matcha is traditionally served in autumn and winter today, it is enjoyed year round. A frappe-like drink with Matcha and crushed ice is a summer favorite. Matcha-flavored soymilk and ice cream are already popular and bottled tea flavored with Matcha powder is popular as well.

Matcha is also an ingredient in noodles and other dishes, along with sweets and snacks. In recent years, it has been used in nutritional supplements, bath soap, and other hygiene products where the anti-oxidant effect proves useful, as well as in socks and underwear as dye and deodorant.


グリーンティーサプリメント
Green Tea Supplement

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	Matcha *(a) 抹茶	Sencha *(b) 煎茶	Bancha *(c) 番茶	Oolong Tea *(c) ウーロン茶	Black Tea *(d) 紅茶	Coffee *(e) コーヒー
Caffeine カフェイン	0.3g	0.02g	0.01g	0.02g	0.03g	0.06g
Polyphenol (Tannin) ポリフェノール（タンニン）	1.0g	0.07g	0.03g	0.03g	0.1g	0.25g
Protein タンパク質	3.1g	0.2g	Tr	Tr	0.1g	0.2g
Fiber 繊維	3.9g	——	——	——	——	——
Calcium カルシウム	42mg	3mg	5mg	2mg	1mg	2mg
Iron 鉄	1.7mg	0.2mg	0.2mg	Tr	0	Tr
Potassium カリウム	270mg	27mg	32mg	13mg	8mg	65mg
Vitamin A ビタミンA	480μg	(0)	(0)	(0)	(0)	0
Vitamin B1 ビタミンB1	0.06mg	0	0	0	0	0
Vitamin B2 ビタミンB2	0.14mg	0.05mg	0.03mg	0.03mg	0.01mg	0.01mg
Vitamin C ビタミンC	6mg	6mg	3mg	0	0	0
Carotene カロチン	2900μg	(0)	(0)	(0)	(0)	0

*(a) 抹茶10g中の含有量
*(b) 抽出法：茶葉10g/90℃ 430ml 1分
*(c) 抽出法：茶葉15g/90℃ 650ml 0.5分
*(d) 抽出法：茶葉5g/熱湯 360ml 1.5分—4分
*(e) 抽出法：コーヒー粉末10g/熱湯 150ml
(b)から(e)は可食部100ml当たりの成分値

*(a)Content Per 10g Matcha
*(b)Infusion : 10g Tea Leaves/430ml Hot Water (90℃)/Steep 1 Minute
*(c)Infusion : 15g Tea Leaves/650ml Hot Water (90℃)/Steep 0.5 Minute
*(d)Infusion : 5g Tea Leaves/360ml Boiling Water/Steep 1.5 to 4 Minute
*(e)Infusion : 10g Ground Coffee /150ml Boiling Water
Per 100ml edible portion from *(b) to *(e)

Top antioxidant foods*[2]

orac units per gram (umoleTE/g)

fruits		**vegetables**	
cranberries	95	small red beans	150
wild blueberries	93	artichokes	95
black plums	74	blackeye peas	44
blackberries	54	broccoli	31
raspberries	50	red cabbage	32
strawberries	36	asparagus	31
apples	43	beets	28
cherries	19	spinach	27

superfoods	
wolfberries	303
gojiberries	253
dark chocolate	227
pomegranate	105
acaiberries	60
wheatgrass	49

Aiya Traditional Matcha Tea 1384

One serving of matcha green tea (1g per serving) yields the following nutrients naturally[1]:

nutrients		
energy	2.91	calories
protein	289	mg
carbohydrates	348	mg
lipids	40	mg
dietary fiber	332	mg
tea caffeine (theine)	34	mg
orac units	1384	umoleTE/g

vitamins and minerals		
vitamin A β – Carotene	292	ug
vitamin A Retinol Equiv.	24.3	ug
vitamin C	0.6	mg
vitamin E	0.281	mg
calcium	3.25	mg
potassium	21.13	mg
iron	0.17	mg
sodium	0.06	mg
zinc	0.047	mg

catechin antioxidants and amino acids		
epigallocatechin gallate	66	mg
epigallocatechin	30	mg
epicatechin gallate	15	mg
epicatechin	6	mg
gallocatechin gallate	1	mg
catechin gallate	1	mg
L-aspartic acid	7.23	mg
L-glutamine acid	5.59	mg
L-asparagine	2.28	mg
L-serine	1.25	mg
L-glutamine	1.08	mg
L-threonine	8.33	mg
L-arginine	0.64	mg
L-theanine	19.5	mg
L-tyrosine	0.37	mg
L-valine	0.27	mg
y-amino butyric acid	0.18	mg
L-isoleucine	0.36	mg
L-phenylalanine	0.56	mg
L-leucine	0.32	mg
L-lysine	0.09	mg

In summary

- Matcha green tea contains over 10 to 15 times the overall nutrients when compared to traditional green, white, black, rooibos and yerba mate teas as well as when compared to popular fruits and vegetables

Lycopin

Pharmakologische Wirkung von Lycopin:

- Bevorzugte Anreicherung in bestimmten Organen (Hoden, Prostata, Gebärmutter, Brust,)
- antikanzerogener Effekt
- antioxidativ
- antiatherogen
- blutdrucksenkend

Schokolade – Polyphenole mit Genuss

Positiver Einfluss auf den Insulinstoffwechsel

Dunkle – ***polyphenolhaltige*** – und nicht weiße – ***polyphenolarme*** – Schokolade senkt die Insulinresistenz und erhöhen die Insulinsensitivität

Grassi D. et al. Am J Clin Nutr 2005; 81; 611 - 614

Metanalyse bestätigt antyhypertensive Wirkung

- Auswertung von ***5 kontrollierten, randomisierten Studien*** mit
- ***173 Probanden***
- ***Konsum von kakaohaltigen Lebensmitteln für die Dauer von 7 Tagen***

➡ Ergebnis: signifikante Reduktion des systolischen **(- 4,7 mm Hg)** und diastolischen **(- 2,8 mm Hg**) Blutdrucks im Vergleich zu den Kontrollgruppen

Taubert D. et al. Effect of Cacoa and Tea Intake on Blood Pressure; Arch Int Med 2007; 167, 625

Die Zutphen Elderly Study

- Studie des National Institute for Public Health and Environment in Bilthoven (Niederlande)
- **Evaluierung der Verzehrsgewohnheit von 470 Probaten (Alter 65 bis 84 Jahre) seit 1985**
- **3 Gruppen:** **Ein Drittel der Probanden „Kakaokonsumfrei“**
  Ein Drittel täglich etwa 2 g Kakao
  Ein Drittel täglich etwa 4 g Kakao
- Ergebnis:

→ Probanen mit ***hohem Kakao-Konsum hatten einen um 50 % niedrigeres KH-Risiko*** im Vergleich zu „Kakaokonsumfreien“

→ ***Gesamtsterblichkeit um 47 % reduziert***

Butijsse, B. et al. Cacoa Intake, Blodd Pressure and Cardiovascular Mortality, The Zutphen Elderly Study. Arch Intern 2006, 166, 441 - 417

Früchte – Polyphenolvielfalt mit vielfätigen protektiven Wirkungen

„PACS“ in Preiselbeeren und Cranberries

- Wirkung: antiinflammatorisch, gefäß- und zellprotektiv
- Inhaltsstoffe:

  „PACS“: Proanthoyanidine

  in Cranberries in höherer Konzentration als in der deutschen Preiselbeere

  Ursolsäuren: zellprotektiv, antianzerogen

Anwendung bei Harnwegsinfekten, Reizblase, Zahnfleischentzündung

Vaccinium myrtillus Heidelbeeren senken Cholesterinspiegel

- Inhaltsstoff **„Pterostilben“ identifiziert** – Resveratrolähnliche Struktur
- Aktivität am PPAR-alpha-Rezeptor vergleichbar Ciprofibrat
- Vorteil für Pterostilben: selektive Wirkung ausschließlich am PPAR-alpha-Rezeptor

Vortrag Jahreskonferenz der Am. Ges. Chem. (ACS) Philadelphia, 2004

Polyphenole aus Heidelbeeren und Äpfel senken Darmkrebsrisiko

- Diverse Heidelbeerspezies im Test:

  Nachweis – in vitro – der DNA Fragmentierung (Apoptose) von Colon-CA-Zelllinien

Yi W. et. al. J. Agric Food Chem. 2005, 53, 7320 – 7329

- Diverse Apfelspezies und Apfelsäfte im Test:

  Nachweis – in vitro – der Hemmung von Zellproliferation von Colon-CA-Zelllinien

Pohl C. et al. J Agric Food Chem. 2006, 27, 54 (6), 10 262-8

Arbeitsgruppe D. Schrenk, Universität Kaiserslautern, BMBF-Projekt

Punica granatum - Granatapfel

- Polyphenole (Gerbstoffe)
- Antioxidantien
- Phytoestrogene (Samen)
- Essentielle Fettsäuren (Samen)

Der Granatapfel und seine Wirkung

- Gefäßschutz:

  Verbesserung der Blutrheologie

  Antiinflammatorische Wirkung

  Hemmung der Oxidation der Fette

- Anti Aging

- Entgiftung und Chemoprävention:

  Hemmung der der Phase I Enzyme

  Förderung der Apotose von Tumorzelle

Granatapfel – die Frucht für den Mann?

- Erste klinische Studie mit **48 Probanden mit Prostatakrebs**
- **Verumgruppe (n=24): Konsum von 250 ml Granatapfelsaft – die (entsprechenden 570 mg Polyphenole versus) Placebo (n=24)**

→ Ergebnis: Verzögerung der Krankheitsporgression

Deutlich verzögerter Anstieg des PSA-Wertes (versus Placebo)

In vitro Testungen des Serums (Inkubation mit Prostatazellinien) vor und nach Konsum ergab Reduktion der Zellproliferation der Tumorzellen (um 12%) und Erhöhung der Apotose (um 17%)

Pantuck AJ. Et al. Clin. Can. Research 2006; 1, 12 (13), 4018-4026


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