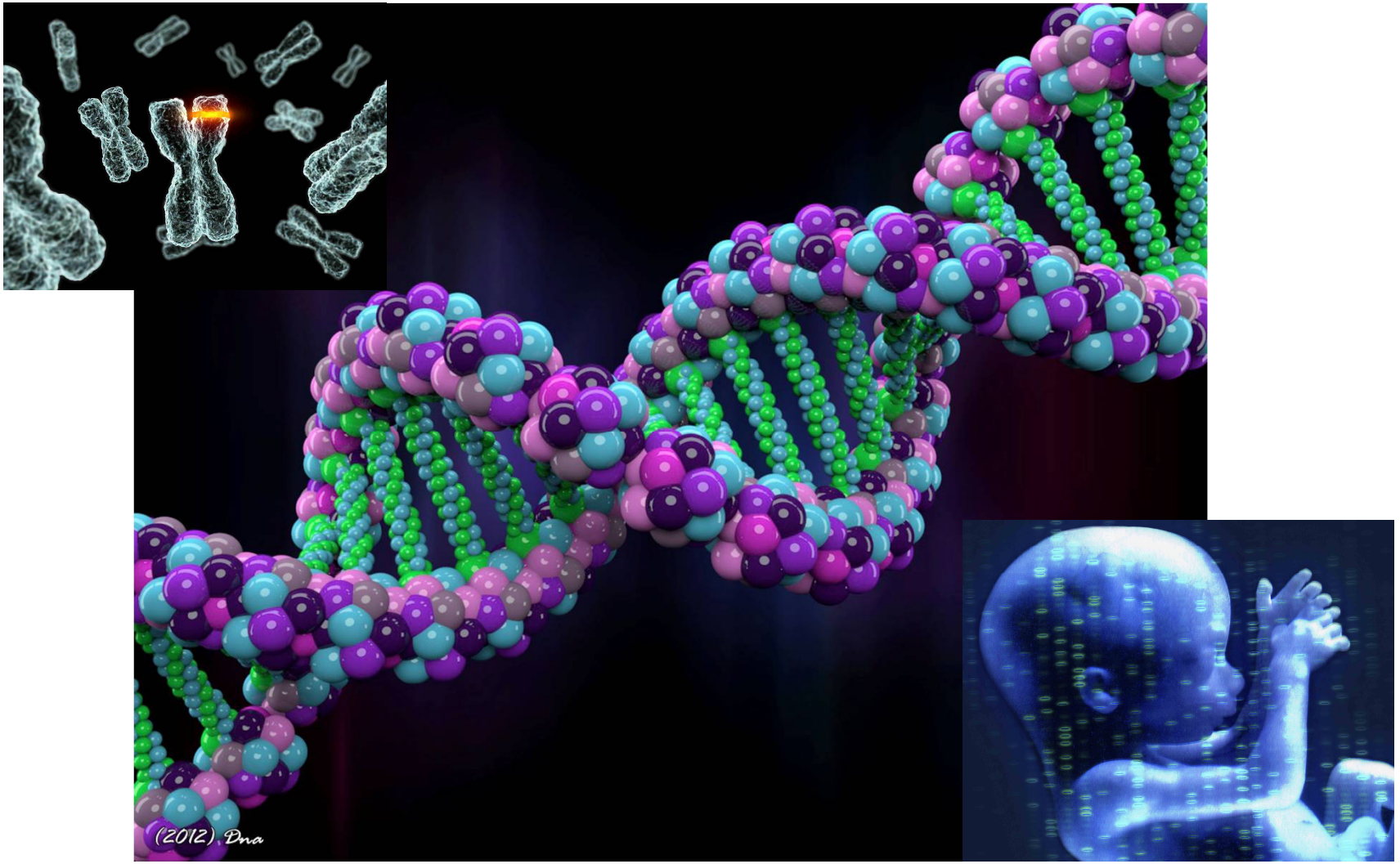
PERSONALIZED NUTRITION PLANS BASED ON MEASUREMENT OF SPECIFIC REDOX BIOMARKERS IN HUMAN BLOOD

Demetrios Kouretas

Professor, Animal Physiology - Toxicology

IS THERE A WAY TO BRIDGE THE GAP BETWEEN LIFESPAN AND HEALTHSPAN?

Is Your Lifespan (and/or Healthspan) "Programmed" in Your Genes?



Genetics

Your Genetic Make-up Influences Life Expectancy

A glance at your family tree may indicate whether you have a tendency to live a long, healthy life

Family History

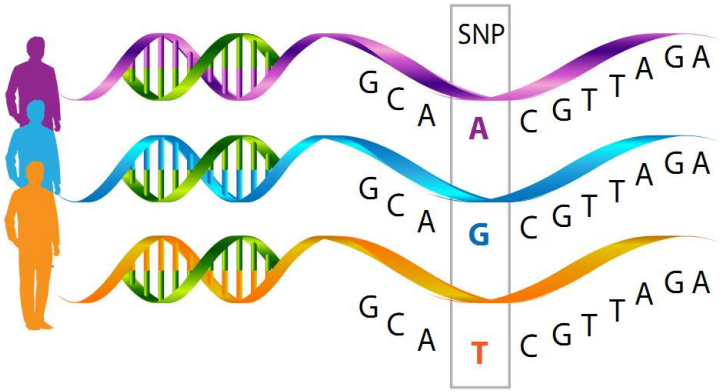
1. Exceptional longevity (1 to 3 decades longer than average) tends to run in families

2. Siblings of "super-centenarians" tend to live longer than average

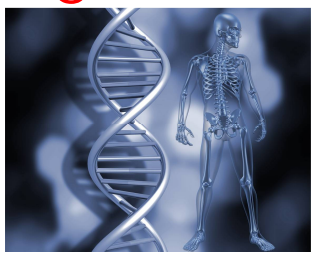
What Does Genetic Analysis of Exceptionally Long-lived People Reveal About Longevity?

There are "nodes" of exceptionally long-lived people throughout the world

Genome Analysis [with "single nucleotide polymorphisms" (SNPs)] of Exceptionally Long-lived People Reveal…



Complex Genetic Signatures



19 different genetic groupings

Very Few Genes Consistently Involved

- FOXO3A
- APOE
- Many SNPs

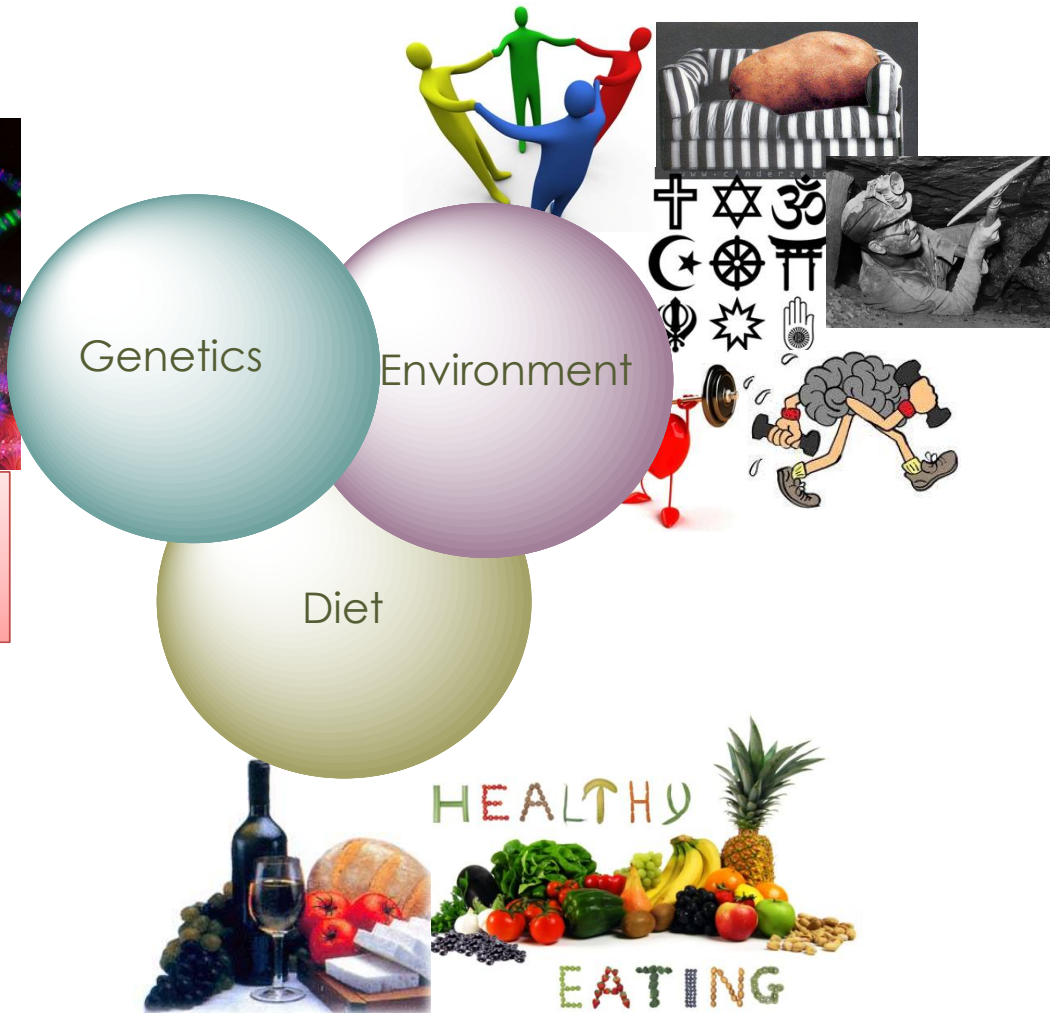
No Genes Associated With Diseases

Longevity genes confer resiliency

Genes do not solely govern whether you will live longer than an average lifespan

Genetic Analysis Suggests that Environment & Diet are the Major Determinants for Healthy Aging

15-25% of longevity quotient



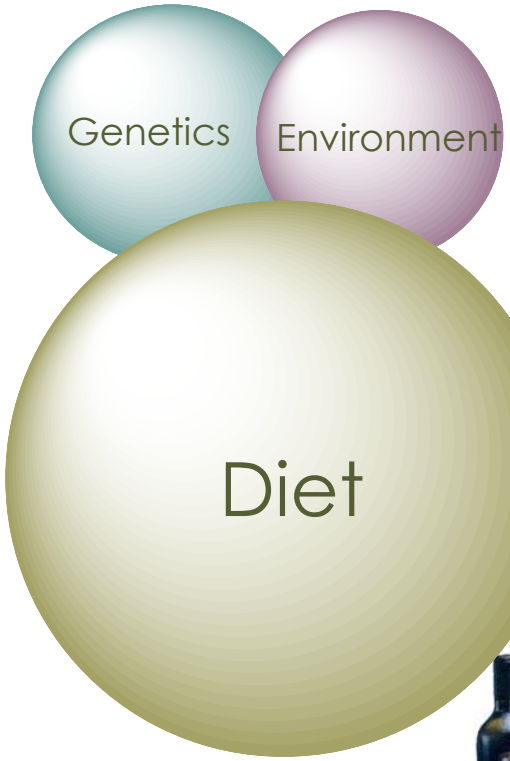
Accentuating Positive Lifestyle Factors & Eliminating the Adverse Ones Promotes Healthy Aging

Faster Walk Times
Greater Handgrip Strength

Life- and health-span can be increased by as much as
10 years!

Lower Blood Pressure & glucose
Lower Indices of Inflammation

DIET IS THE LARGEST FACTOR AFFECTING LONGEVITY AND HEALTHY AGING



Nutrient influence on healthy aging is being extensively studied in humans and in many animal models of aging

THE 3 PILLARS OF METABOLIC HEALTH

1ST PILLAR

Consumption of plant – derived products rich in polyphenols promotes healthy lifespan

WHAT IS THE QUANTITY OF ANTIOXIDANTS FOR A PERSONALIZED NUTRITION REGIME?

ELSEVIER

Food and Chemical Toxicology

Volume 73, November 2014, Pages 1-6

Pomegranate juice consumption increases GSH levels and reduces lipid and protein oxidation in human blood

Chrysoula M. Matthaiou [b], Nikolaos Goutzourelas [a], Dimitrios Stagos [a], Eleni Sarafoglou [a], Athanasios Jamurtas [c], Sofia D. Koulocheri [b], Serkos A. Haroutounian [b], Aristidis M. Tsatsakis [d], Dimitrios Kouretas [a]

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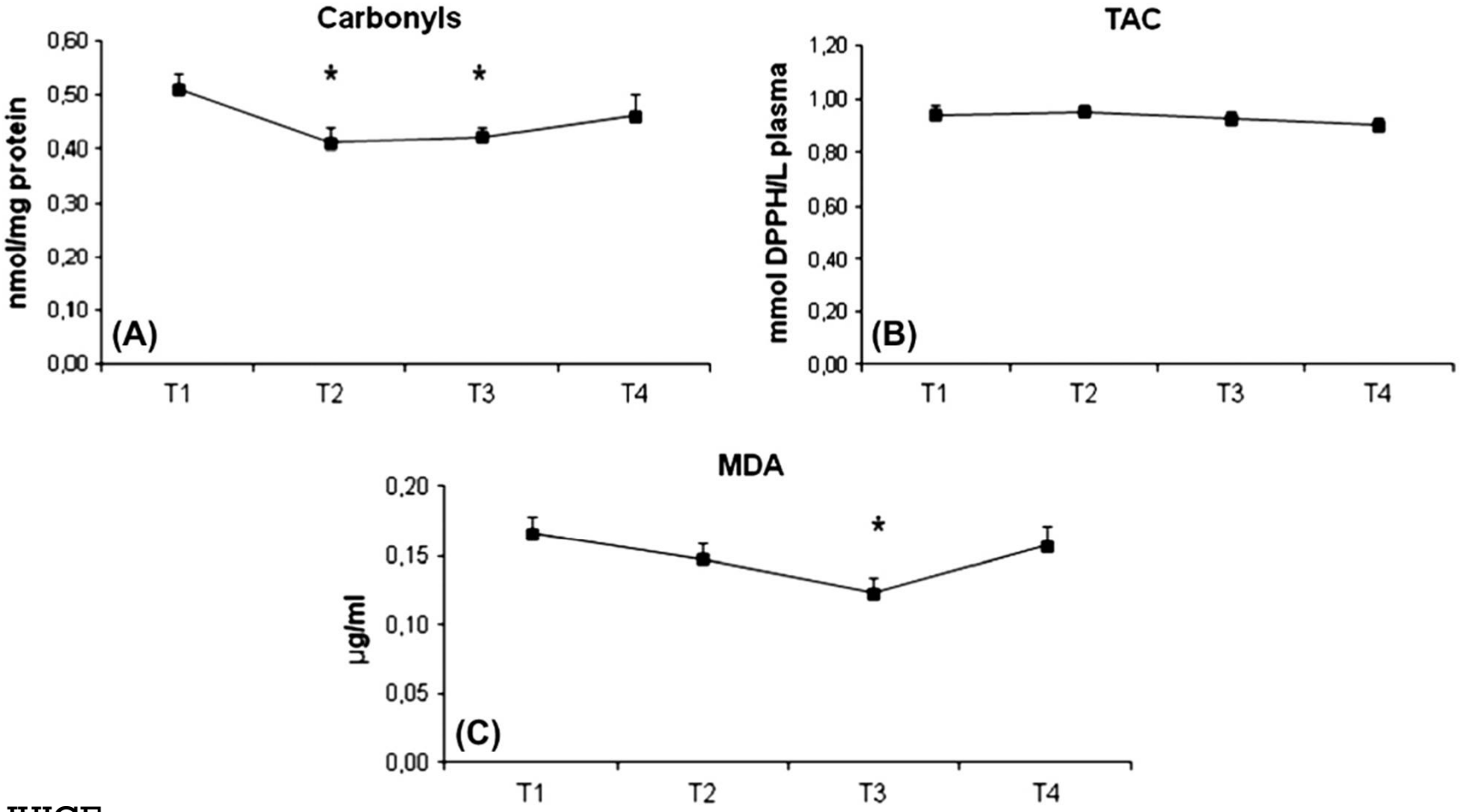
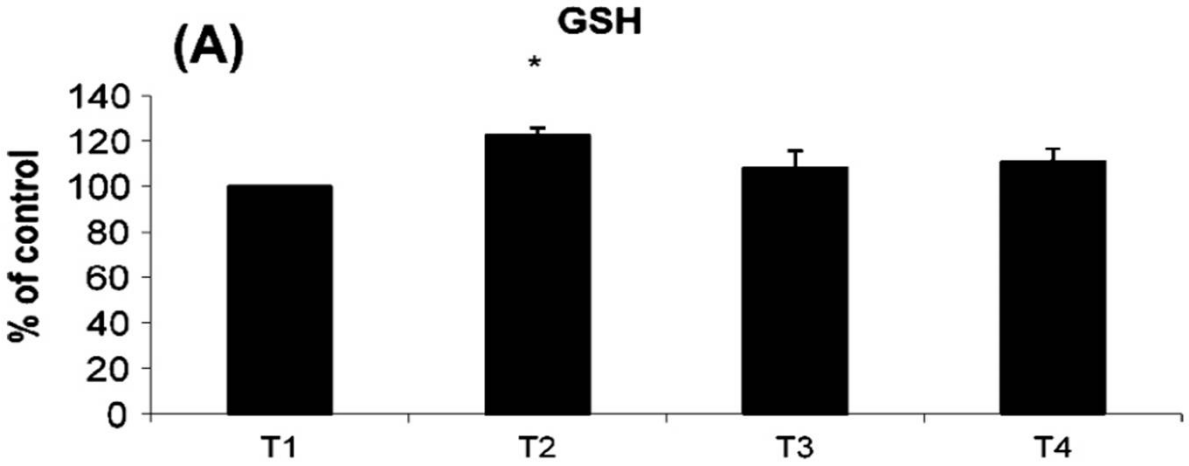
https://doi.org/10.1016/j.fct.2014.07.027

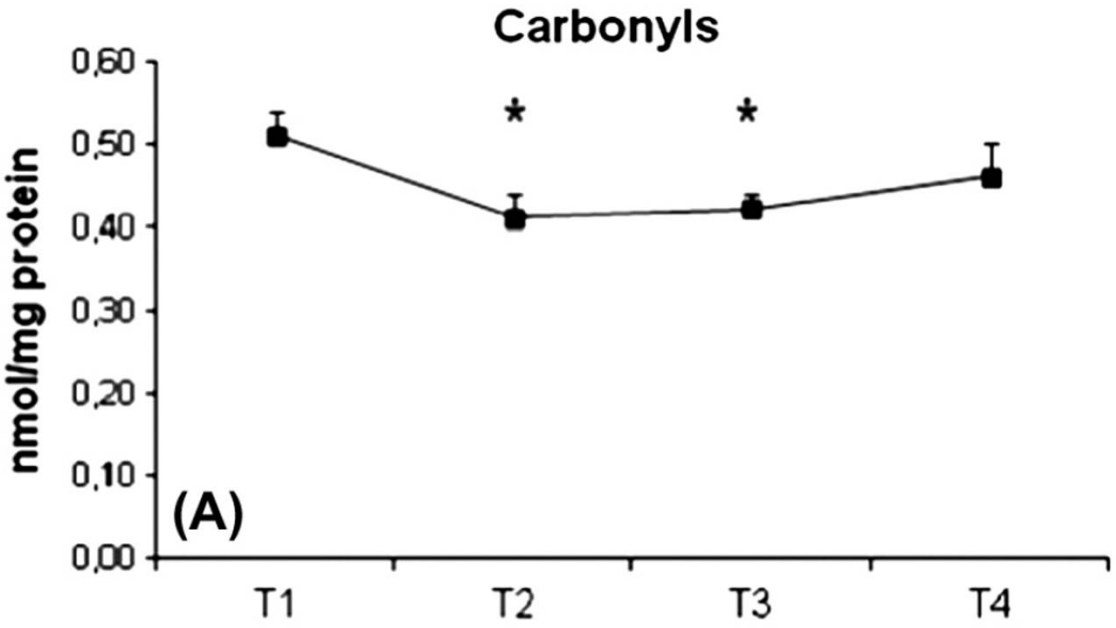


T1: BEFORE JUICE
T2: IMMEDIATELY AFTER STOPPING JUICE (2 WEEKS)
T3: A WEEK AFTER THE JUICE ADMINISTRATION
T4: 3 WEEKS AFTER STOPPING JUICE ADMINISTRATION



Statistically significant increase in GSH with pomegranate juice for 2 weeks

Statistically significant decrease in protein carbonyls with pomegranate juice for 2 weeks and maintained for 1 month



antioxidants

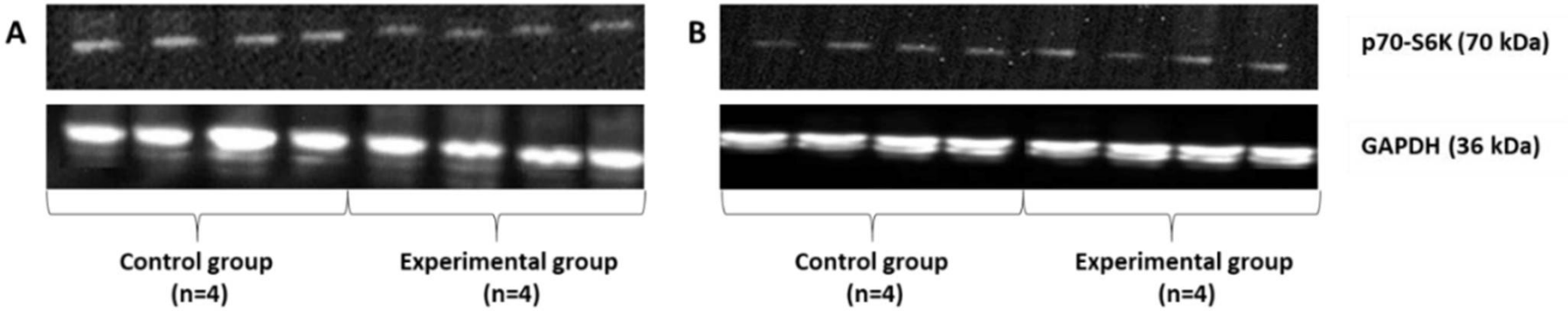
MDPI

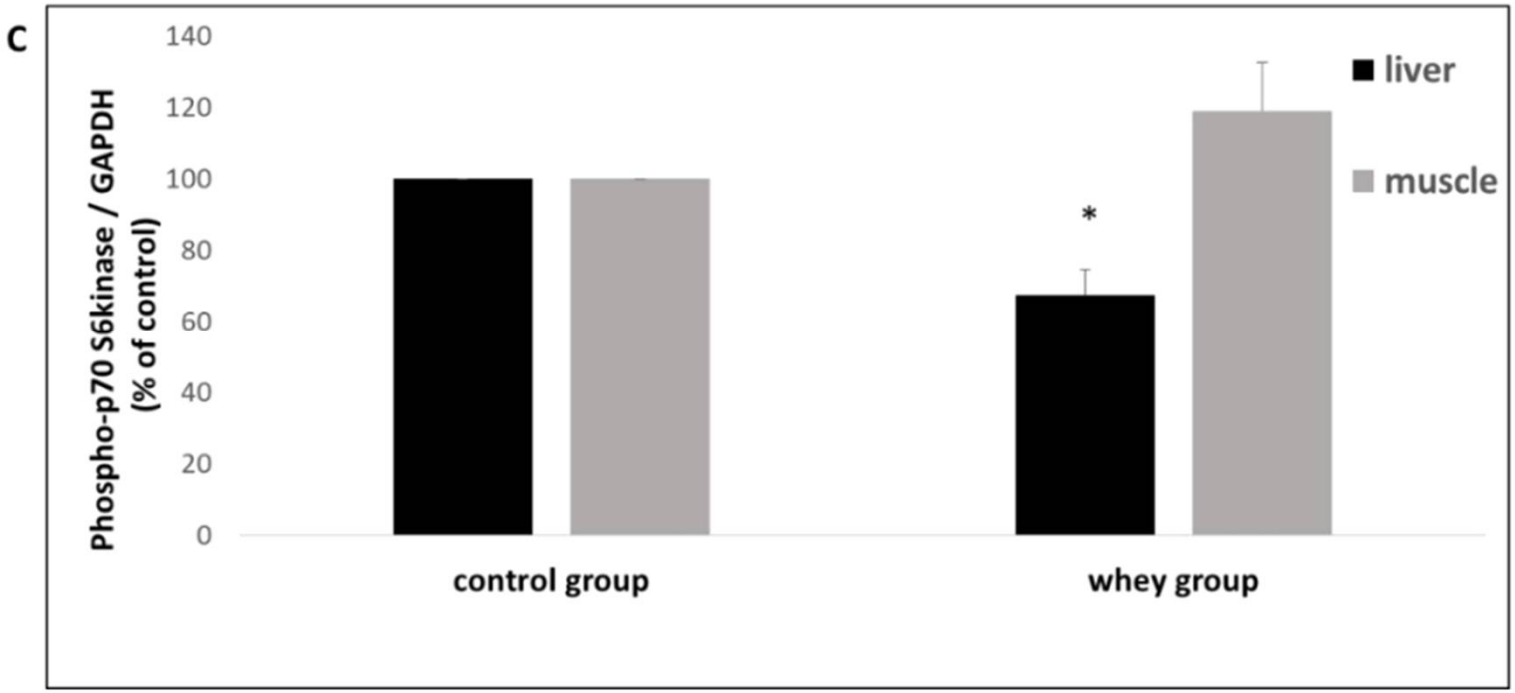
Article

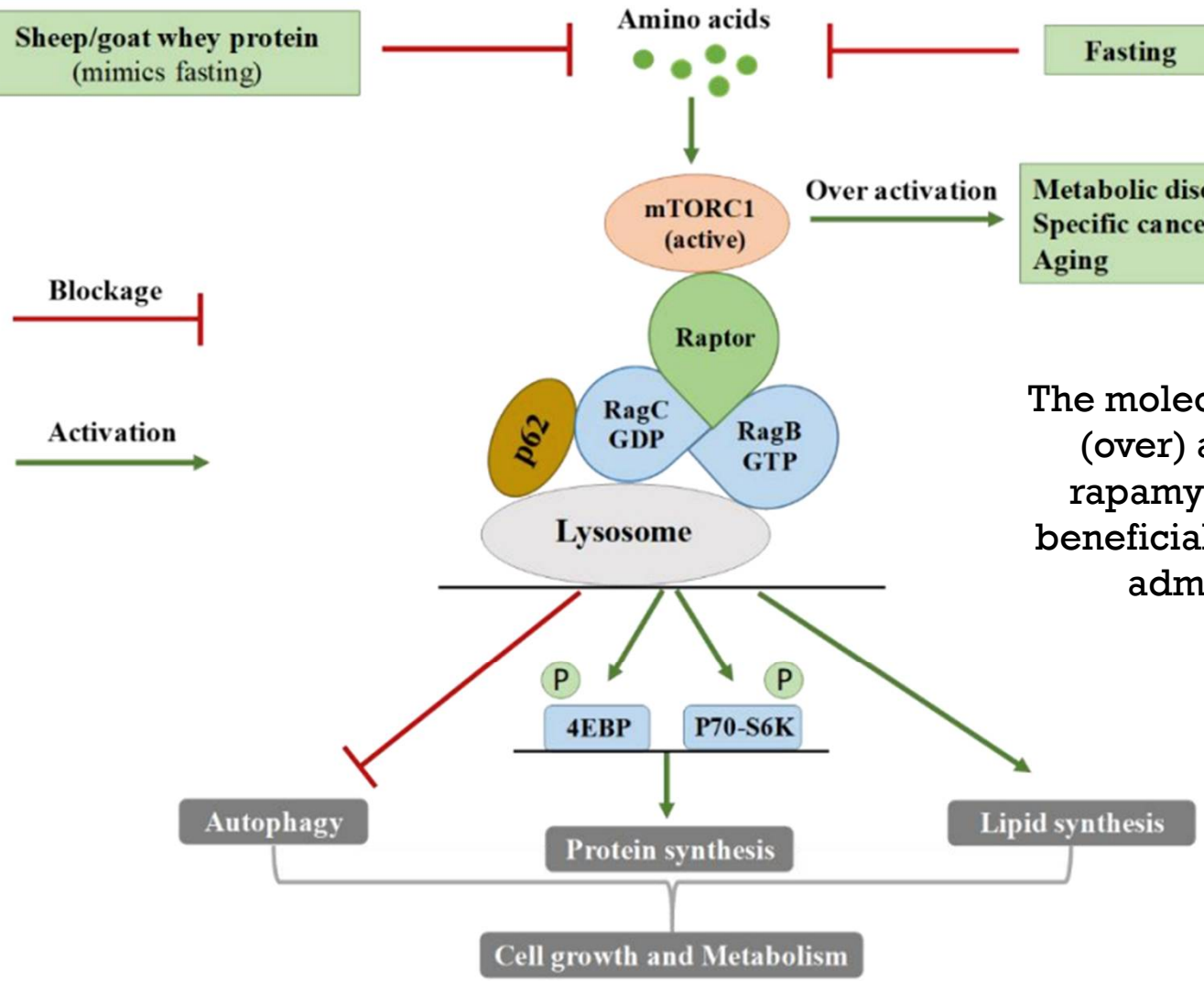
The Strong Antioxidant Sheep/Goat Whey Protein Protects Against mTOR Overactivation in Rats: A Mode of Action Mimicking Fasting

Efthalia Kerasioti [1], Aristidis Veskoukis [1], Christina Virgiliou [2,3], Georgios Theodoridis [2,3], Ioannis Taitzoglou [4] and Dimitrios Kouretas [1,*]

Sheep/Goat Whey Protein inactivates of mTOR





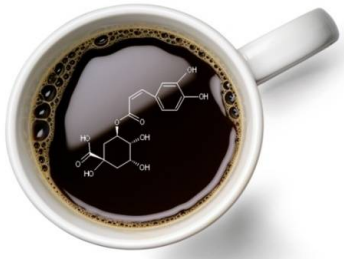


The molecular pathway of amino-acid-related (over) activation of mammalian target of rapamycin complex 1 (mTORC1) and the beneficial action of sheep/goat whey protein administration that mimics fasting.

COMPARISON OF ANTIOXIDANTS

1 glass of pomegranate juice

=



3 cups espresso
1 cup instant coffee

=

5 glasses of red wine

=

17 cups of juice

23 glasses of beer

=

50 glasses of white wine

=

100 glasses of milk

2ND PILLAR

Exercise promotes healthy lifespan

REACTIVE SPECIES AND PHYSIOLOGICAL ADAPTATIONS TO ENDURANCE TRAINING

VS

Acute oxidative stress

Mitochondrial biogenesis ↑
Antioxidant capacity ↑
Insulin sensitivity ↑
Muscle hypertrophy ↑

Takuji Kawamura, Isao Muraoka. Exercise-Induced Oxidative Stress and the Effects of Antioxidant Intake from a Physiological Viewpoint. Chemistry, MedicinePublished in Antioxidants 2018. DOI:10.3390/antiox7090119

EFFECTS OF PHYSICAL ACTIVITY ON OXIDATIVE STRESS STATUS

Sedentary lifestyle

Light/moderate PA

Acute strenuous PA

Regular training/Elite sports (Hormesis)

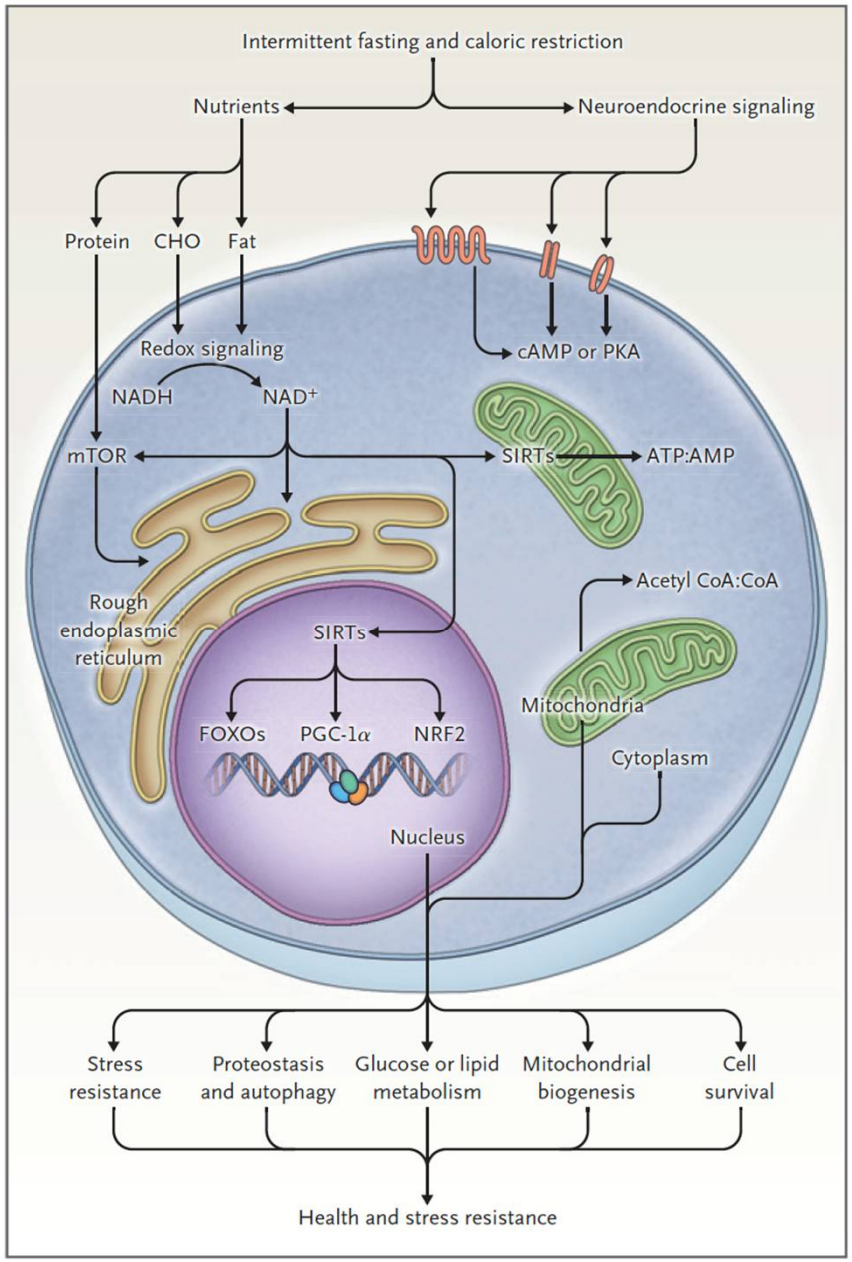
Changes related to PA

1-2 MET	> MET	>> MET	>> MET
= Scavengers = ROS =Ox stress	↑ Scavengers ↑ ROS ↓ Ox stress	↑ Scavengers ↑ ↑ ROS ↑ ↑ Ox stress	↑ Scavengers ↓ ROS ↓ Ox stress ↑ Resistance to Ox stress bursts

Alessandro PingitoreM.D., Giuseppina Pace PereiraLimaPh.D., FrancescaMastorciPh.D., AlfredoQuinonesM.D., GiorgioIervasiM.D., CristinaVassallePh.D. Exercise and oxidative stress: Potential effects of antioxidant dietary strategies in sports. Volume 31, Issues 7–8, July–August 2015, Pages 916-922

3RD PILLAR

Fasting induces metabolic shift and promotes healthy lifespan

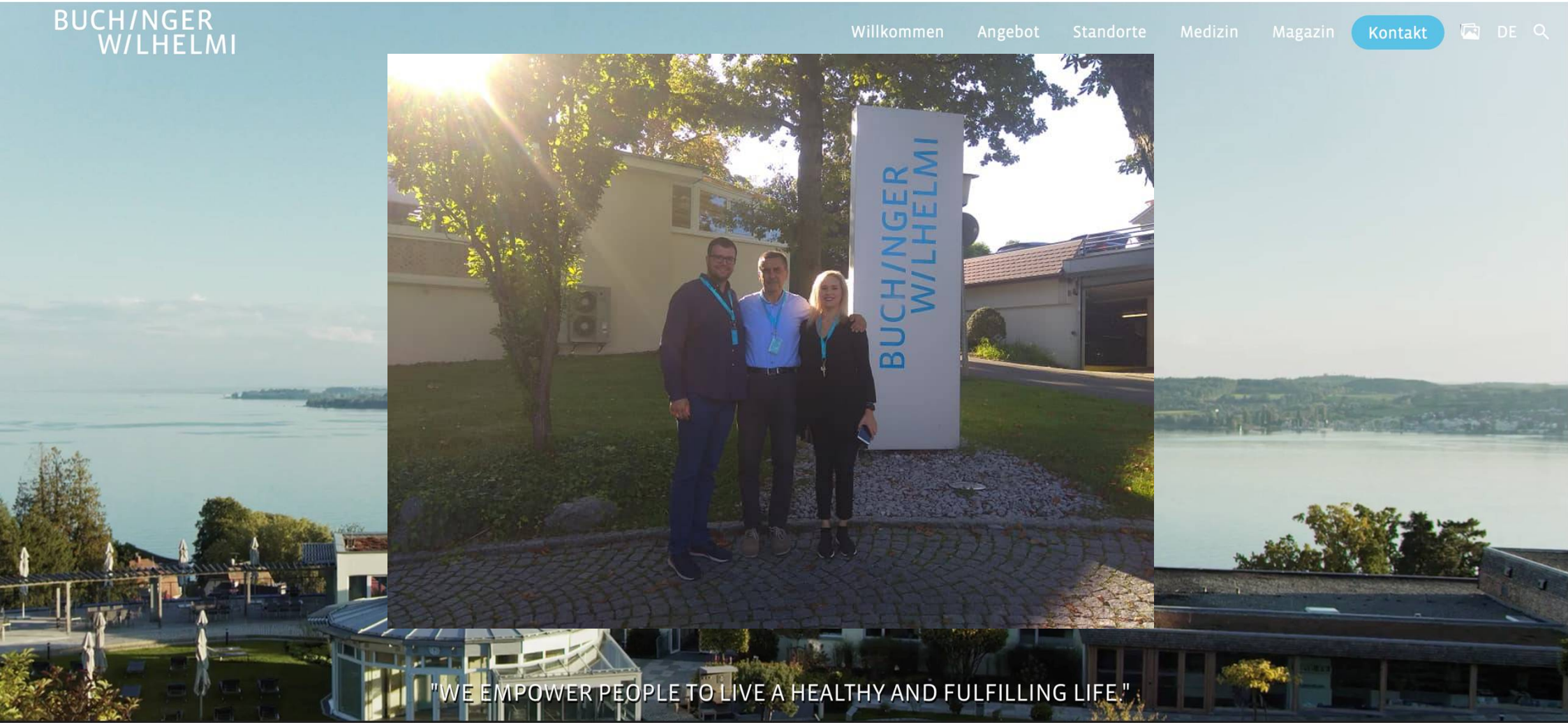


FASTING AND HEALTH

Cellular Responses to Energy Restriction That Integrate Cycles of Feeding and Fasting with Metabolism.

Effects of Intermittent Fasting on Health,
Aging, and Disease. Rafael de Cabo, Ph.D., and Mark P. Mattson, Ph.D. N
Engl J Med 2019;381:2541-51.
DOI: 10.1056/NEJMra1905136

BUCHINGER WILHELMI CLINIC



antioxidants

MDPI

Article

Influence of Long-Term Fasting on Blood Redox Status in Humans

Françoise Wilhelmi de Toledo [1,*,†], Franziska Grundler [1,2,†], Nikolaos Goutzourelas [3], Fotios Tekos [3], Eleni Vassi [3], Robin Mesnage [4] and Demetrios Kouretas [3,*]

1 Buchinger Wilhelmi Clinic, 88662 Überlingen, Germany; franziska.grundler@buchinger-wilhelmi.com
2 Charité–Universitätsmedizin Berlin, Corporate Member of Freie Universität Berlin, Humboldt–Universität zu Berlin and Berlin Institute of Health, 10117 Berlin, Germany
3 Department of Biochemistry-Biotechnology, School of Health Sciences, University of Thessaly, Viopolis, 41500 Larissa, Greece; nikgkoutz@gmail.com (N.G.); fotis.tekos@gmail.com (F.T.); elenhva.97@outlook.com.gr (E.V.)
4 Gene Expression and Therapy Group, King's College London, Faculty of Life Sciences & Medicine, Department of Medical and Molecular Genetics, 8th Floor, Tower Wing, Guy's Hospital, Great Maze Pond, London SE1 9RT, UK; robin.mesnage@kcl.ac.uk
* Correspondence: francoise.wilhelmi@buchinger-wilhelmi.com (F.W.d.T.); dkouret@uth.gr (D.K.); Tel.: +49-7551-8070 (F.W.d.T); +30-2410-565-277 (D.K.)
† These authors contributed equally to this work.

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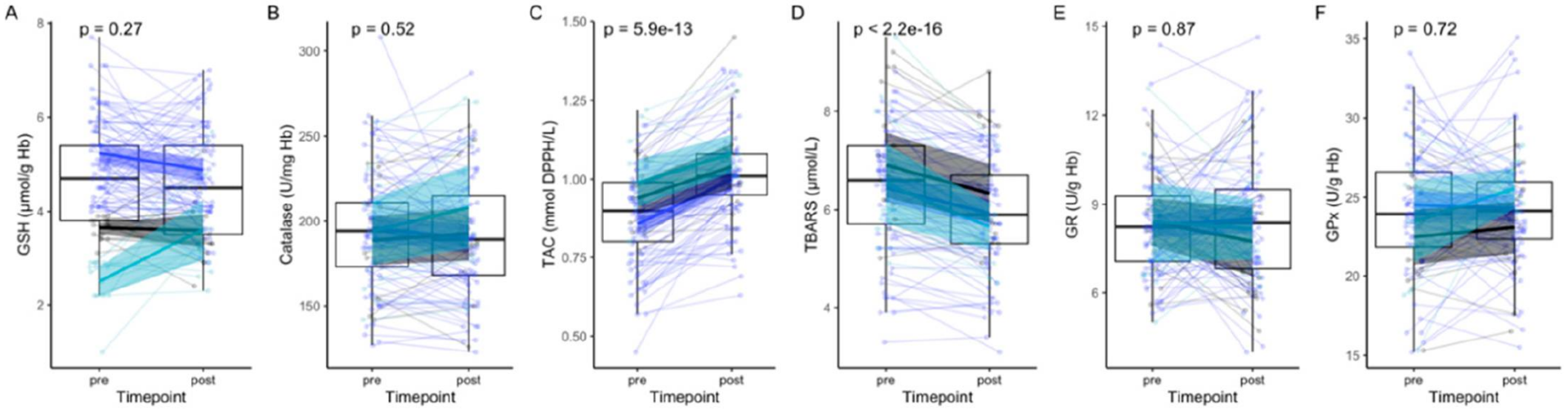


Figure 1. The effects of the 10-day fast on the mean levels of redox biomarkers in a group of 109 subjects. There was no change in GSH levels (**A**). We highlighted 3 subgroups based on the variations in their GSH levels (increase, light blue; decrease, dark blue; unchanged, black) to understand if baseline GSH levels could influence the response to fasting. Catalase (**B**) levels showed no changes either, while TAC (**C**) was significantly increased, and TBARS (**D**) levels were significantly decreased. GR (**E**) as well as GPx (**F**) levels were unchanged.

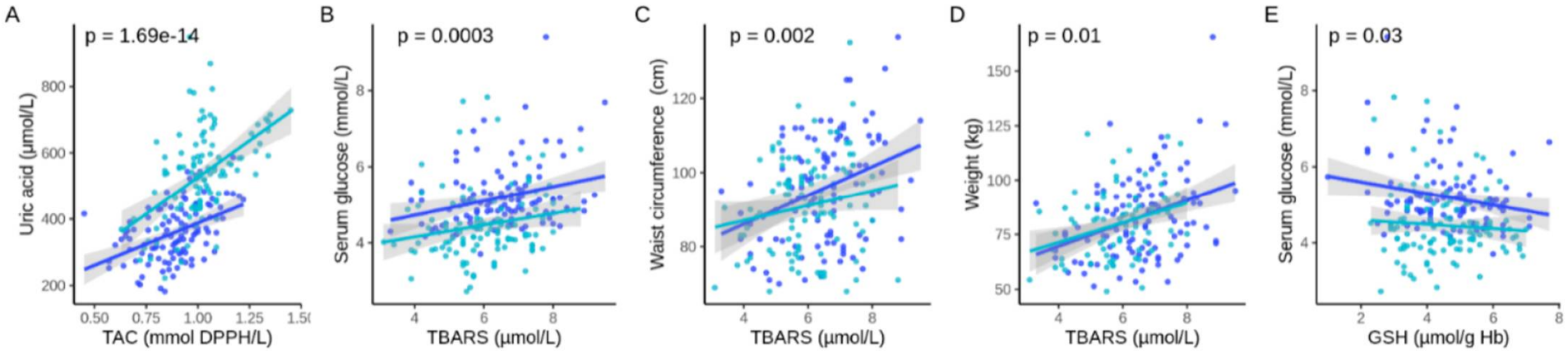


Figure 2. Changes in redox parameters during fasting were associated with changes in clinical parameters. We evaluated associations between the four redox parameters measured in this study (GSH, Catalase, TBARS, TAC) with weight, waist circumference, glucose and uric acid serum levels. The 5 significant associations (**A**–**E**) are presented in this figure. Dot plots shows the correlations between the different parameters for pre-fasting (dark blue) and post-fasting (light blue) levels.

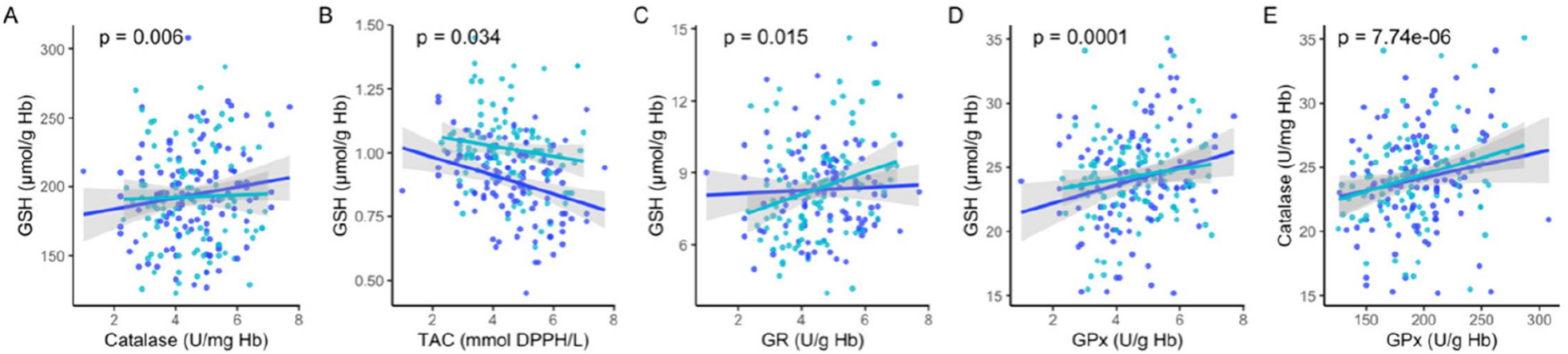
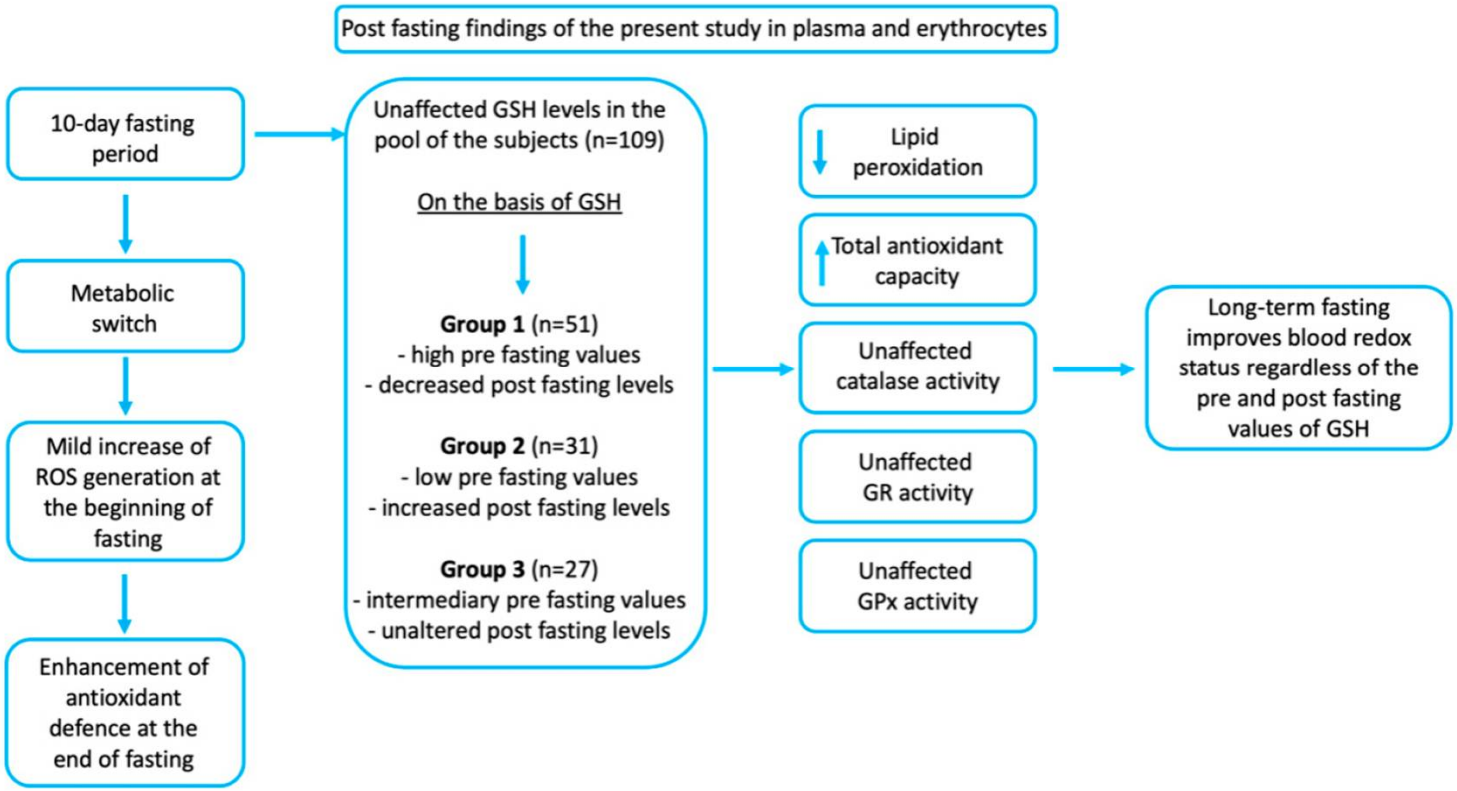


Figure 3. Associations between the different redox parameters measured in this study. We evaluated associations between the six redox parameters measured in this study (GSH, Catalase, TBARS, TAC, GR, GPx). The 5 significant associations (**A**–**E**) are presented in this figure. Dot plots show the correlations between the different parameters for pre-fasting (dark blue) and post-fasting (light blue) levels.


Post fasting findings of the present study in plasma and erythrocytes
10-day fasting period
Metabolic switch
Mild increase of ROS generation at the beginning of fasting
Enhancement of antioxidant defence at the end of fasting
Unaffected GSH levels in the pool of the subjects (n=109)
On the basis of GSH
Group 1 (n=51)
- high pre fasting values
- decreased post fasting levels
Group 2 (n=31)
- low pre fasting values
- increased post fasting levels
Group 3 (n=27)
- intermediary pre fasting values
- unaltered post fasting levels
Lipid peroxidation
Total antioxidant capacity
Unaffected catalase activity
Unaffected GR activity
Unaffected GPx activity
Long-term fasting improves blood redox status regardless of the pre and post fasting values of GSH

HUMAN BIOMARKER MEASUREMENT SERVICES

HOLISTIC EVALUATION OF BLOOD REDOX STATUS MEASURING A WIDE RANGE OF BIOMARKERS, BEFORE AND AFTER A PROPOSED NUTRITIONAL SCHEME

WE MEASURE THE FOLLOWING BIOMARKERS

- **Control of antioxidants**
  - GSH (reduced glutathione),
  - TAC (total antioxidant capacity),
  - Reducing Power,
  - ABTS Radical scavenging
  - Hydroxyl Radical scavenging
  - Superoxide Radical scavenging
- **Control of critical gene products**
  - Catalase,
  - GPx (glutathione peroxidase),
  - SOD (peroxidase dismutase),
  - GR (glutathione reductase) – enzymatic antioxidants that are involved in protecting the cell against free radicals.
- **Control of oxidative damage products**
  - TBARS (lipid peroxidation),
  - Protein Carbonyls (oxidative protein damage)-the end products of free radical action.

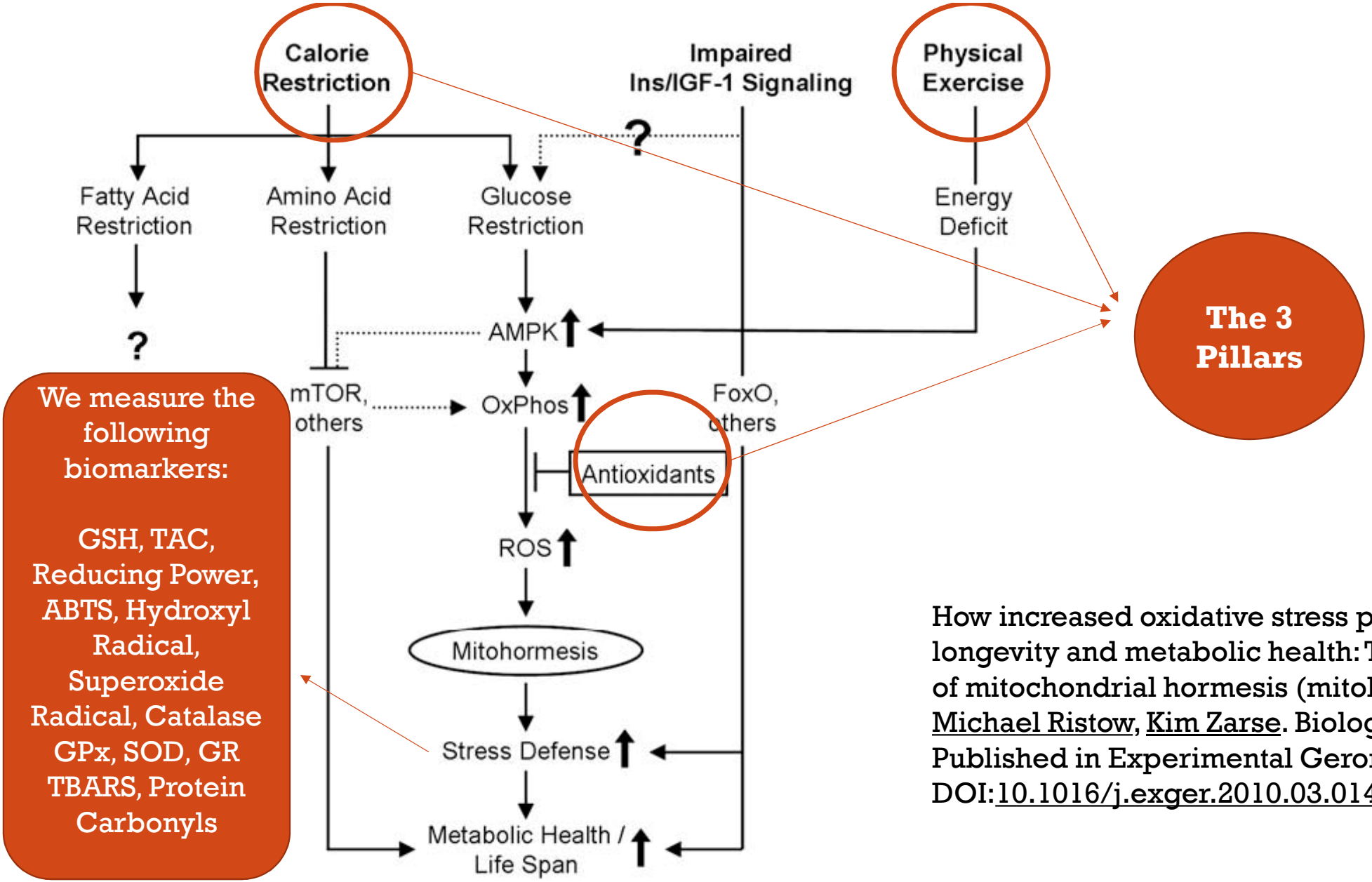
The effect of personalized nutrition on human redox status is evaluated and human health is improved

ANTIOXIDANT CONSUMPTION, EXERCISE AND FASTING REGULATE BASELINE GSH LEVELS IN BLOOD AND IMPROVE HUMAN REDOX STATUS

1ST PILLAR

2ND PILLAR

3ND PILLAR



How increased oxidative stress promotes longevity and metabolic health: The concept of mitochondrial hormesis (mitohormesis) Michael Ristow, Kim Zarse. Biology, Medicine Published in Experimental Gerontology 2010 DOI:10.1016/j.exger.2010.03.014

THANK YOU VERY MUCH FOR YOUR ATTENTION

Demetrios Kouretas

Professor, Animal Physiology - Toxicology

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