

„Health Claims—a medical researcher’s view“

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The Concise Oxford Dictionary:

Health

- Soundness of body
- Condition of body (as good, bad..)

sound

- healthy, not *diseased* nor *injured* nor *rotten*

Roget's College Thesaurus

Health

Verbs--bloom, flourish, look oneself, be in *or* enjoy good health, get better, improve, take a new lease on life, cure, restore, ,feel like a million dollars‘

WHO definition of Health

Health is a state of complete *physical*, *mental* and *social* well-being and not merely the absence of disease or infirmity.

The correct bibliographic citation for the definition is:

Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.

The Definition has not been amended since 1948.

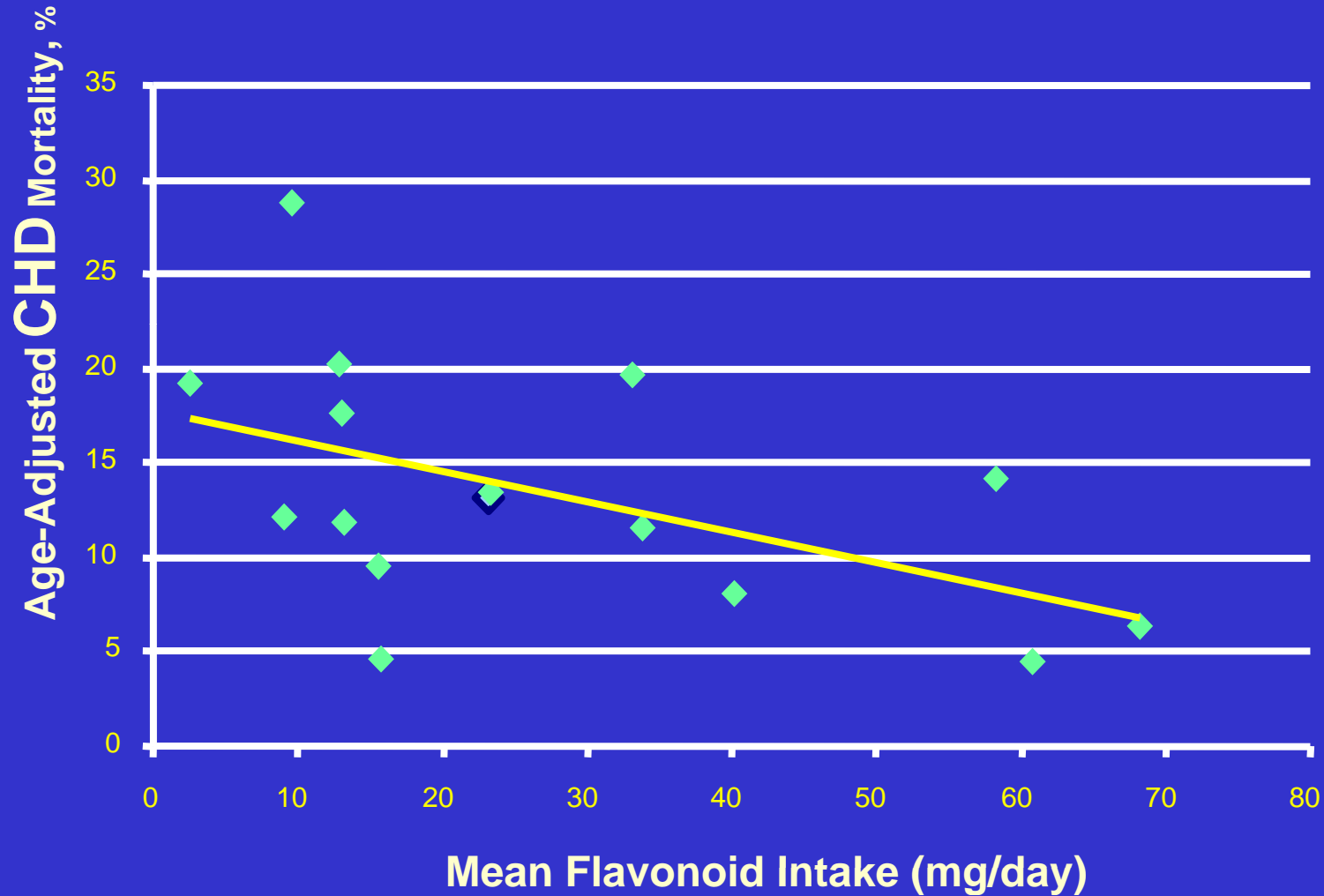
Polyphenols and Health: ??

Where are we?

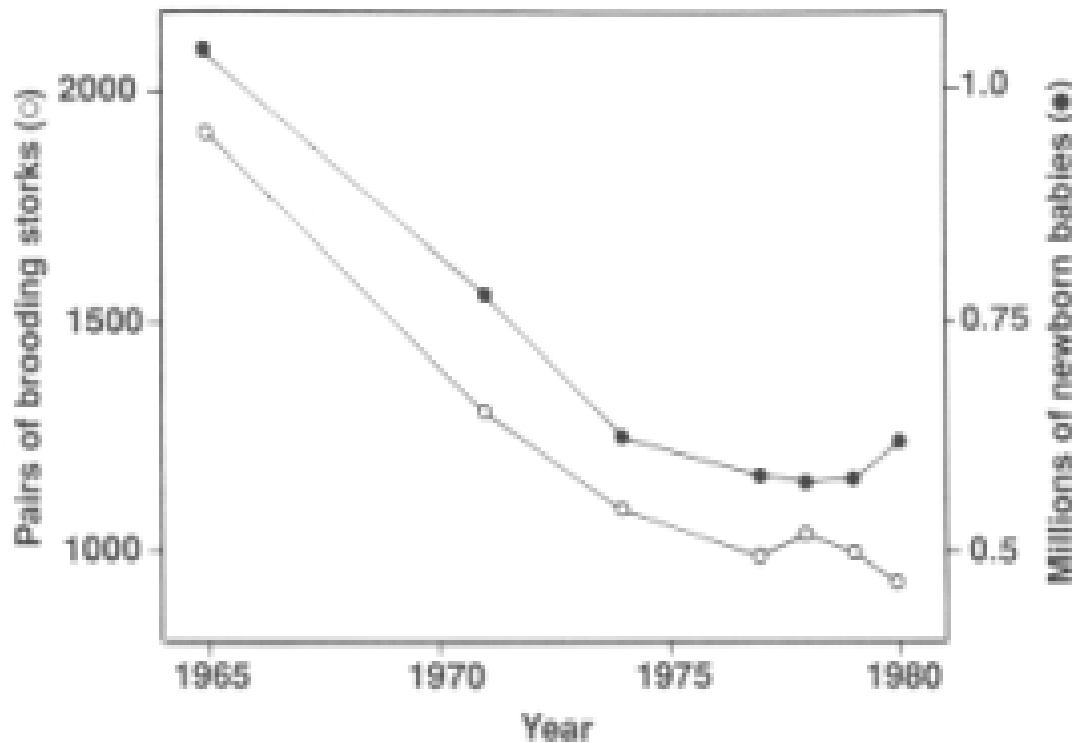
What do we really know?

Who is ,**we**‘? Botanists, Biologists, Nutritionists, Dieticians, Chemists, Biochemists, Cell Biologists, Pharmacists, Pharmacologists, Journalists, Lobbyists, Industrialists, Regulators, and--hopefully--also some health professionals, such as ,**Doctors**‘, theoretical or clinical.....

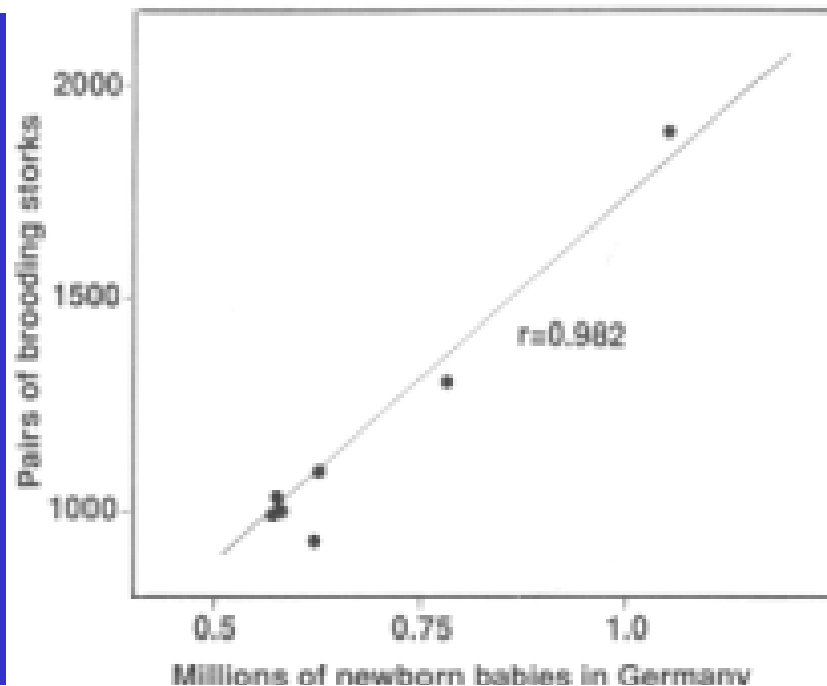
Flavonoid Intake and Risk of Coronary Heart Disease (CHD) Mortality



Hertog *et al* (1995) *Arch Intern Med* **155**: 381-6



Correlation of Number of Brooding sSorks with Newborn Babies



A contribution to epidemiology....

Associations vs. Cause-Effect

Sies, H. (1988) *Nature* 332, 495

literally „comparing apples with oranges“.....

Note:

,TAC' applied to *in vivo*:

•neither ,Total' nor the real ,Antioxidant Capacity' is measured

what is measured by TAC is mainly ascorbate, urate and other minor components;

in vivo antioxidant enzyme support is not assessed in isolated fluids out of steady-state

Upshot:

- TAC *in vitro* (e.g. in foods or extracts): OK
- TAC *in vivo* (e.g. in plasma): not OK

- Publication of such data is being discouraged

See: [Total antioxidant capacity: appraisal of a concept.](#)

Sies, H. (2007) *J Nutr.* **137**:1493-5

PASSCLAIM: Process for the Assessment of Scientific Support for Claims on Foods

PASSCLAIM criterion 5. Effect should be significant and biologically relevant

- **The biological relevance of antioxidant effects of polyphenols for CV health is not established**

P Hollman et al (2011) J Nutr 141, 989S-1009S

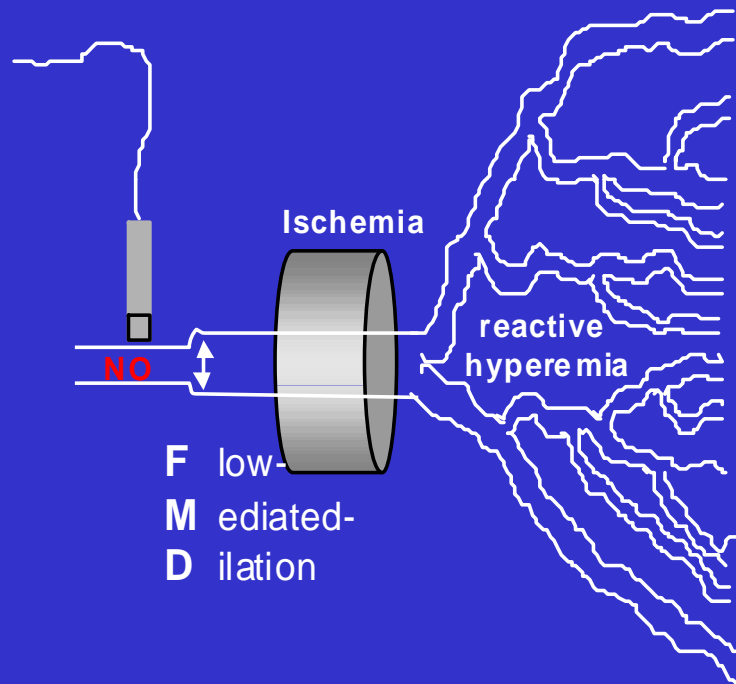
On behalf of the ILSI Expert Group on Antioxidant Activity of Polyphenols

- Cardiovascular System

- ‘Functional Biomarker’: Flow-mediated
Dilation

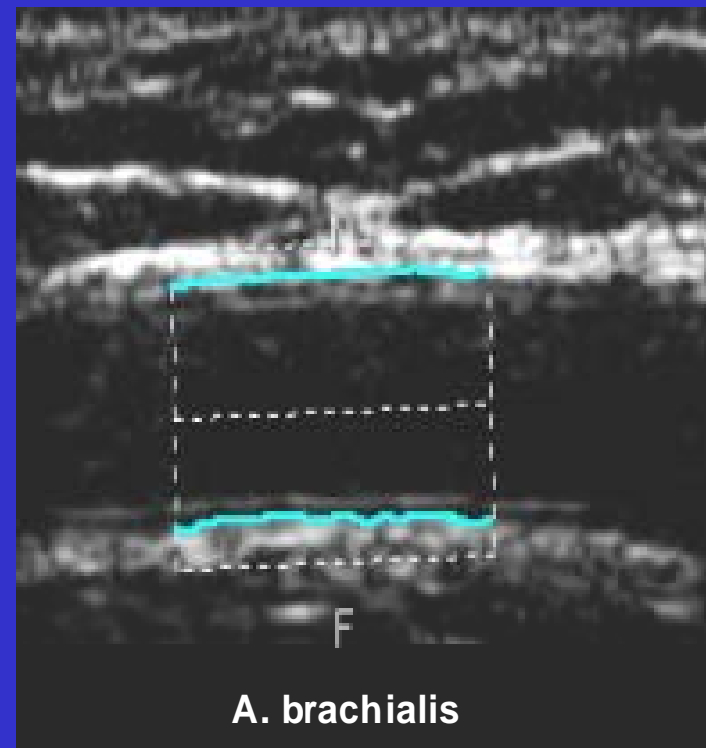
FMD as noninvasive „Functional Biomarker“

Flow Mediated Dilatation



Macro

Micro



Effect of a Single High-Fat meal on Endothelial Function in Healthy Subjects

Vogel RA, Corretti MS, Plotnick GD (1997) *Am J Cardiol* **79**, 350-354

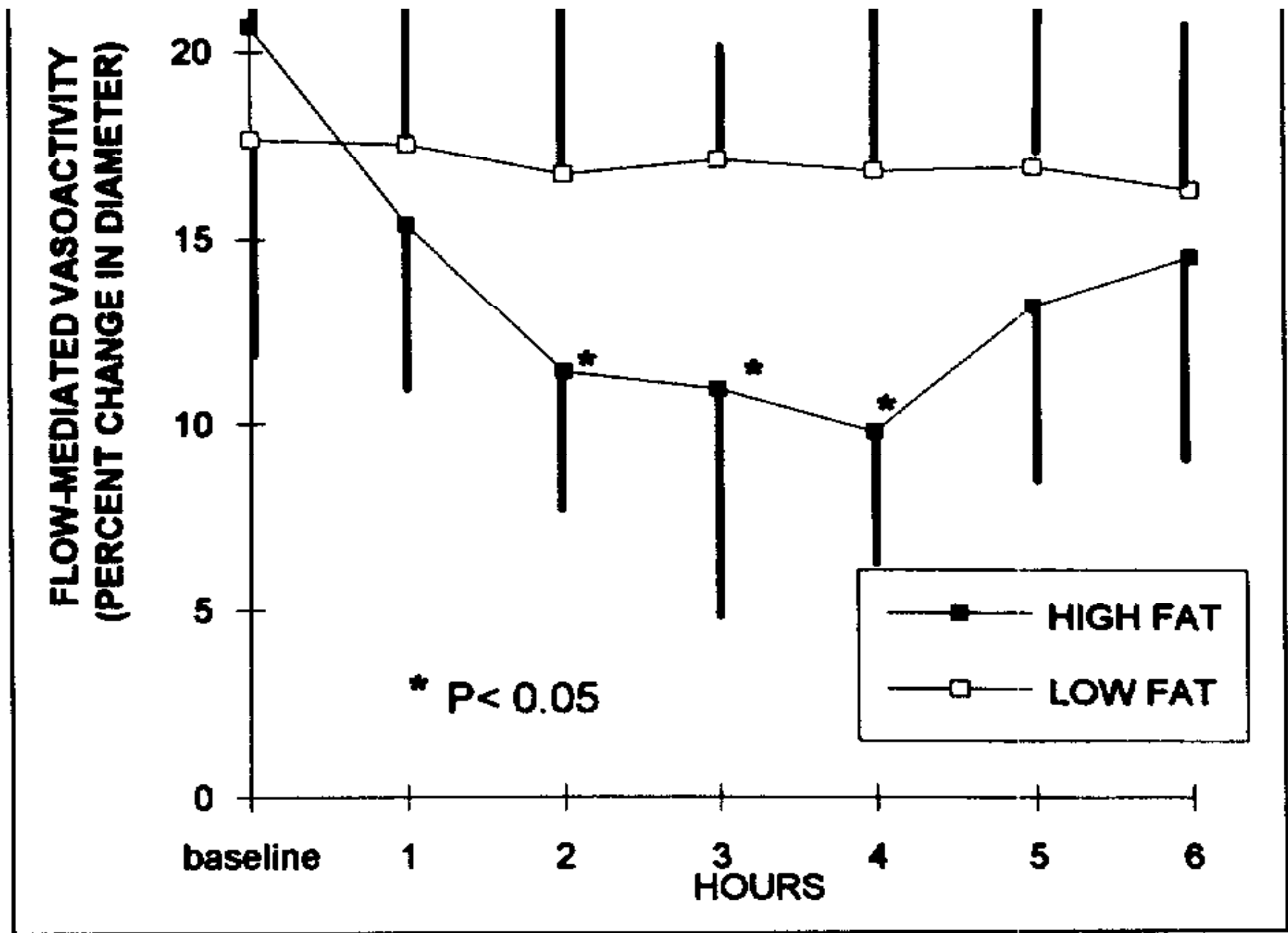
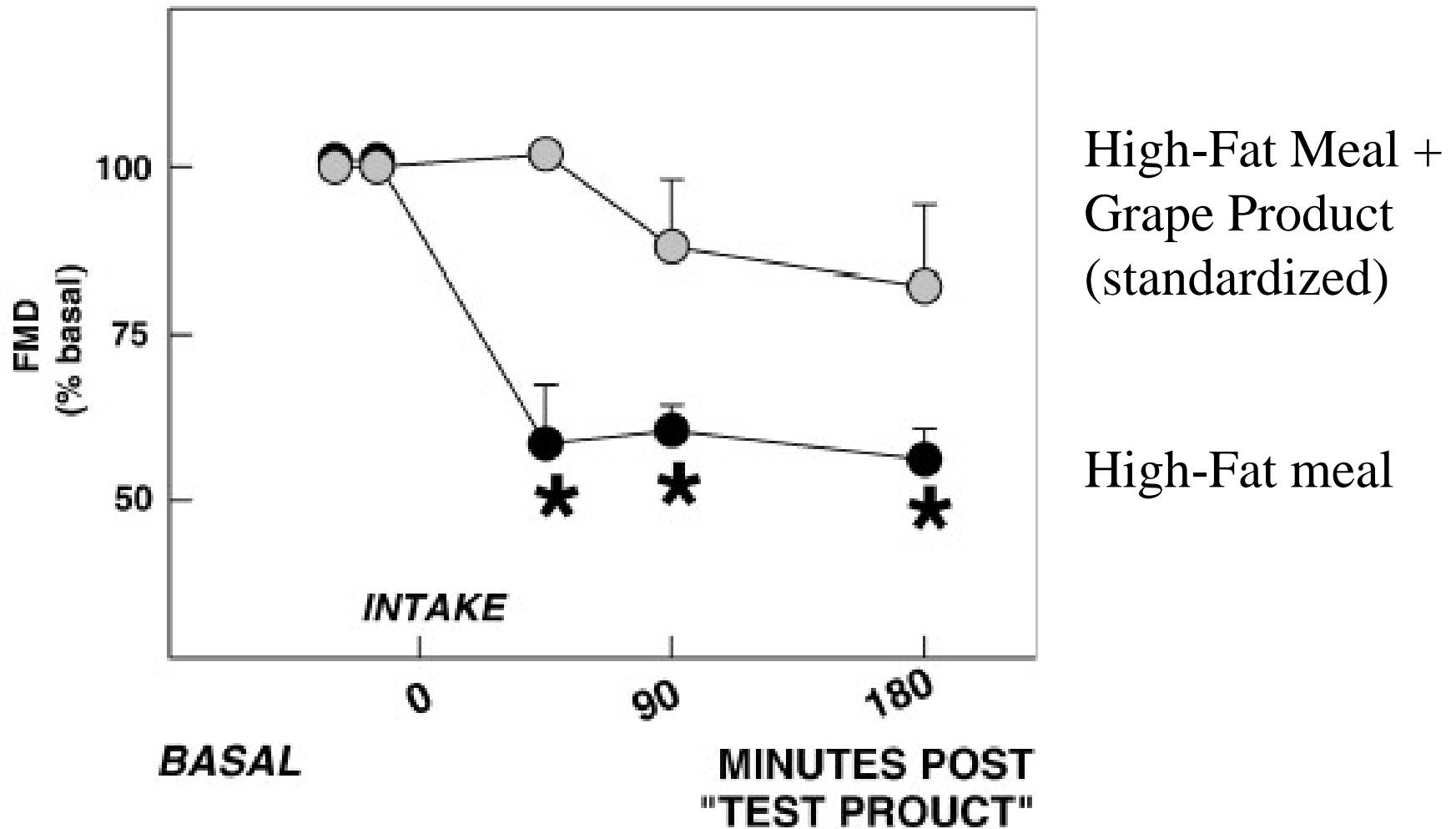
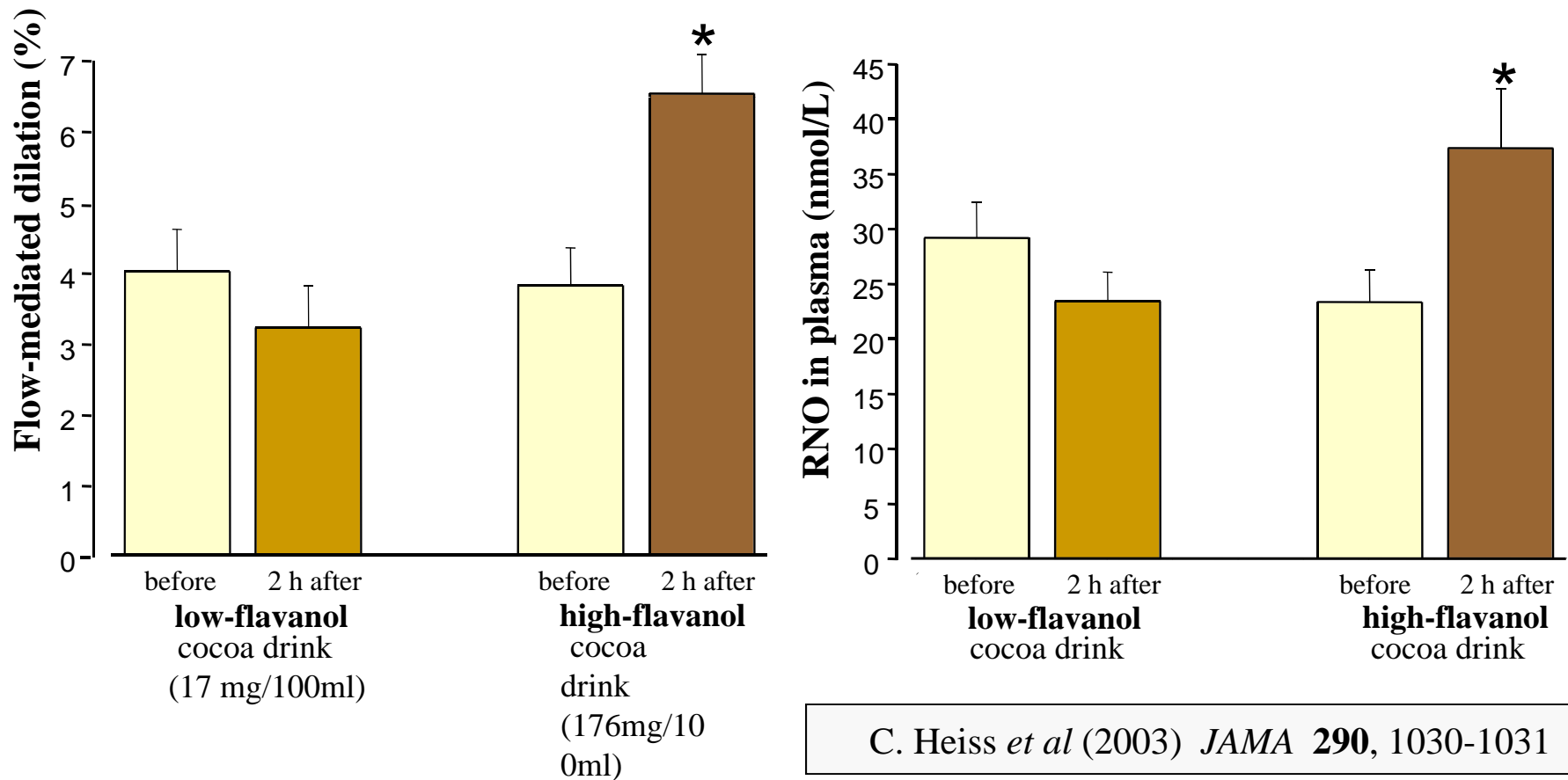


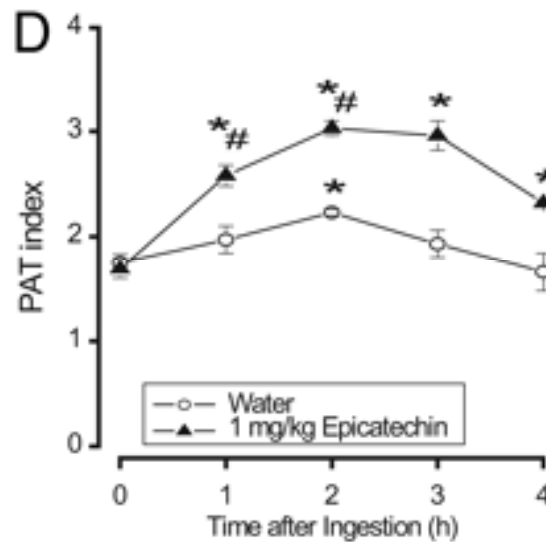
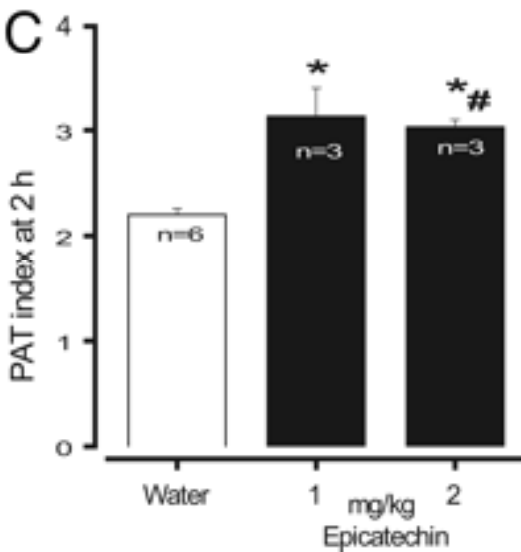
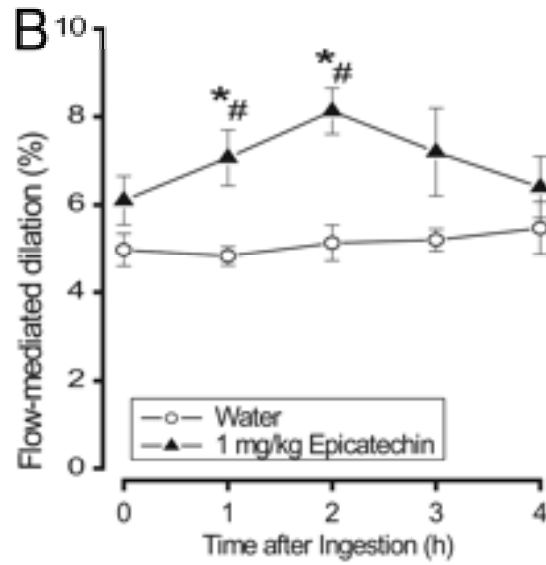
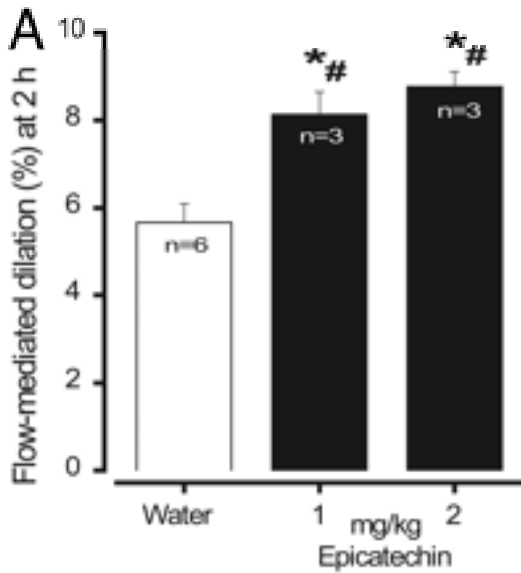
FIGURE 1. Flow-mediated brachial artery vasoactivity is plotted before and after ingestion of the high- and low-fat meals. Signifi-

Vasoprotective endothelial effects of a standardized grape product in humans



High-flavanol cocoa drink ameliorates endothelial function *in vivo* through improved bioactivity and bioavailability of NO





(-)-Epicatechin mediates beneficial effects of flavanol-rich cocoa on vascular function in humans

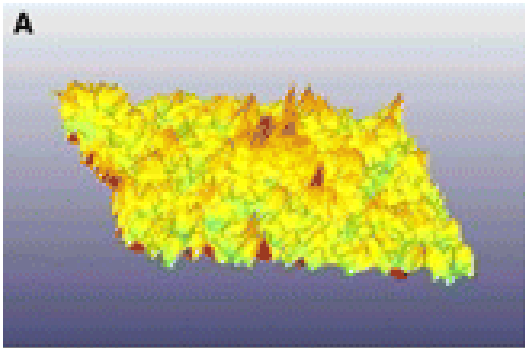
Schroeter *et al* (2006)
PNAS **103**, 1024-1029

Consumption of flavanol-rich cocoa acutely increases microcirculation in human skin

Dermal blood flow and oxygen saturation of hemoglobin were examined by laser Doppler flowmetry and spectroscopically at 1 mm skin depth.

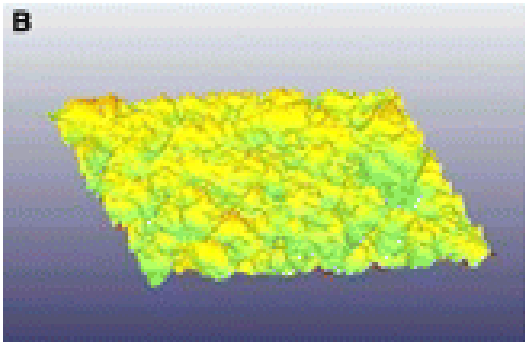
Dermal blood flow was significantly increased by 1.7-fold at $t = 2$ h and oxygen saturation was elevated 1.8-fold.

Neukam *et al* (2007) *Eur J Nutr.* **46**, 53-56

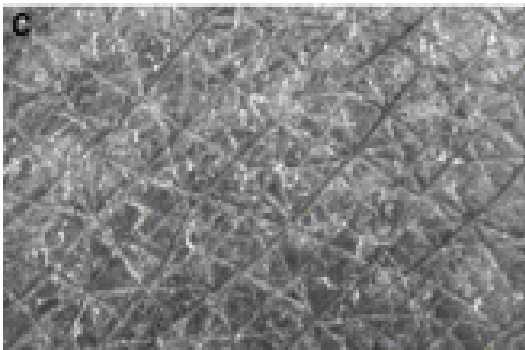


Skin surface profiles

at week 0

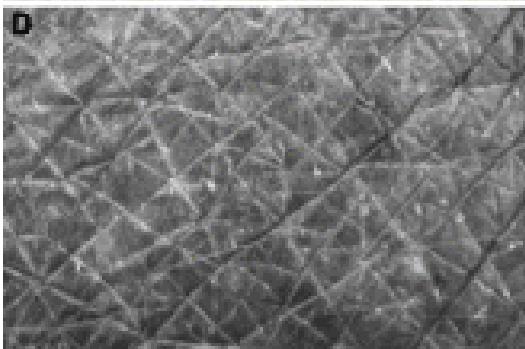


after 12 weeks of consuming high flavanol
cocoa beverage



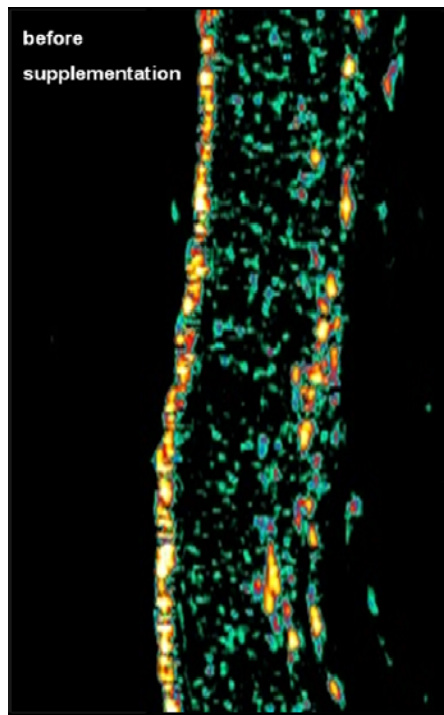
Corresponding top view of skin

at week 0

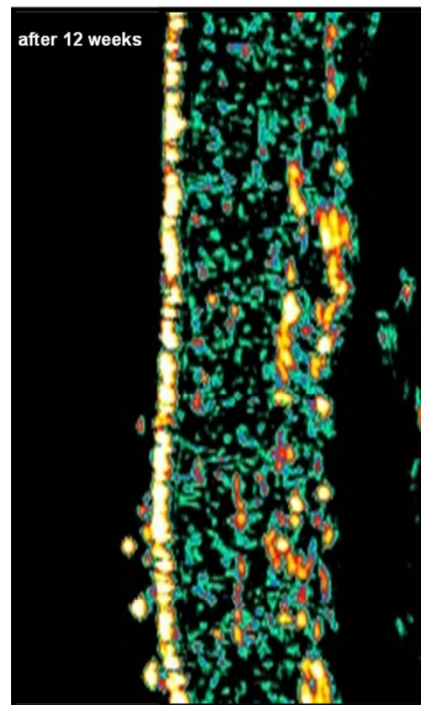


after 12 weeks

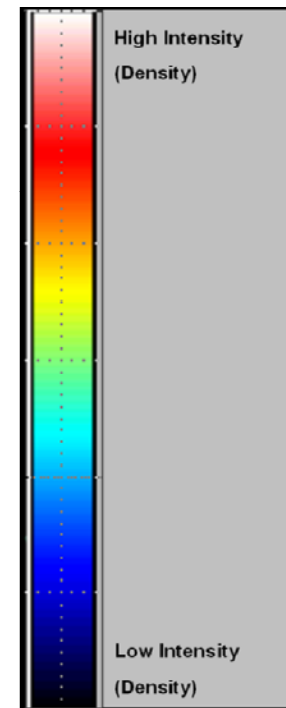
„An Encapsulated Fruit and Vegetable Juice Concentrate Increases Skin Microcirculation in Healthy Women“



before



after 12 weeks



Skin
Density
and
Thickness

Conclusions and Challenges for the Future:

- *Bridge the Potential Disconnect* between Food and Nutrition Science and Health Sciences
- *Health and Disease Parameters*: measure the chemical compounds involved (no 'Kit-ology', avoid non-compositional assays) and functional biomarkers (e.g. FMD)
- *Mechanism of Action*: focus on targeted control of prooxidant enzymes in inflammation and cardiovascular biology (specificity)
- *Keywords*: 'Bioactives' rather than (only) 'Antioxidants'
- *Optimum Dose* : Benefit vs. Risk, Toxicities

Selenium and Diabetes Type 2

- Recent human epidemiological studies point to an increasing risk of diabetes through selenium supplementation

Stranges et al (2007) *Ann Intern Med* **147**, 217–223.

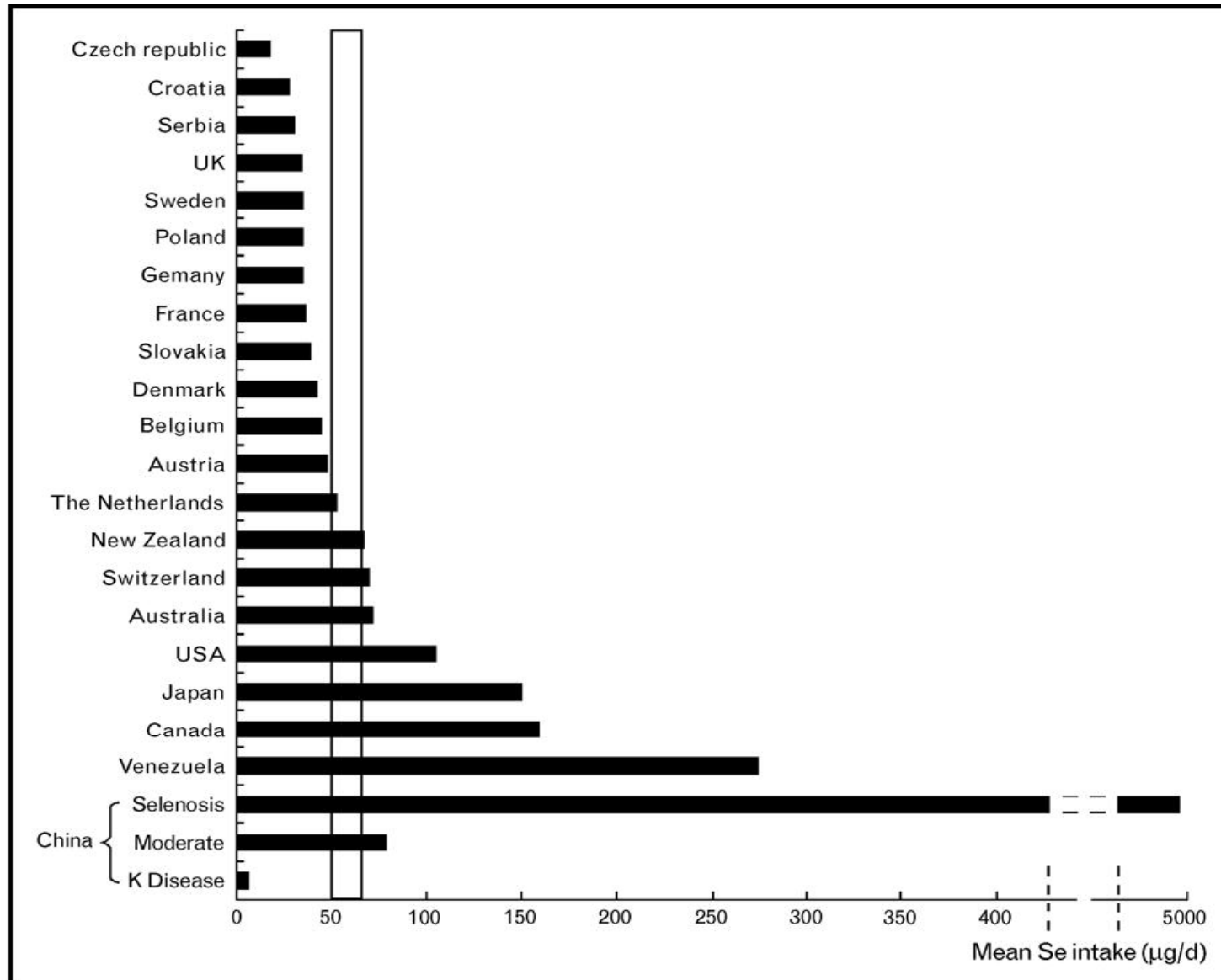
Bleys et al (2007) *Diabetes Care* **30**, 829–834

Lippman et al (2009) *JAMA* **301**, 39–51

Stranges et al (2010) *BMC Public Health* **10**, 564

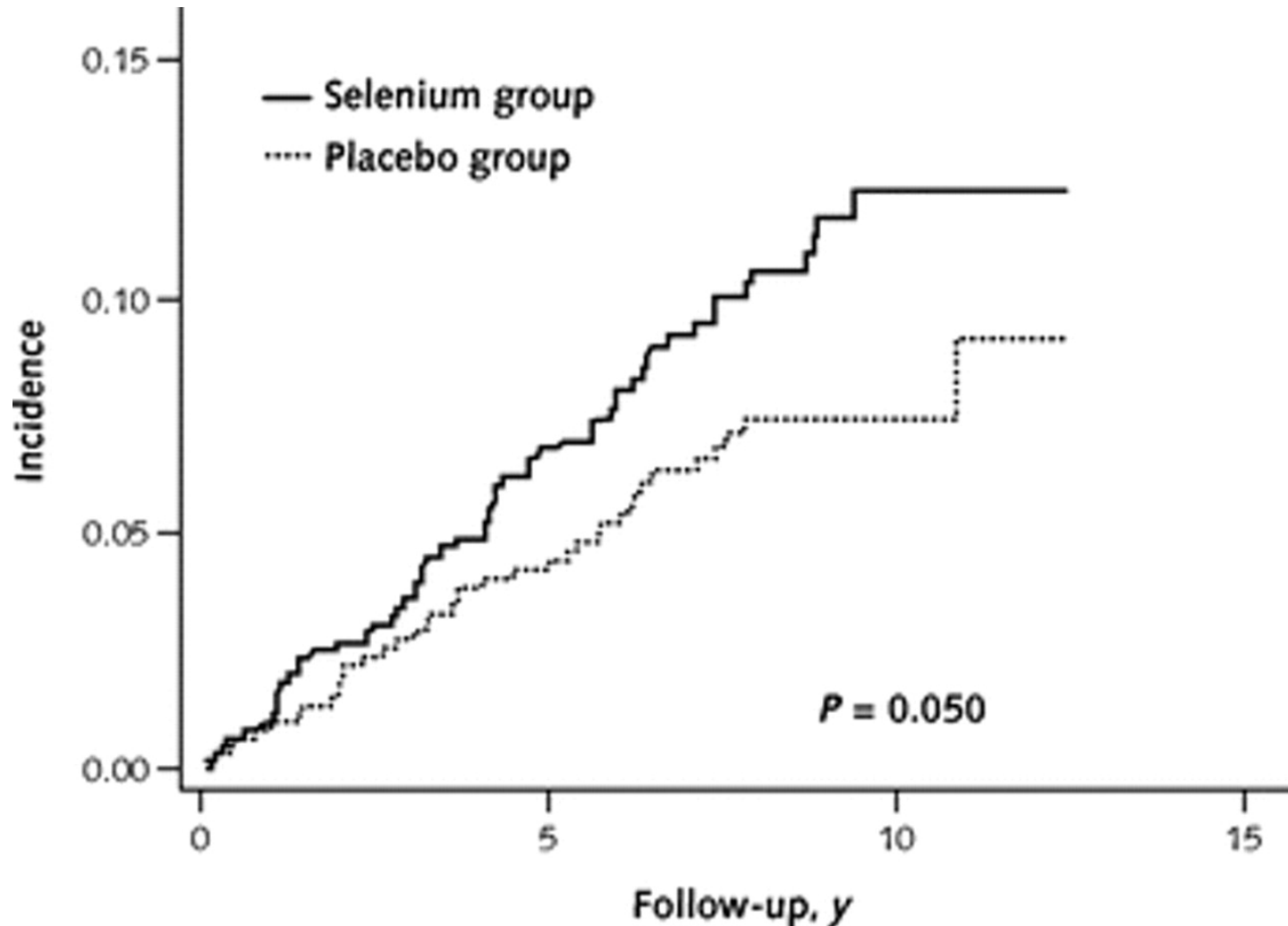
Stranges et al (2010) *J. Nutr.* **140**, 81–87

Daily Selenium Intake in Various Countries ($\mu\text{g}/\text{d}$)



(from: Navas-Acien *et al.* Curr. Opin. Lipidol. 2008)

Cumulative incidence of type 2 diabetes



Stranges S et al. Ann Intern Med 2007;147:217-223

Annals of Internal Medicine

Hypothesis

Selenoprotein P expression interferes with glucose metabolism and insulin signaling and can induce insulin resistance

Speckmann et al (2008) *Hepatology* **48**, 1998–2006

Speckmann et al (2009) *Biochem Biophys Res Commun* **387**, 158–163

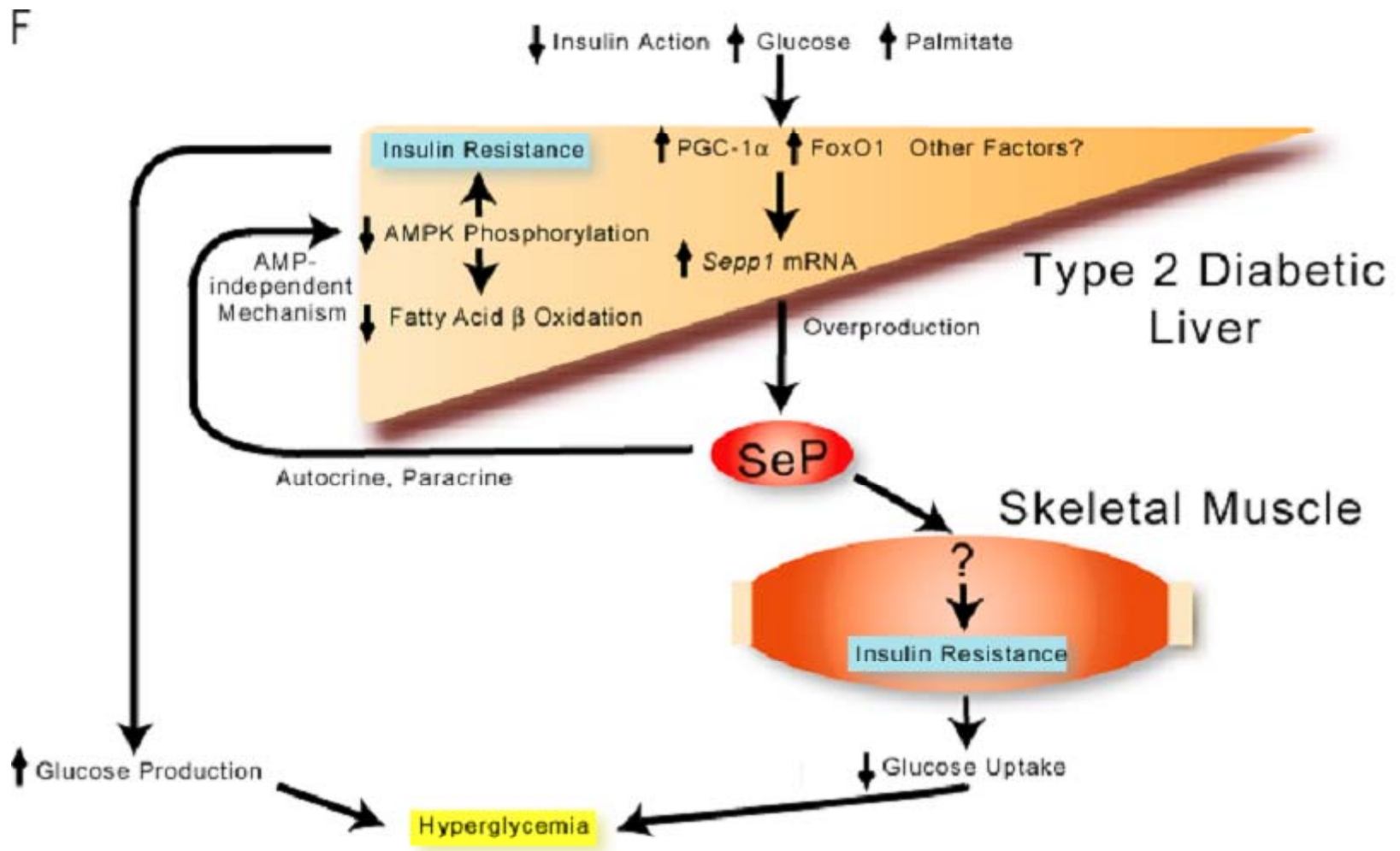
Walter et al (2008) *Biochem Biophys Res Commun* **365**, 316-321

Misu et al (2010) *Cell Metabolism* **12**, 483-495

Pinto et al (2011) *J Inorg Biochem* **105**, 812-820

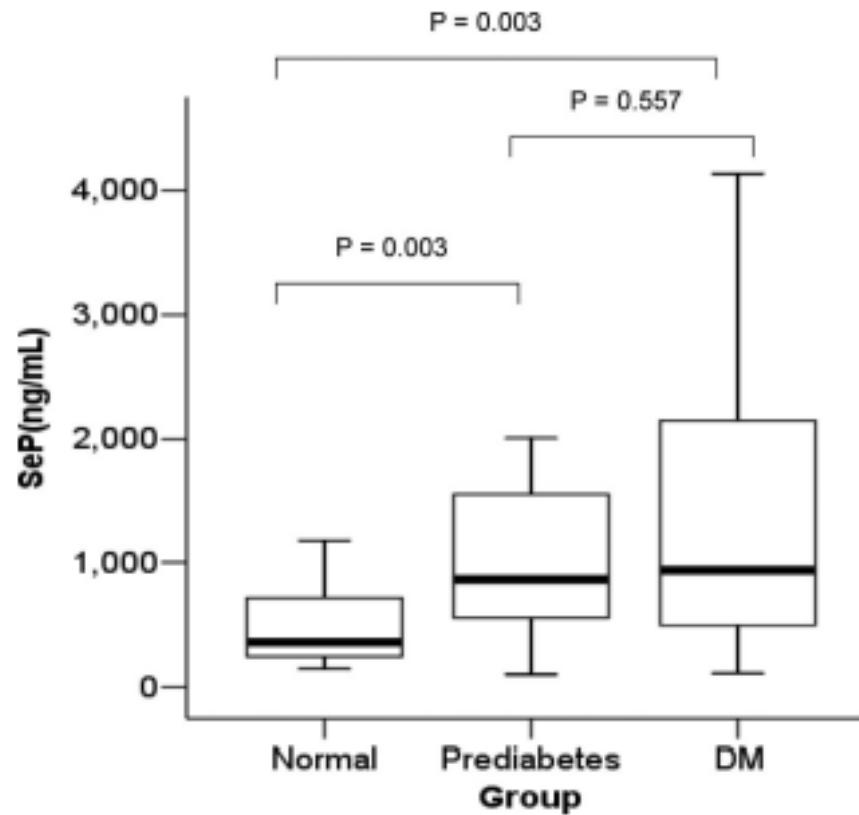
Review: Steinbrenner et al (2011) *J Clin Biochem Nutr* **48**, 40-45

A Liver-Derived Secretory Protein, Selenoprotein P, Causes Insulin Resistance



Misu *et al* (2010) *Cell Metabolism* **12**, 483-495

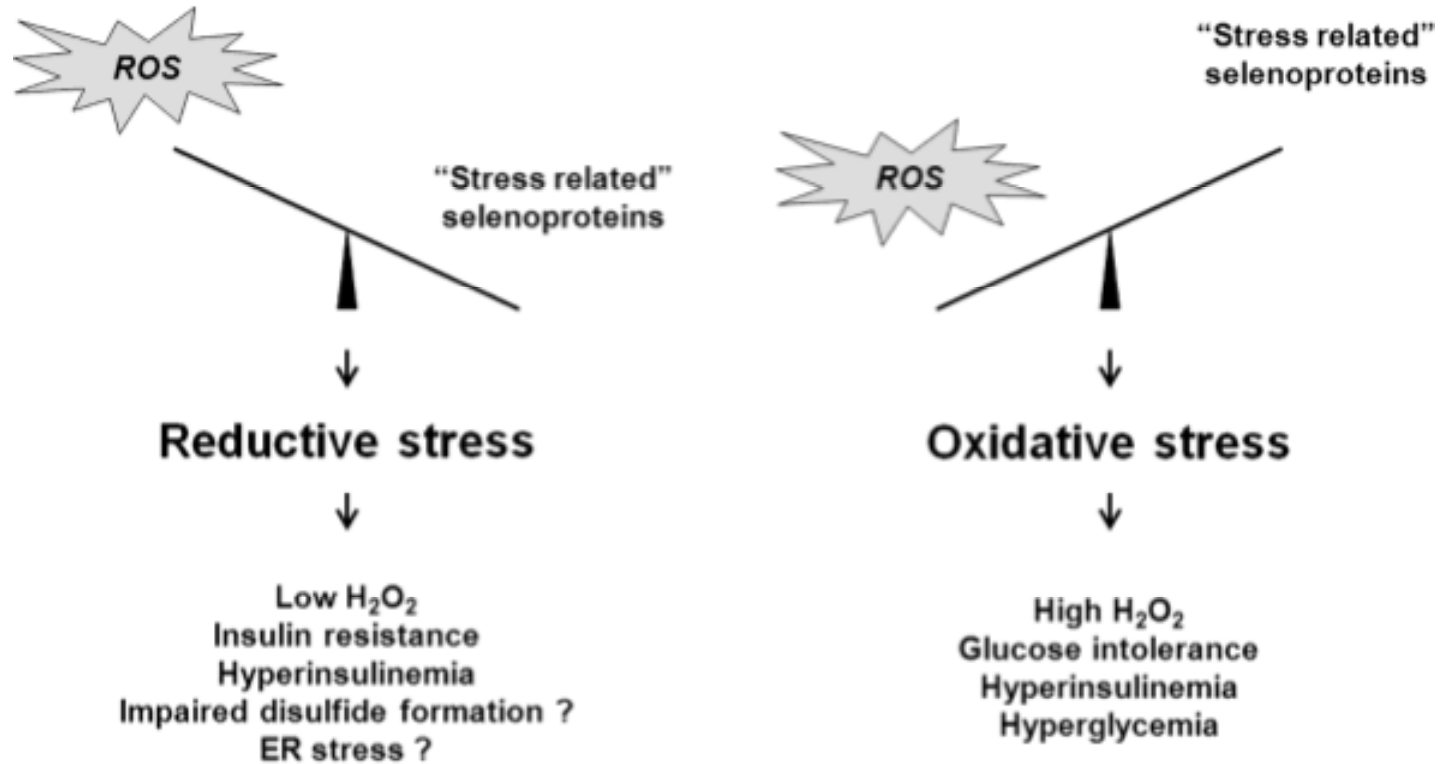
Serum selenoprotein P levels in individuals with prediabetes and type 2 diabetes



S.J. Yang *et al.* J Clin Endocrinol Metabol 96, 2011

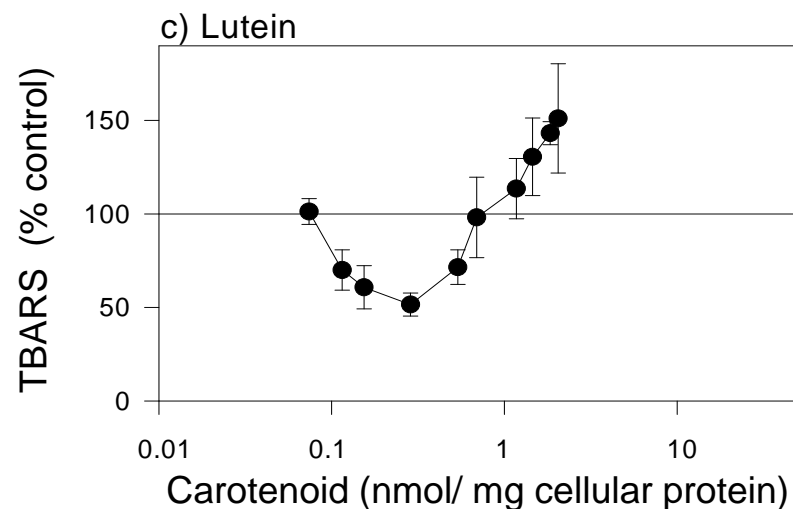
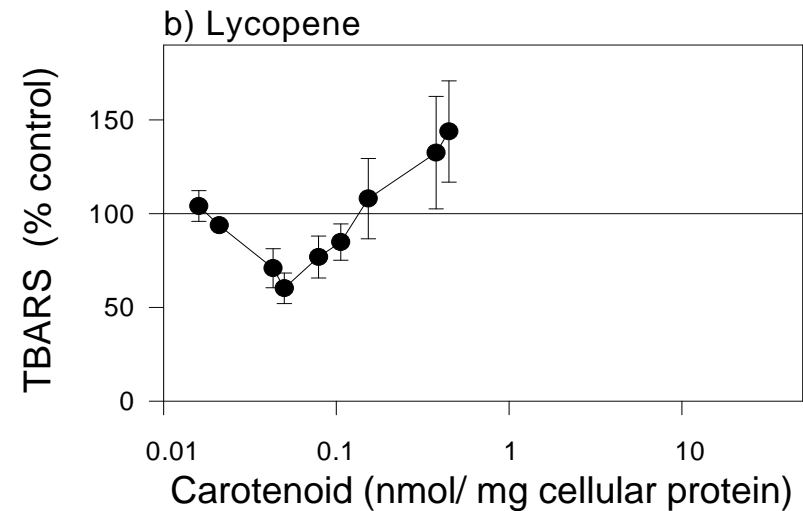
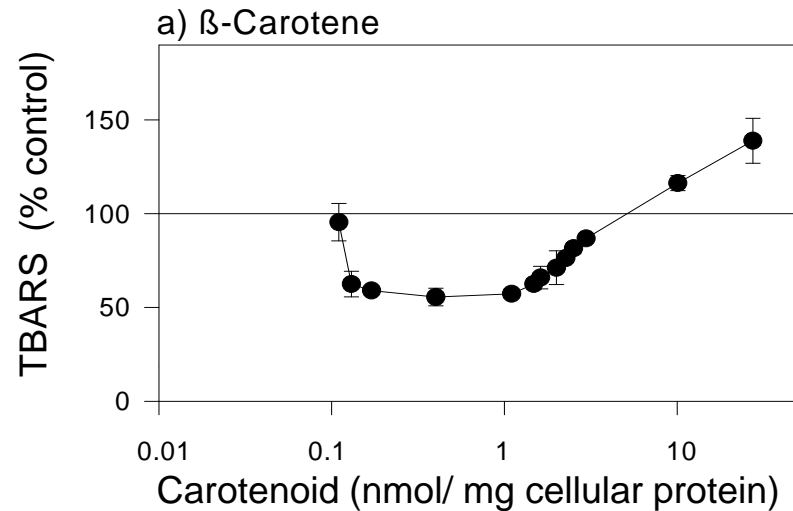
Se supplementation

Selenoprotein deficiency



Labunskyy et al., Figure 6

Carotenoids and UV-induced TBARS formation in skin fibroblasts

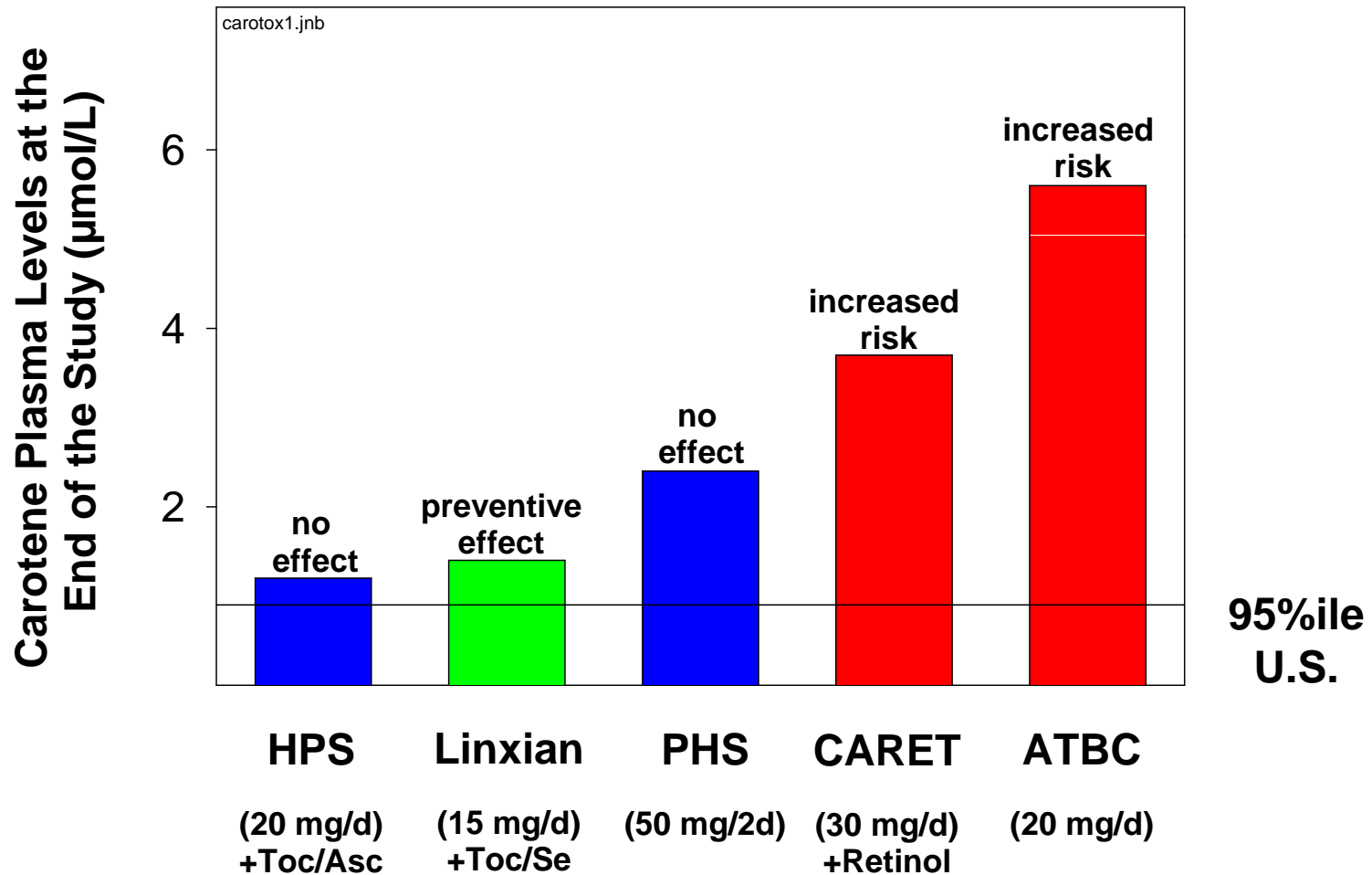


100 % = UV-induced TBARS-formation in controls without carotenoids:

1.4 ± 0.2 nmol MDA/mg protein
(n=14)

Eichler et al (2002) Photochem. Photobiol. 75, 503-506

β -Carotene - Intervention Studies



Oxidative Stress

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Oxidative Stress Definitions

Related Terms

Reductive Stress

Nitrosative Stress

Concluding Remarks

Glossary

Oxidative stress An imbalance between oxidants and antioxidants in favor of the oxidants, leading to a disruption of redox signaling and control and/or molecular damage.

In:

Encyclopedia of Stress

(Fink, G., ed.) Vol. 3,
45-48, , Elsevier, 2007