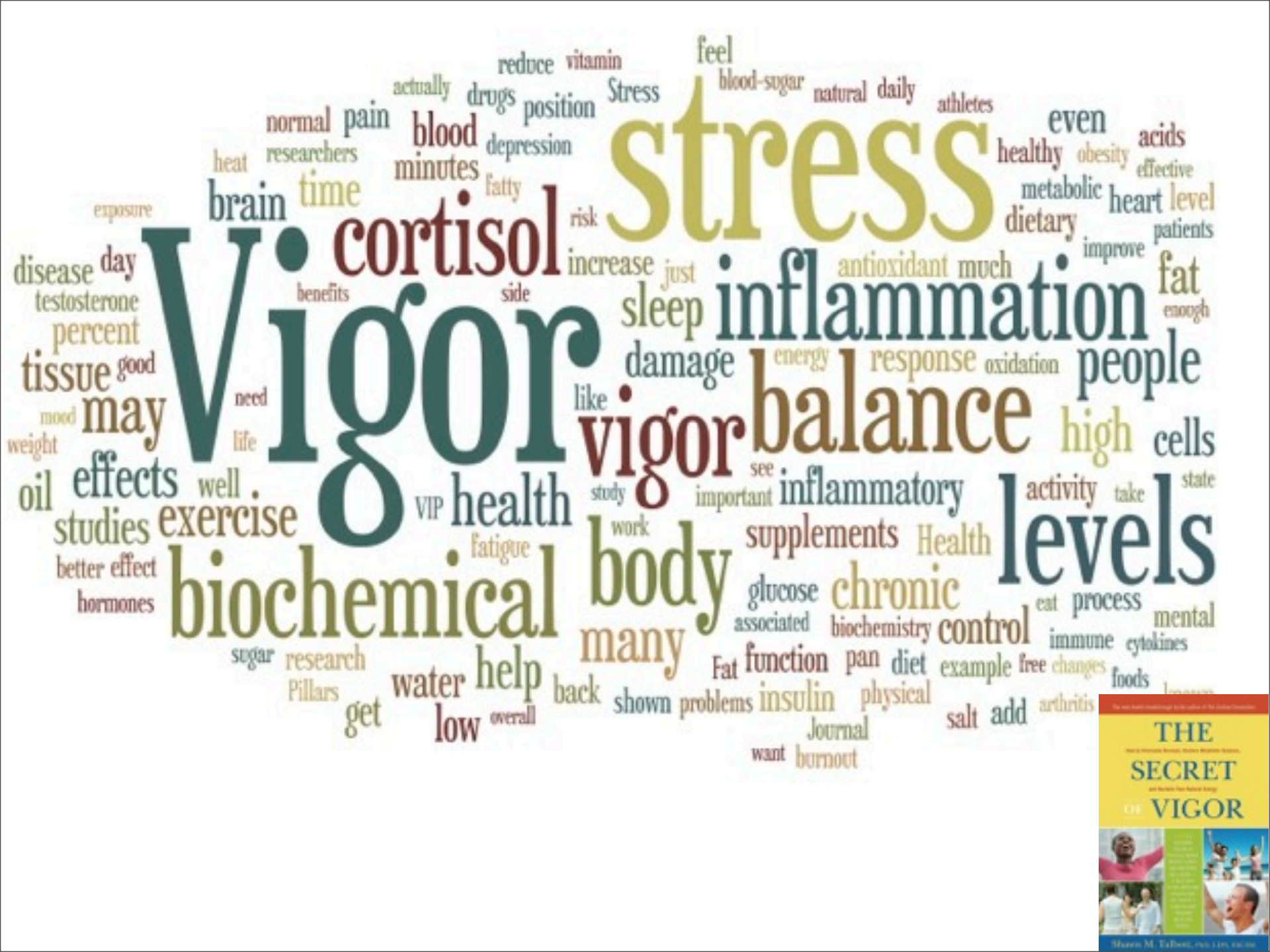
Impact of Chronic Stress & Nutrition on Vigor

Shawn M. Talbott, PhD, CNS, LDN, FAIS, FACSM, FACN

Vigor

3-tiered sustained mood state characterized by
physical energy, mental acuity, and emotional well-being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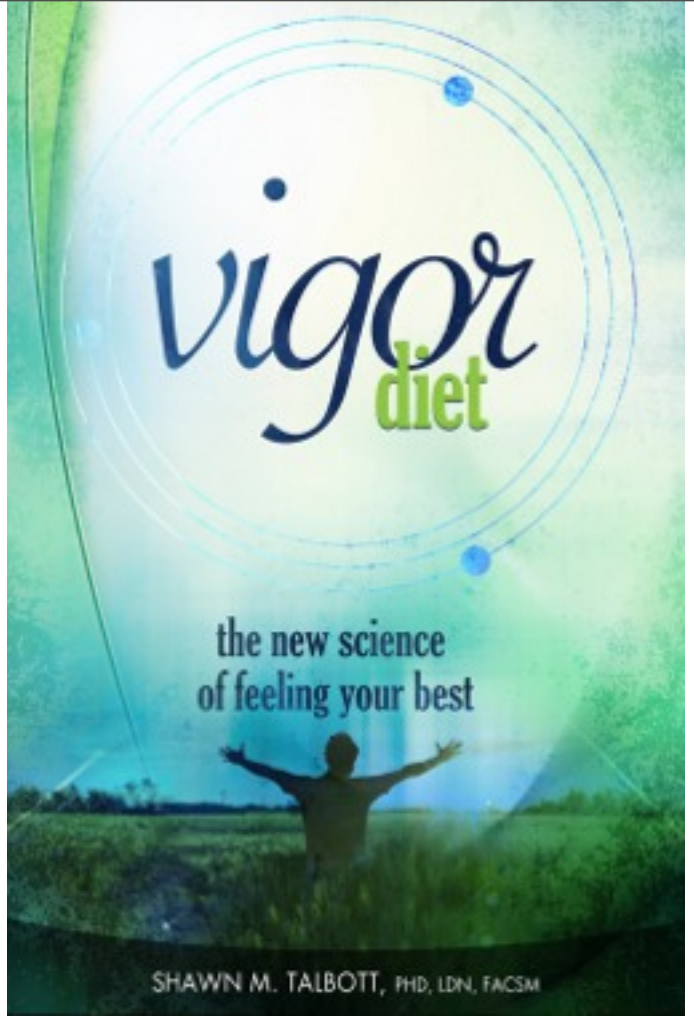
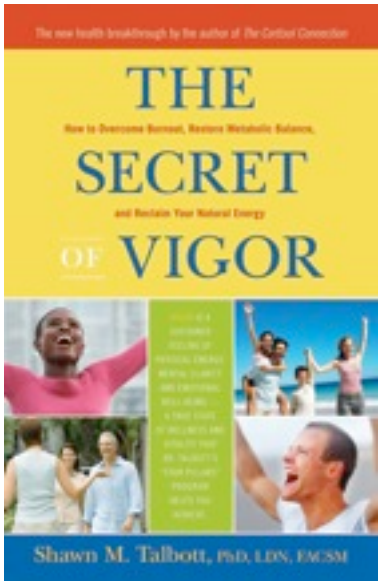
THE
SECRET
OF
VIGOR





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THE MORE PROJECT

Prevalence of Chronic Stress

- Studies show that 50-60% of all lost working days are related to stress
- Work-related stress costs the EU more than 265 billion Euros annually
- Chronic stress is a determinant of Depression, Heart Disease, Diabetes, & Syndrome X
- Stress contributes to half of all illnesses in the United States
- 70-80% of all doctor visits are for stress-related illnesses
- More than half of all deaths before age 65 result from stressful lifestyles
- Generalized anxiety disorder affects ~183 million people worldwide
- People with high anxiety are 4.5x more likely to die of a heart attack or stroke
- 80% of workers report feeling stress on the job
- 65% = American Psychological Association
- 70-80% = World Health Organization (WHO) & Centers for Disease Control (CDC)
- 90% = American Institute of Stress (AIS)

Sources: Working on Stress - European Agency for Safety and Health at Work (http://agency.osha.eu.int)

U.S. Center for Disease Control

World Health Organization; www.whmc.af.mil

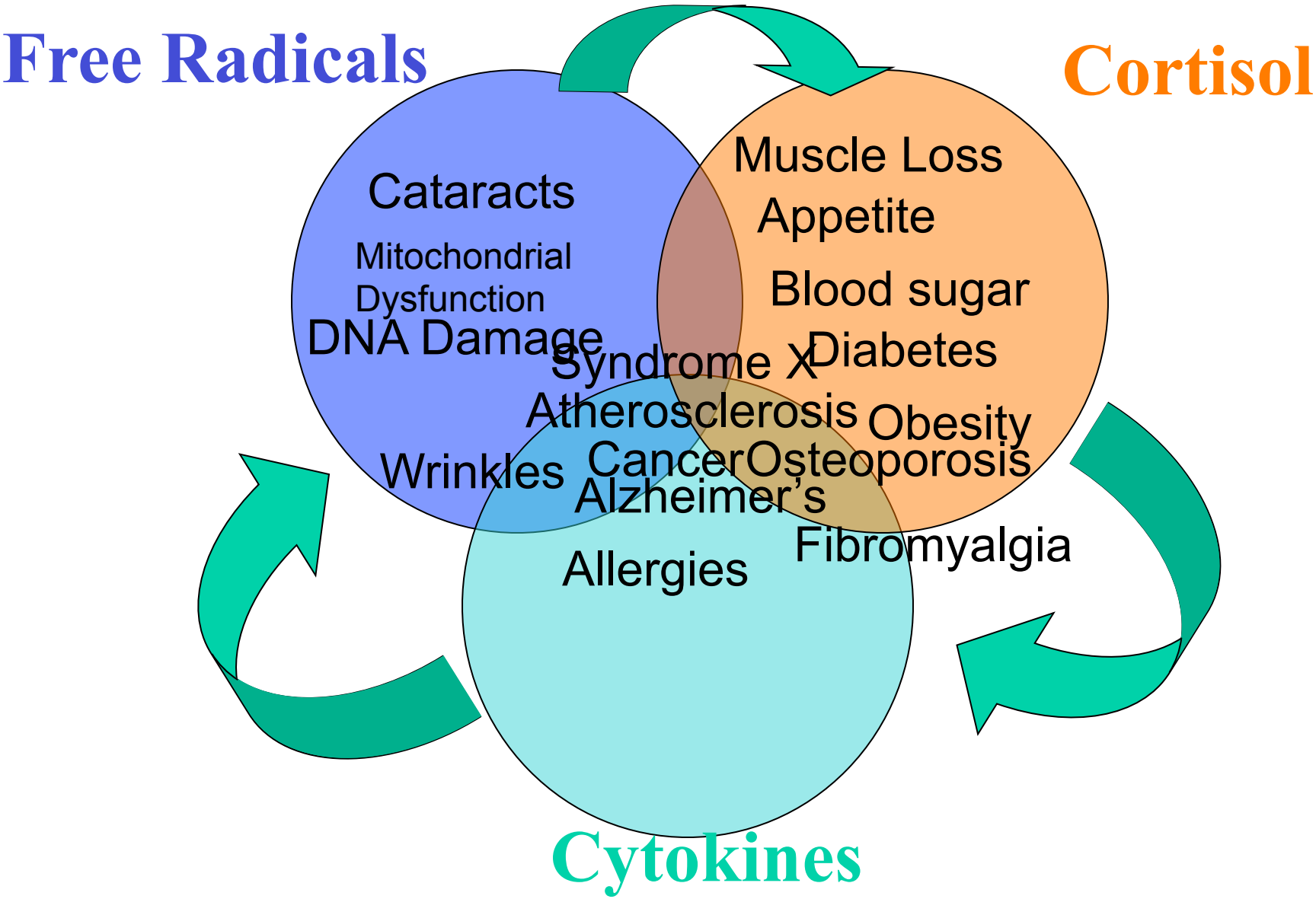
2000 Gallup Poll "Attitudes in the American Workplace"

Stress-Related Conditions

Metabolic and Long-Term Health Effects of Elevated Stress (Cortisol Overexposure/Metabolic Imbalance)

- Increased appetite, Accelerated muscle catabolism, Suppressed fat oxidation, Enhanced fat storage **(Obesity - 2,694)**
- Elevated cholesterol and triglyceride levels; Elevated blood pressure **(Heart disease - 4,604)**
- Alterations in brain neurochemistry [dopamine/serotonin/norepinephrine] **(Depression/Anxiety/ADHD - 22,491)**
- Physical atrophy of brain cells **(Memory problems/Dementia - 3,169)**
- Insulin resistance and elevated blood-sugar levels **(Diabetes - 1,203)**
- Accelerated bone resorption **(Osteoporosis - 2,675)**
- Reduced levels of testosterone **(Suppressed libido - 1,439)**
- Suppression of immune-cell number/activity **(Frequent Colds/Flu/infection; Increased Cancer risk - 9,651)**

Pillars of Health



Causes of "Imbalance" (Stress)

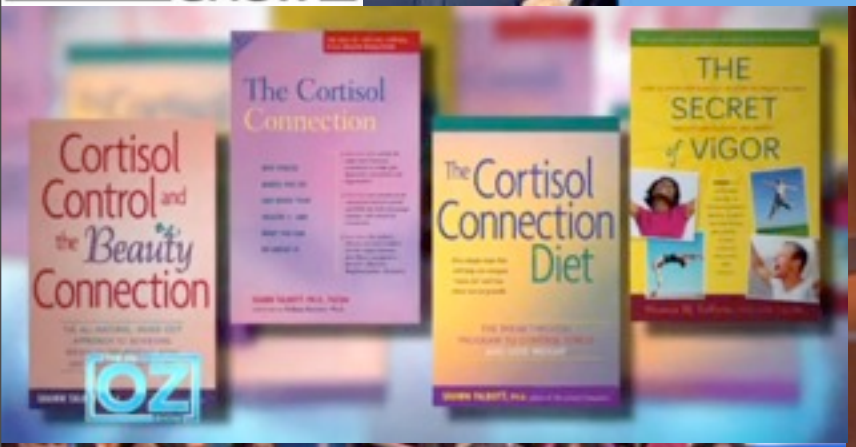
- Emotional stress (deadlines, bills, traffic…)
- Physical stress (aging, sleep deprivation, exercise…)
- Environmental stress (air/water pollution, heat, cold…)
- Non-Optimal Diet (processed foods, inadequate nutrients/phytonutrients…)
- Sources of Imbalance (stress) are:
  - Internal
  - External
  - Everywhere!
  - Unavoidable!!
- Athletes / Dieters / Short-Sleepers / Stressed
  - Share the SAME *biochemical* disruptions
  - Share the SAME *psychological* outcomes
  - Exhibit the SAME benefits to *restored biochem*

Tired, Stressed, Depressed


THE
DR.
OZ
SHOW


THE DR.
OZ
SHOW


DR. OZ'S
CORTISOL

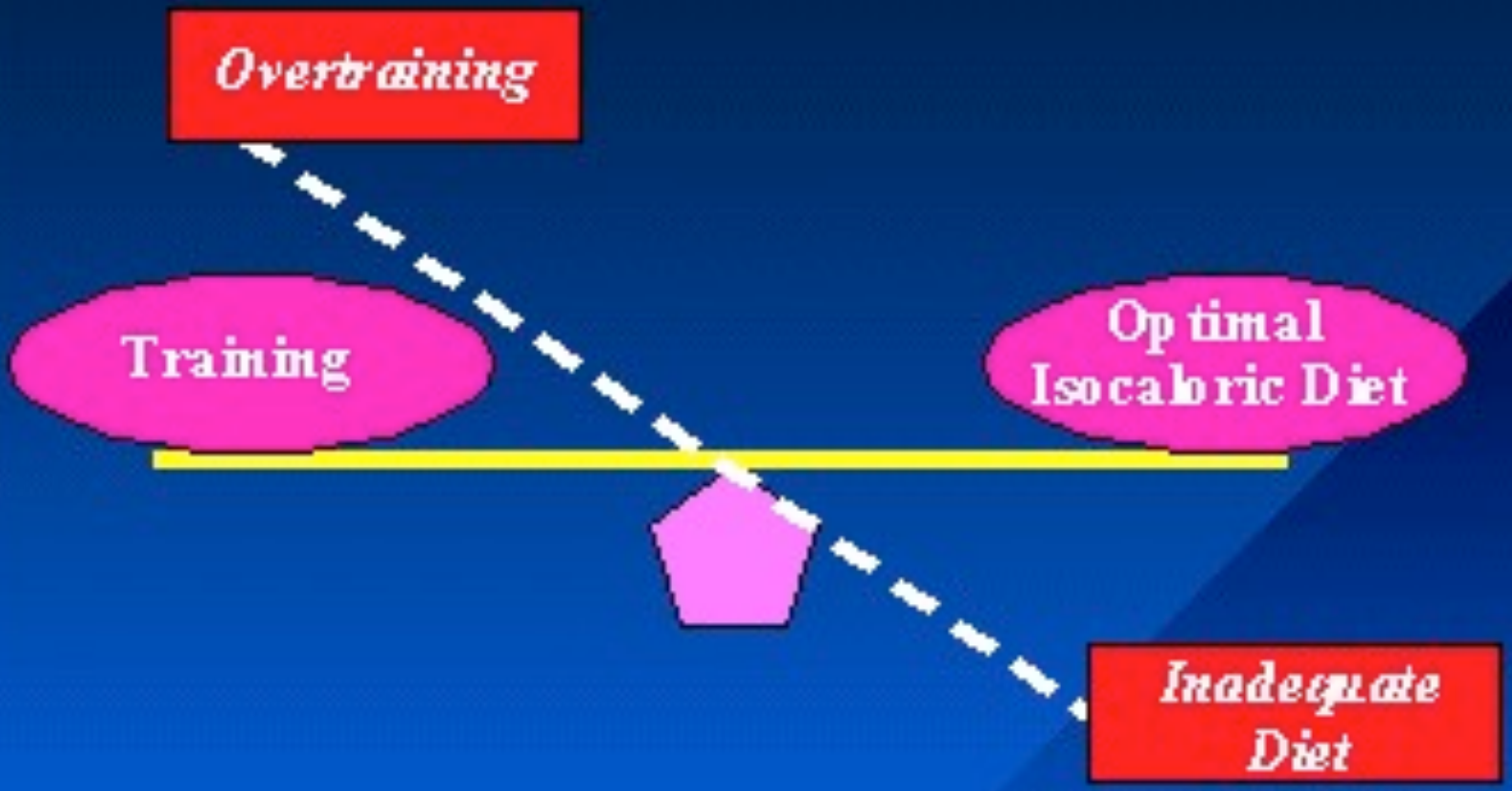

Cortisol Control and the Beauty Connection
The Cortisol Connection
The Cortisol Connection Diet
THE SECRET of VIGOR
OZ


OZ
DR. SHAWN TALBOTT

Training Stimulus

Relationship of Exercise & Nutrition

- Nutritional status during training affects training adaptations and performance



Overreaching

- An accumulation of training and/or non-training stress resulting in a short-term decrement in performance capacity with or without related physiological and psychological signs and symptoms of overtraining in which restoration of performance capacity may take from several days to several weeks.

Overtraining

- An accumulation of training and/or non-training stress resulting in long-term decrement in performance capacity with or without related physiological and psychological signs and symptoms of overtraining in which restoration of performance capacity may take several weeks and/or months.

Factors Contributing to Overreaching/Overtraining

- Sharp increases in training volume/intensity
- Training too often, too intensely, & too frequently
- Lack of rest/recovery days during training (6:1)
- Inadequate diet leading to negative energy states; glycogen depletion; central fatigue; overtraining
- Training boredom/monotony
- Compulsive behavior toward training
- Excessive competitiveness
- Poor performance
- Ignoring signs/symptoms of overtraining

Role of Energy Intake to Overtraining

Berning J. Energy Intake, Diet and Muscle Wasting In Overtraining in Sport 1998.

- Athletes often maintain negative energy balances during heavy training periods.
- Inadequate energy intake during heavy training has been suggested to be a precursor to overtraining.
- Overtrained athletes often experience decreased hunger and appetite suppression leading to weight loss and muscle wasting.
- One proposed preventive measure of overtraining is to ensure athletes ingest an energy sufficient, nutrient dense, high carbohydrate diet.

Theoretical Role of Nutrition in Overtraining

Berning J. Energy Intake, Diet and Muscle Wasting In Overtraining in Sport 1998.

"Health" & "Feeling Better" are BIG

-Health & Wellness products = $2 trillion global market (Stanford Research Institute)
  - Nutrition products = $270 billion global market (Nutrition Business Journal)
  - Energy drinks = $40 billion (Business Insights)

-Over HALF of U.S. Adults (53%) take dietary supplements (Centers for Disease Control)
  - similar rates for Health Professionals (Council for Responsible Nutrition)
  - 60% of consumers have "trouble believing" supplement claims (Thompson Reuters)

-Aging world population

-Failing conventional medical systems ("sickness" model)

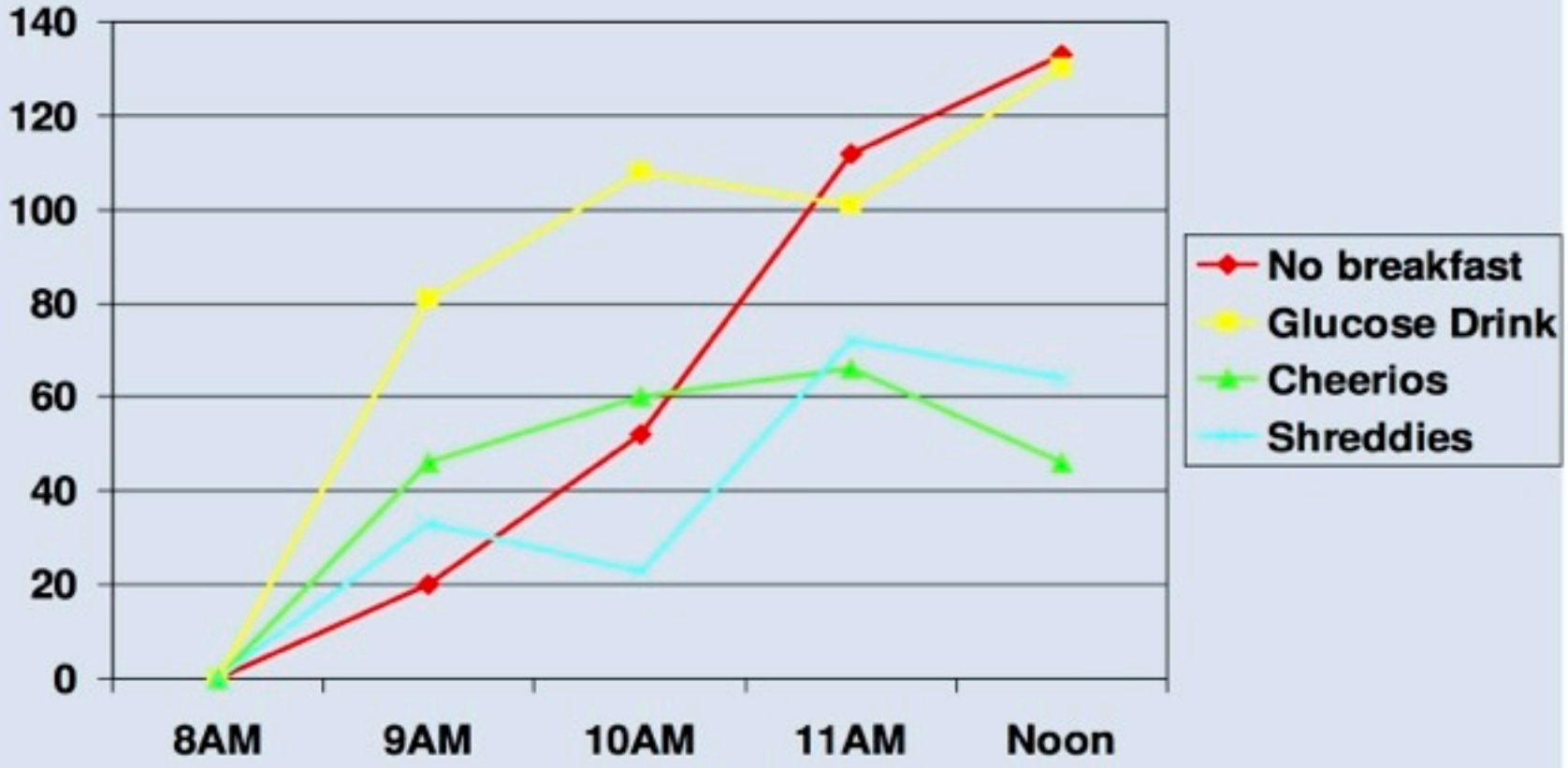
-Globalization of "alternative" health


PROZAC
Lexapro
Folgers
STARBUCKS COFFEE
MONSTER ENERGY
Celexa
Lunesta
$80B+
zoloft
PAXIL
AMBIEN
ROCKSTAR ENERGY DRINK
EFFEXOR XR
Luvox
Cymbalta
Peets Coffee & Tea

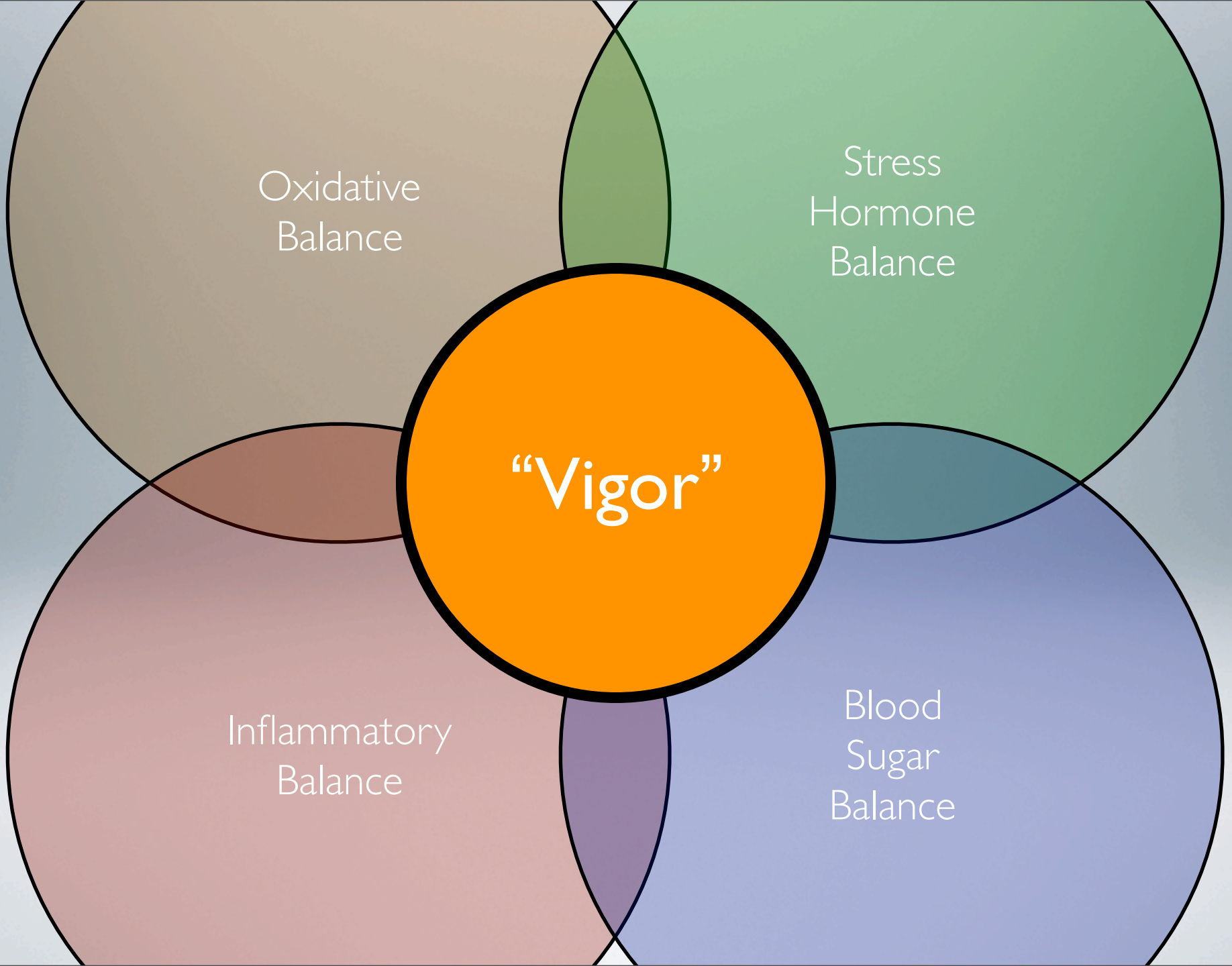
Diet / Vigor Relationship

- **Mediterranean diet = Improved QOL**
  - Henriquez-Sanchez et al. *Eur J Clin Nutr* 66(3): 360-8, 2012
- **Omega3s = Reduced ADHD Sx / Improved QOL (cancer)**
  - Van der Meij et al. *Eur J Clin Nutr* 66, 399-404, 2012
- **Multivitamin = Increased Attention, Mood, Vigor**
  - Kennedy et al. *Psychopharmacology* 211:55-68, 2010
- **Overall Diet Quality = Less Depression / Improved QOL**
  - Kuczmarski et al. *J Am Diet Assoc.* 110(3): 383-389, 2010
- **Low Fat Diet (20%) = Less Anxiety / Higher Vigor**
  - Torres & Nowson CA. *Nutrition*. Sep;28(9):896-900. 2012
- **Fast Food / Commercial Baked Goods = More Depression**
  - Sanchez-Vilegas et al. *Public Health Nutr* 15(3), 424-432, 2011
- **10% weight loss (diet/exercise) = Increased Vitality**
  - Imayama et al. *Int J Behav Nutr & Phys Activity* 8:18, 2011
- **Food restriction (athletes) = Reduced Vigor**
  - Filaire et al. *Int J Sports Med*. Aug;22(6):454-9. 2001
- **Tuna Broth (EAAs) = Reduced Fatigue / Improved Vigor**
  - Kuroda & Nozawa. *Biomed Res* 29(4), 175-179, 2008
- **Depressed Patients (cancer) = Lower use of CAM**
  - Stein et al. *Cancer* Sept 15, pp 4397-4408, 2009
- **Higher Well-Being = Longer Survival (healthy/diseased)**
  - Chida & Steptoe. *Psychosomatic Med* 70:741-756, 2008

Breakfast Experiment
Attention Deterioration from 8 AM
(Higher Score Worse) --Normal Kids

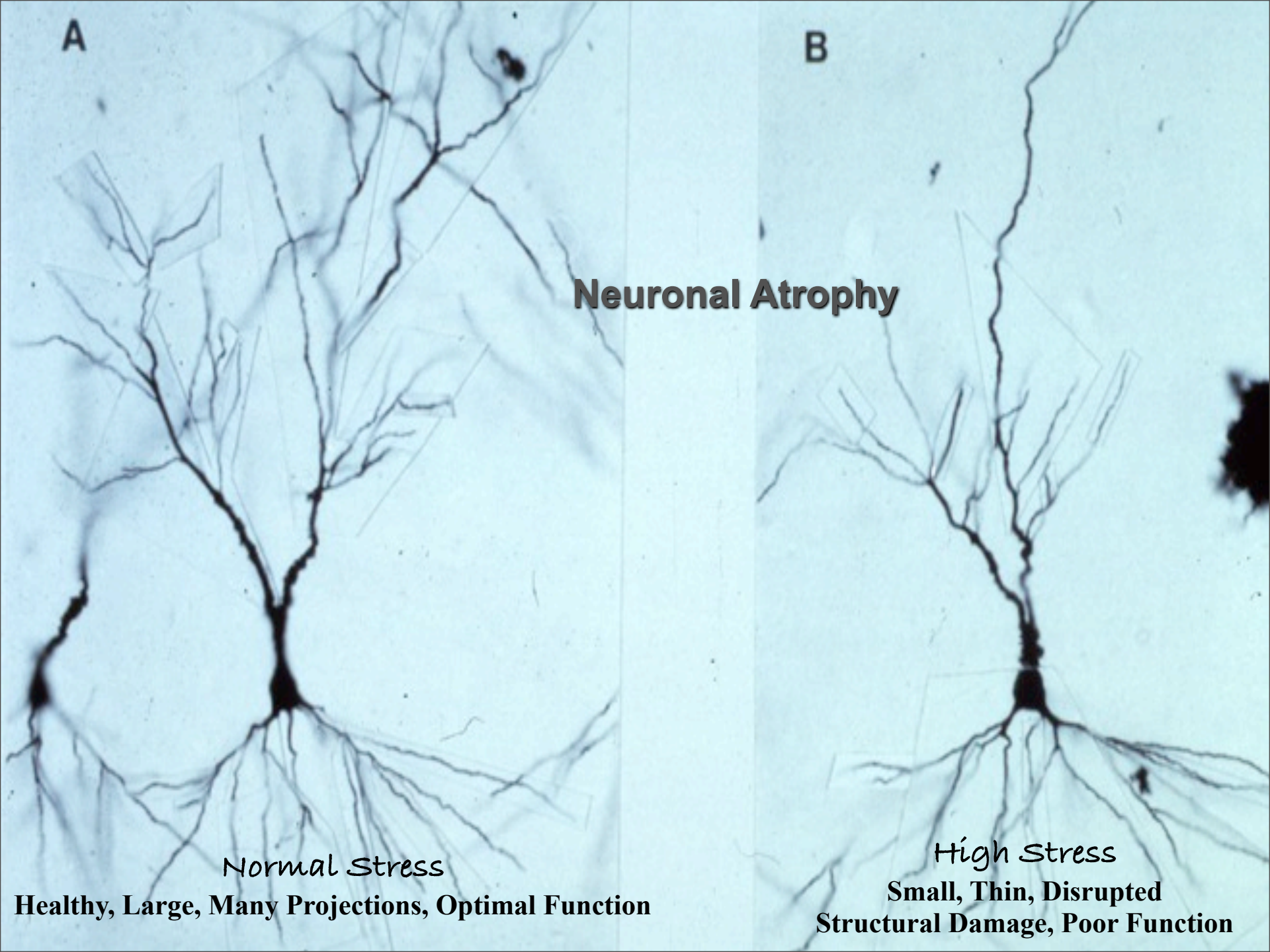


Wesnes et al (2003) Breakfast reduces declines in attention and memory over the morning in schoolchildren. *Appetite, 41*, 329–331


Oxidative
Balance
Stress
Hormone
Balance
"Vigor"
Inflammatory
Balance
Blood
Sugar
Balance

We Feel "Off" - Globally

- I'm Feeling Stiff & Sore
- I'm Feeling Tired & Worn Out
- I'm Gaining Weight
- I'm Feeling Stressed Out



Neuronal Atrophy

Normal Stress

Healthy, Large, Many Projections, Optimal Function

High Stress

Small, Thin, Disrupted
Structural Damage, Poor Function

ABDOMINAL FAT ACCUMULATION

Vigor = “Mental + Physical Energy”
Traditional Medicine = “Qi” – “Prana” – “Life Force”

The New Science of Feeling Your Best

- Oxidation (free radicals)
- Neurotransmission (neurotransmitters)
- Glycation (glucose)
- Allostation (stress)
- Antioxidants
- "Slow" Sugars & Natural Caffeine
- Balanced Macronutrients
- Anti-Stress Herbs

Coordinated Product Platform

MonaVie - Feel Your Best

Elevated Cortisol and Appetite

- Women with high cortisol response (compared to low cortisol):
  - consumed more calories
  - ate significantly more sweet foods
  - had more negative moods

- High dietary restraint is associated with high urinary cortisol
  - Dietary Restraint = Consciously trying to limit food intake to achieve or maintain a desired body weight

1. Epel ES, et al. Psychoneuroendocrinology 2001;26:37-49.
2. McLean JA, Barr SI, Prior JC. Am J Clin Nutr 2001;73:7-12.

"Healthy-Stressed" Subjects

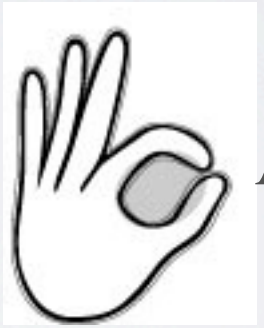
- N=50 (8 men, 42 women)
- Screened for "moderate" levels of psychological stress
- Followed for 8 weeks…
  - **S**tress Management
  - **E**xercise
  - **N**utrition
  - **S**upplementation
  - **E**valuation

The Helping Hand

Fruits & Veggies

Lean Protein

Concentrated Carbs



Added Fat

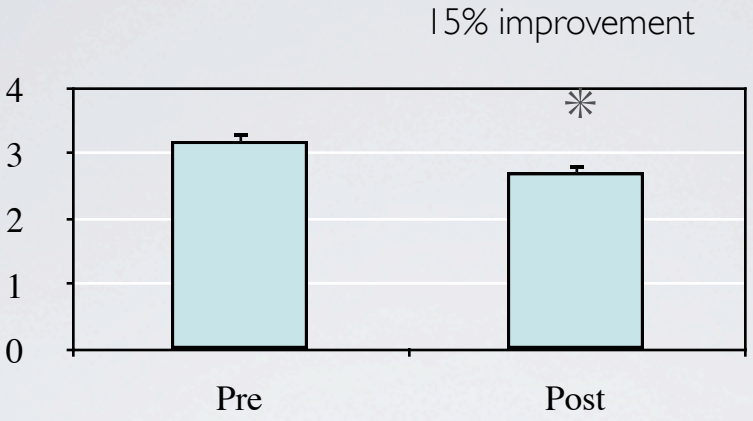
Metabolic Controllers

Hormone Balance Supplements

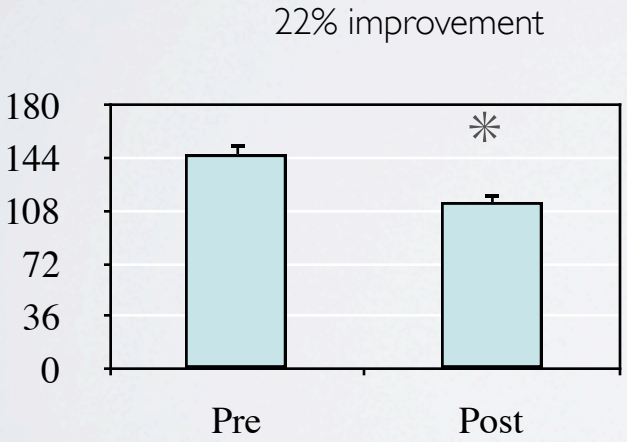
- *Eurycoma longifolia* root extract (Eurypeptides)
- *Citrus sinensis* peel extract (PMFs)
- *Camellia sinensis* leaf extract (Catechins)
- L-Theanine (pure amino acid)
- *Cordyceps sinensis* mycelia extract (Cordycepic acid)
- *Rhodiola rosea* root extract (Rosavin)
- *Eleuthercoccus senticoccus* root extract (Eleutherosides)
- *Withania somnifera* root extract (Withanolides)
- *Magnolia officinalis* root extract (Honokiol)

- Intended to:
  - Maintain "Metabolic Hormone Balance"
    - Cortisol:Testosterone, Dopamine:Norepinephrine, Serotonin, etc…
  - Deliver Healthy Energy (VIGOR)
  - Enhance Mood

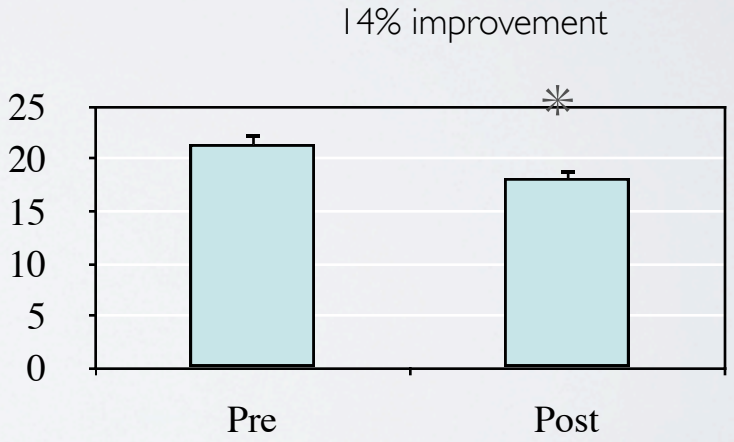
C:T Ratio (x1000)



Global Mood State (POMS)

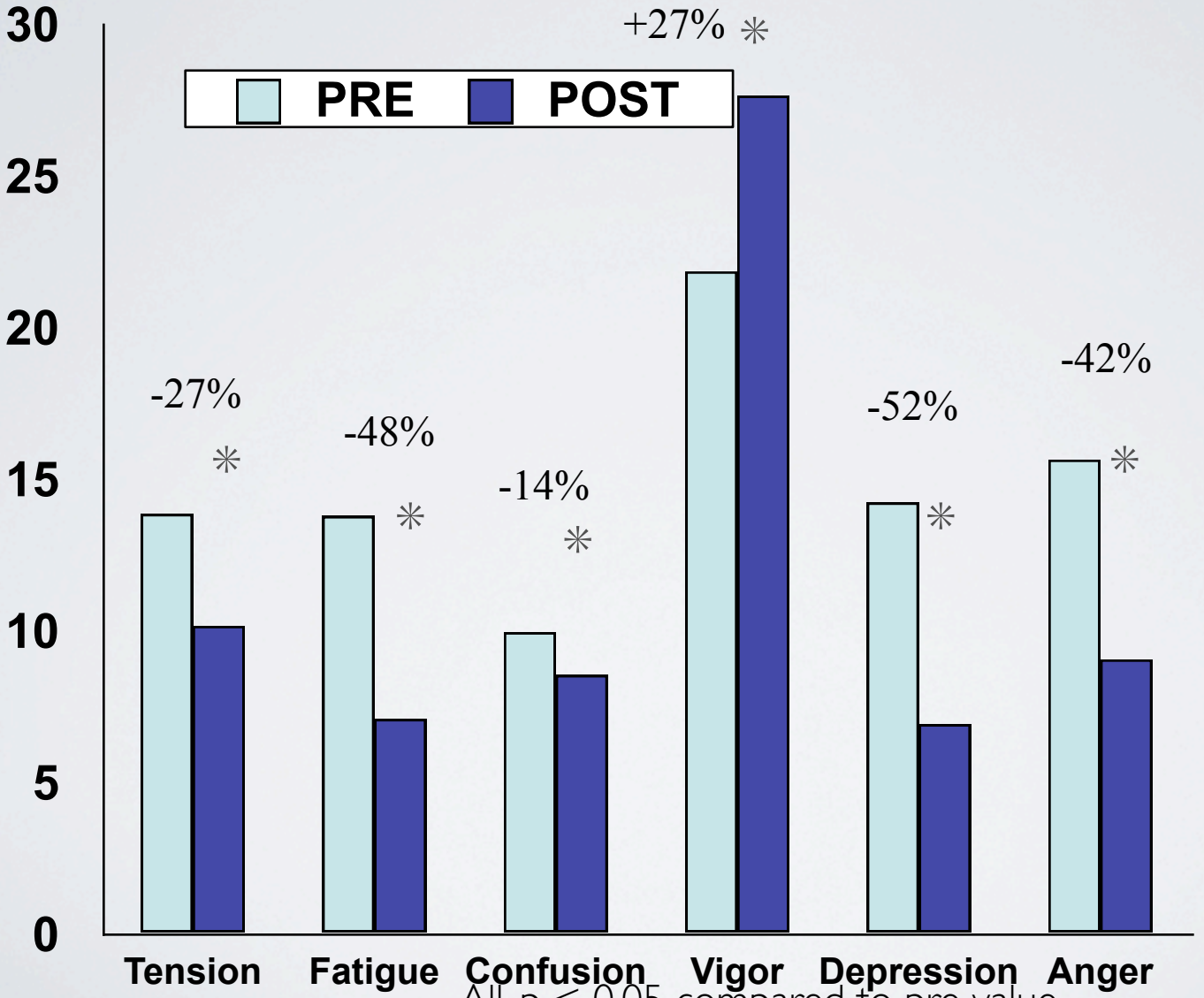


Subjective Stress



All, $p \leq 0.05$ compared to pre value

Profile of Mood States (POMS)

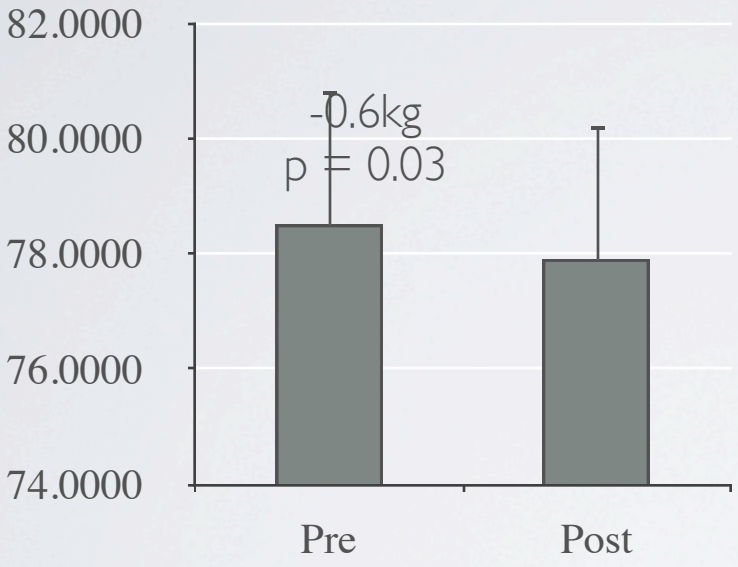


All, $p \leq 0.05$ compared to pre value

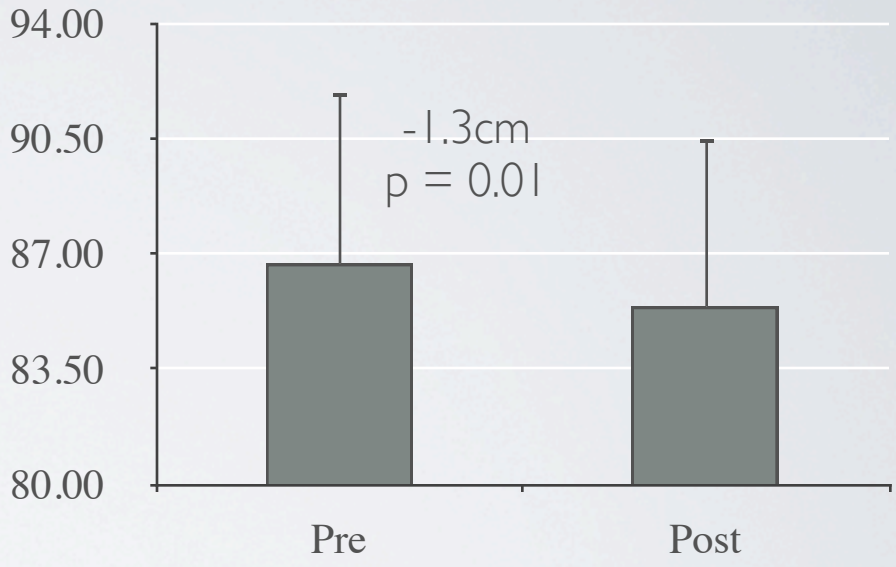
RESULTS

Body Weight & Waist Circumference

Body Weight (kg)



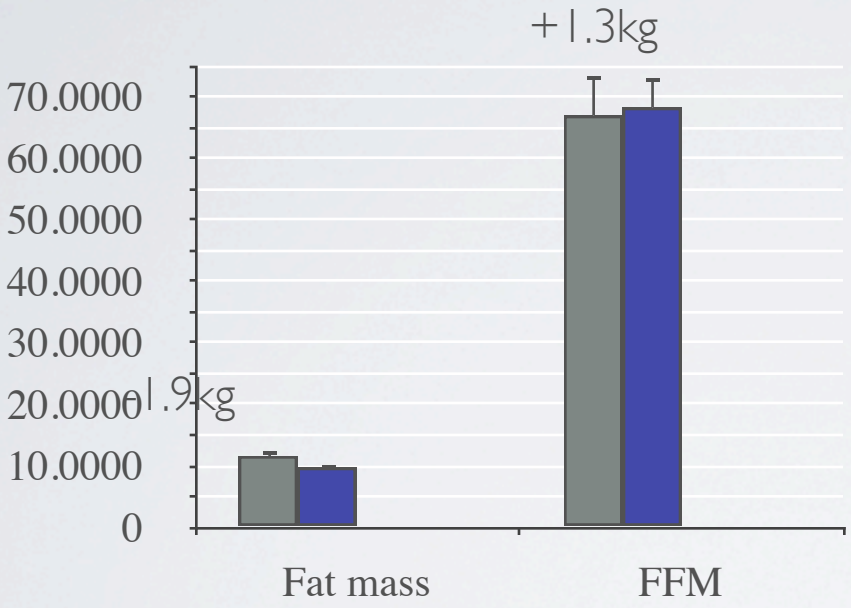
Waist Circumference (cm)



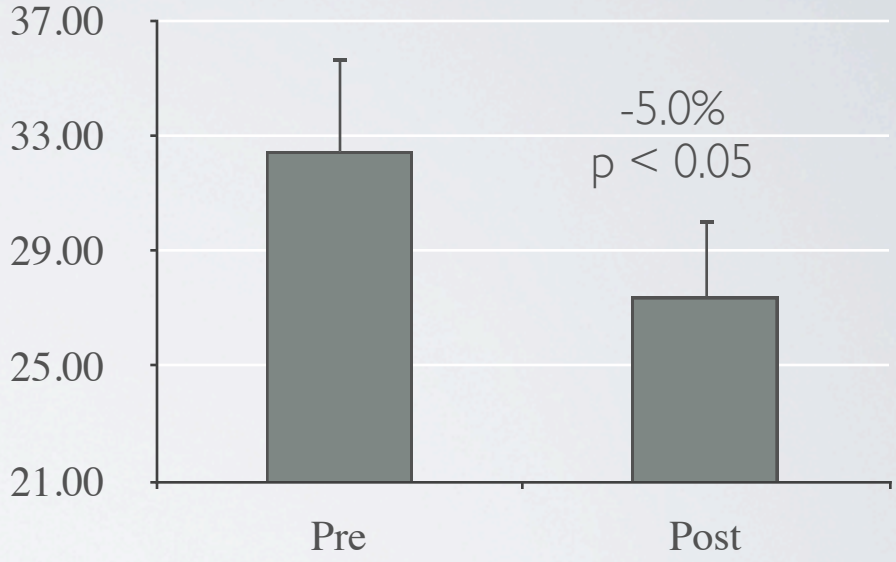
RESULTS

Body Composition

Fat Mass & Lean Mass (kg)



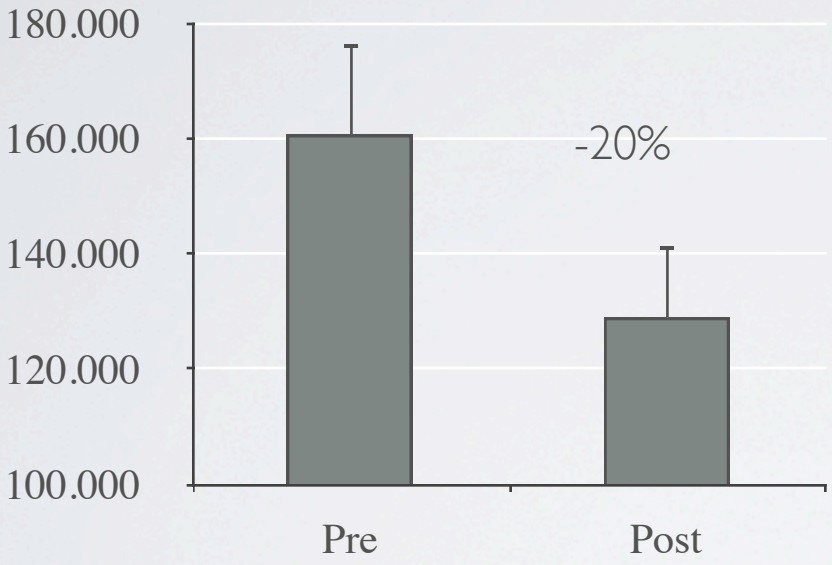
Body Fat (%)



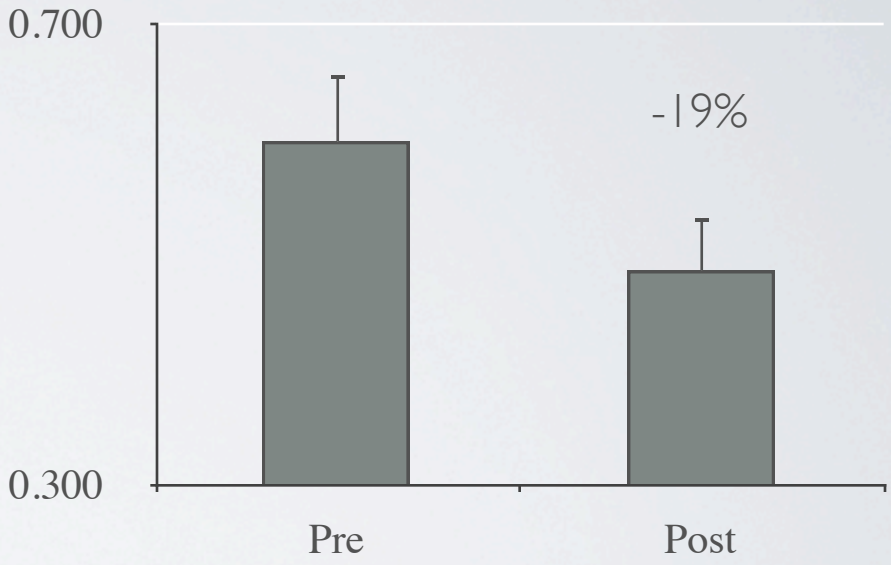
RESULTS

Global Mood State & Salivary Cortisol

Global Mood State (POMS)



Salivary Cortisol (ug/dL)



Both, $p \leq 0.05$ compared to pre value

Dietary Supplement Combination Reduces Inflammation and Improves Mood State in Stressed Subjects

S. Talbott[1], J. Talbott[1], M. Vosti[2], & J. Anderson[2]

[1]SupplementWatch & [2]South Mountain Chiropractic, Salt Lake City (Draper), UT

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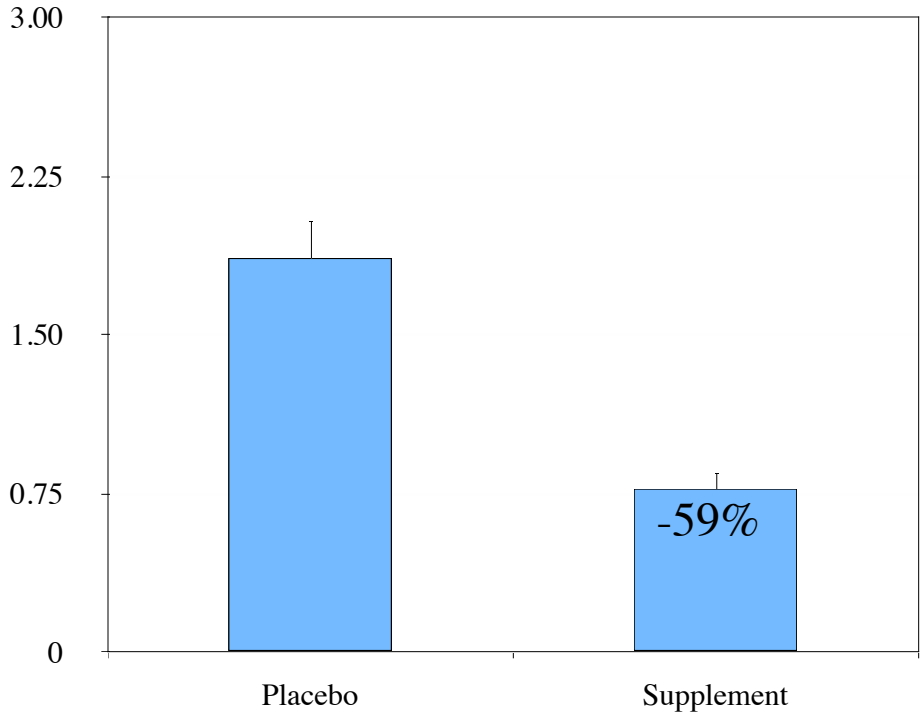
SOUTH MOUNTAIN CHIROPRACTIC

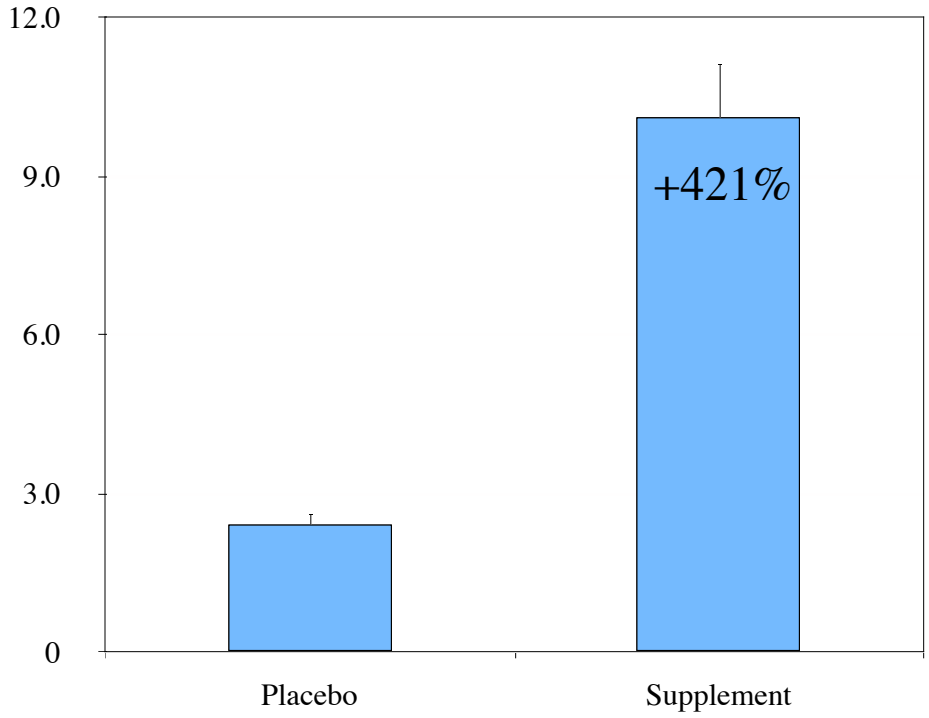
RESULTS (week 4)

Inflammation & Metabolic Balance

hs-CRP



FAI/24h-Cortisol

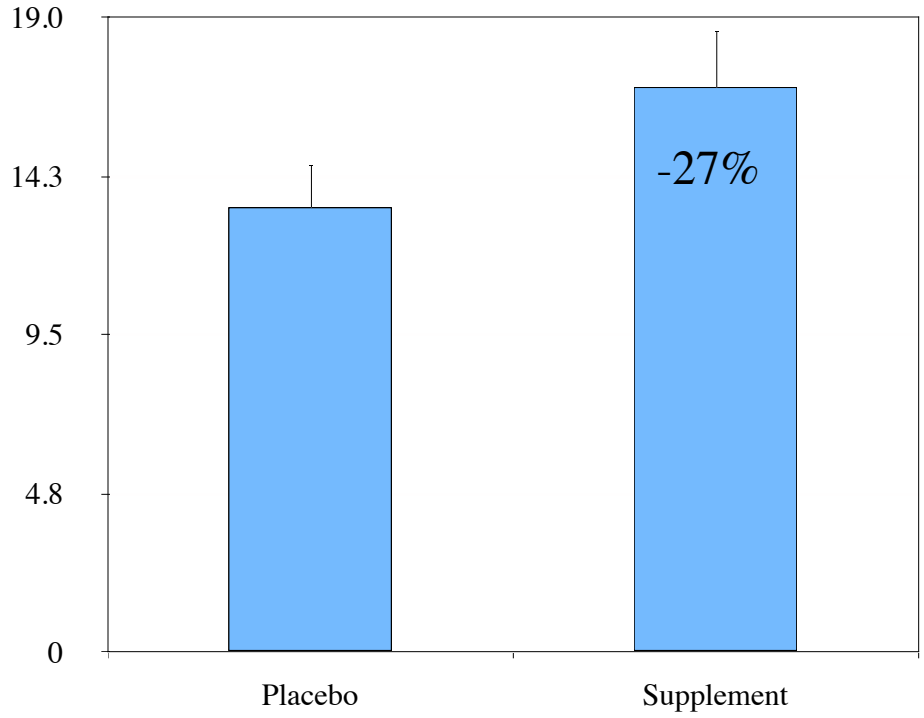


Both, $p \leq 0.05$ compared to Placebo

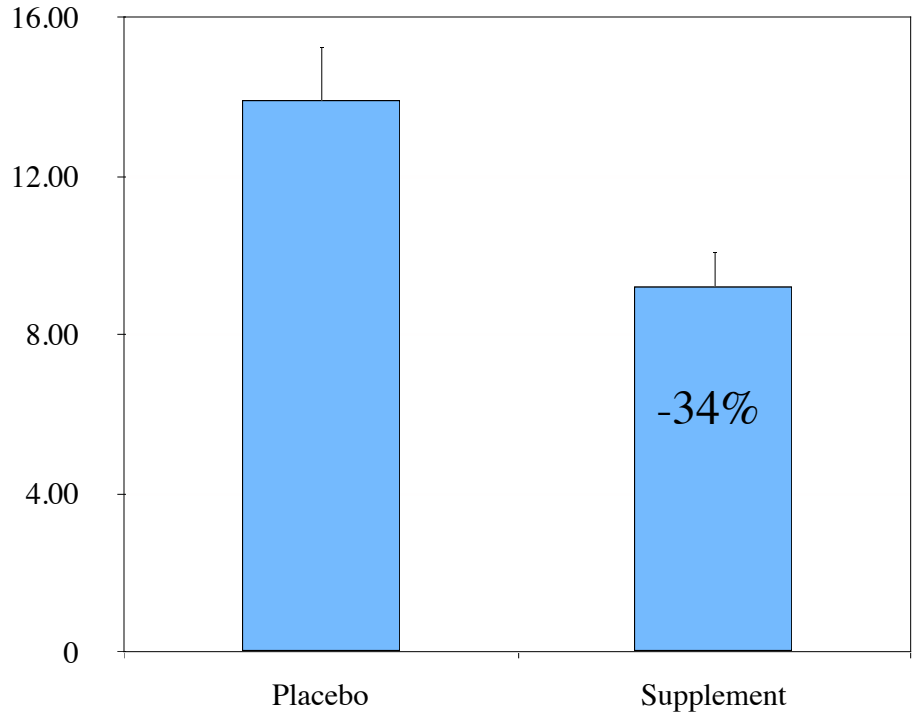
RESULTS (week 4)

Profile of Mood States (POMS)

Vigor



Tension



Both, $p \leq 0.05$ compared to Placebo

Effect of *Eurycoma longifolia* Extract on Anabolic Balance During Endurance Exercise

S. Talbott, J. Talbott, J. Negrete, M. Nichols, and J. Roza

SupplementWatch, Inc., Salt Lake City (Draper), UT

& Source One Global, Chicago, IL

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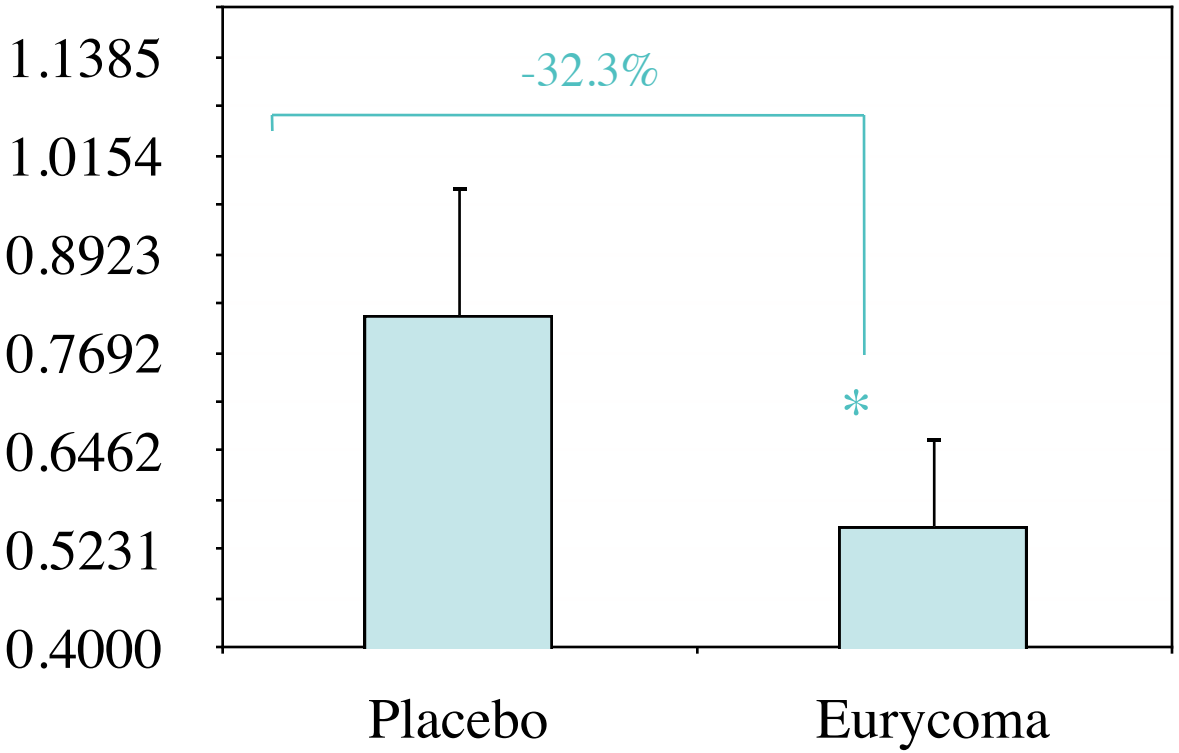
Supplement Decisions Made Easy

RESULTS

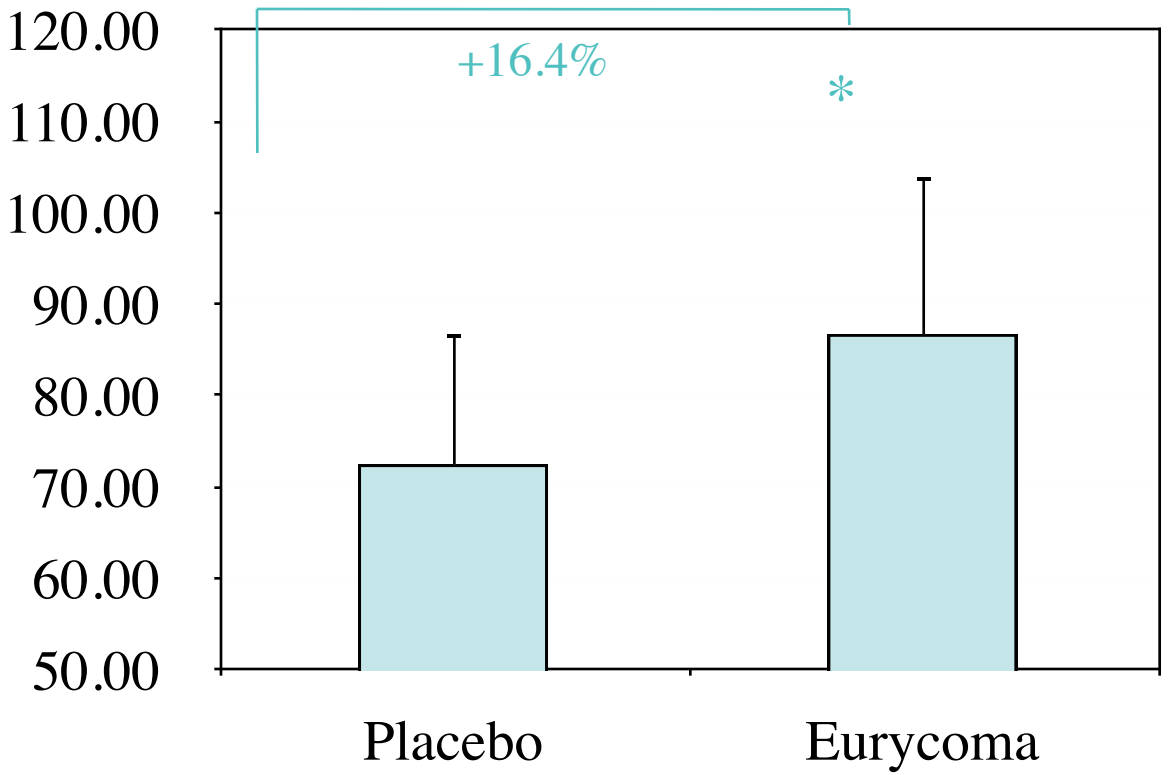
Salivary Cortisol (ug/dL)



*p ≤ 0.05 compared to Placebo

RESULTS

Salivary Testosterone (pg/dL)



*p ≤ 0.05 compared to Placebo

SUPPLEMENT WATCH
Supplement Decisions Made Easy

Effect of Branched Chain Amino Acids on Salivary Cortisol Levels During Endurance Exercise

S. Talbott, J. Talbott, J. Negrete, and M. Nichols

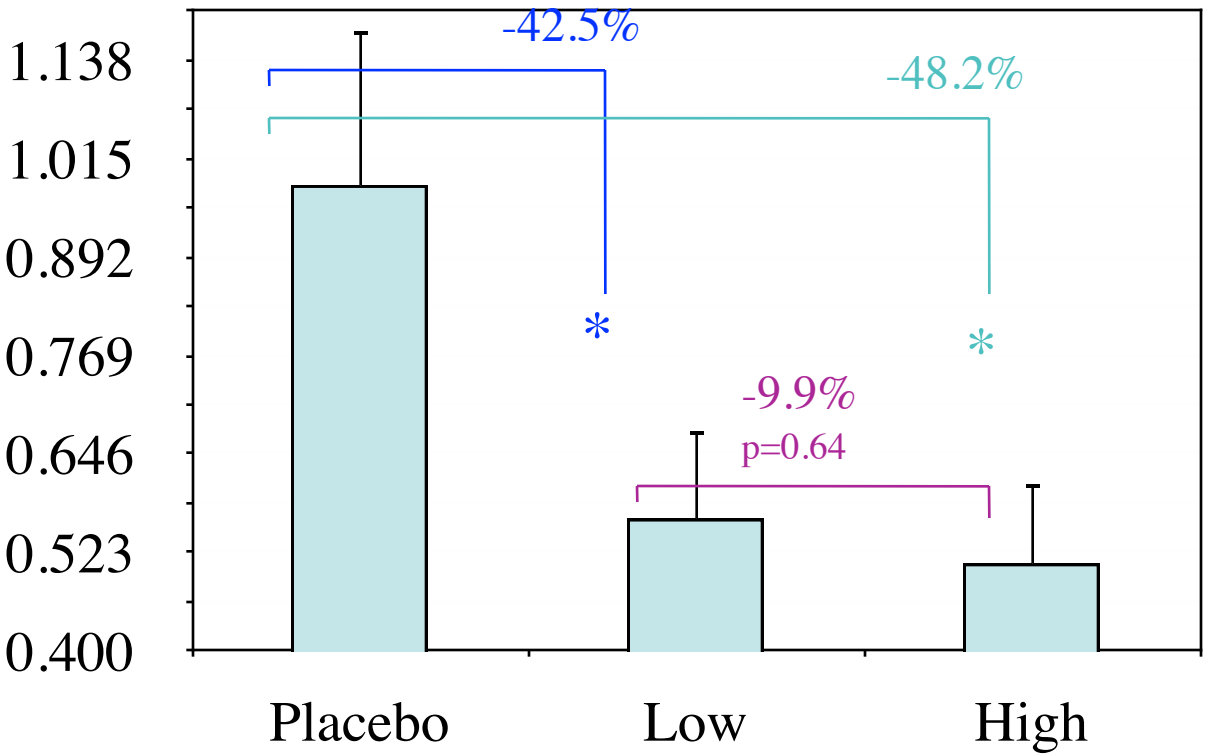
SupplementWatch, Inc.

Salt Lake City (Draper), UT

SUPPLEMENT WATCH
Supplement Decisions Made Easy

RESULTS

Salivary Cortisol (ug/dL)



*p ≤ 0.05 compared to Placebo

Effect of *Eurycoma longifolia* and *Magnolia officinalis* on Hormone Balance & Mood State in Stressed Subjects

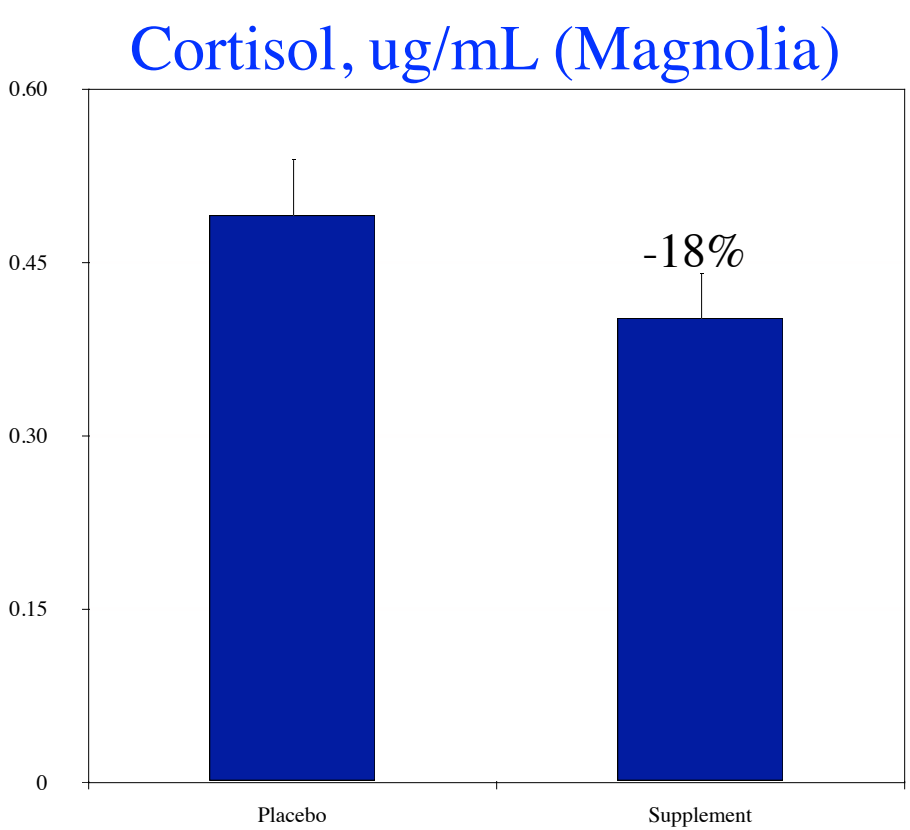
S. Talbott[1,2], J. Talbott[1], & M. Pugh[2]

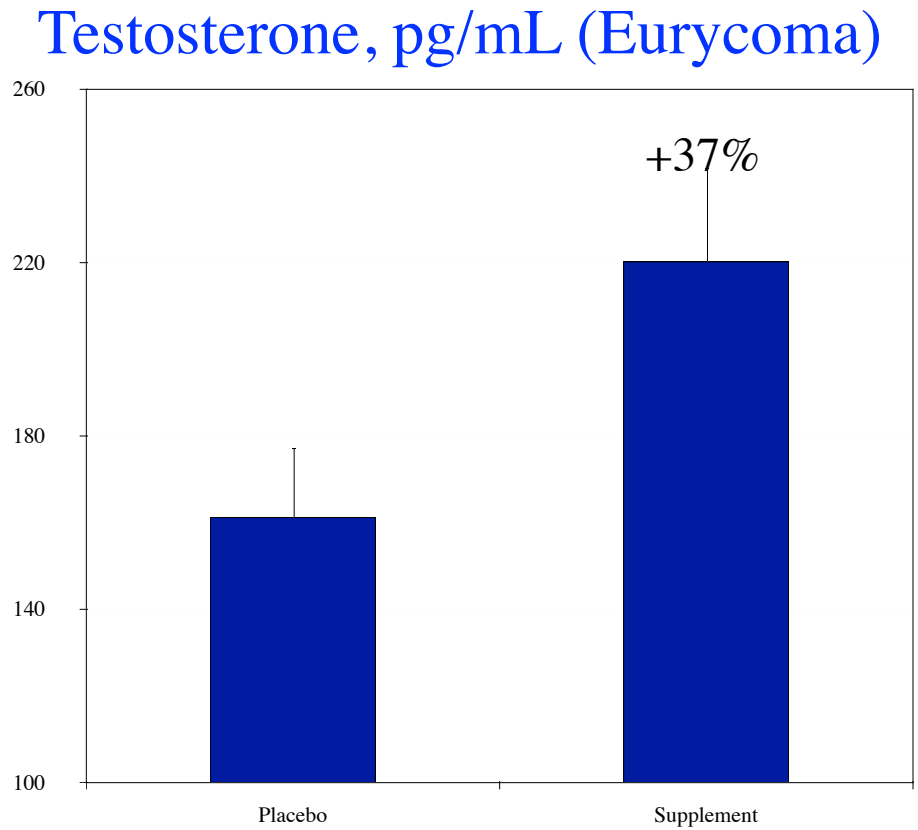
[1]SupplementWatch & [2]MonaVie, Salt Lake City, UT

SUPPLEMENT WATCH
Supplement Decisions Made Easy

RESULTS (week 4)

Cortisol & Testosterone (% difference from Placebo)



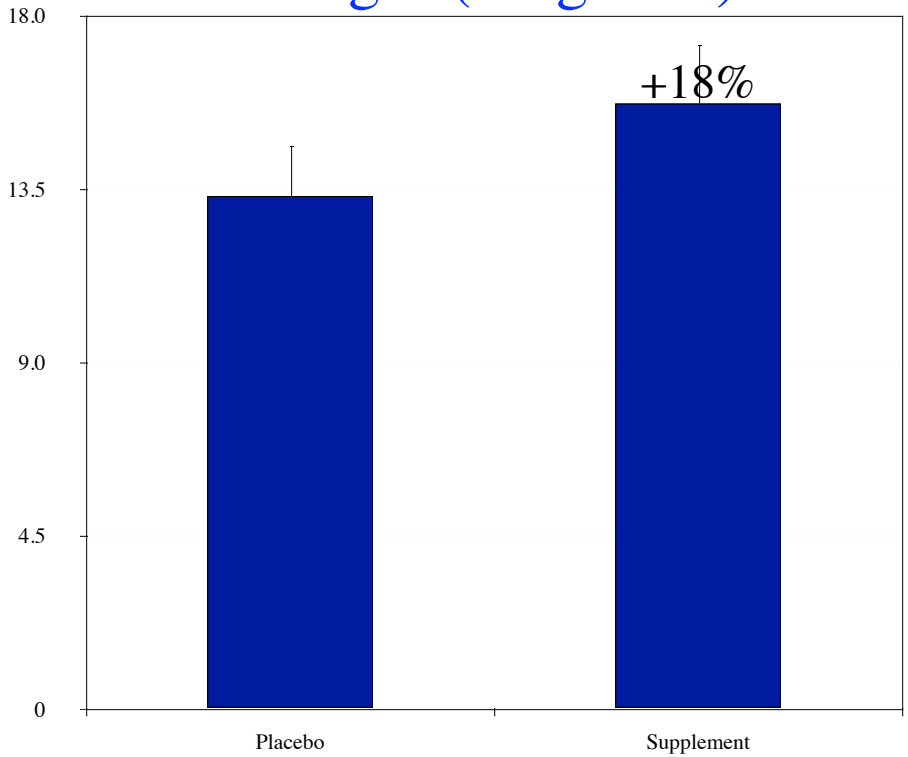


Both, $p \leq 0.05$ compared to Placebo

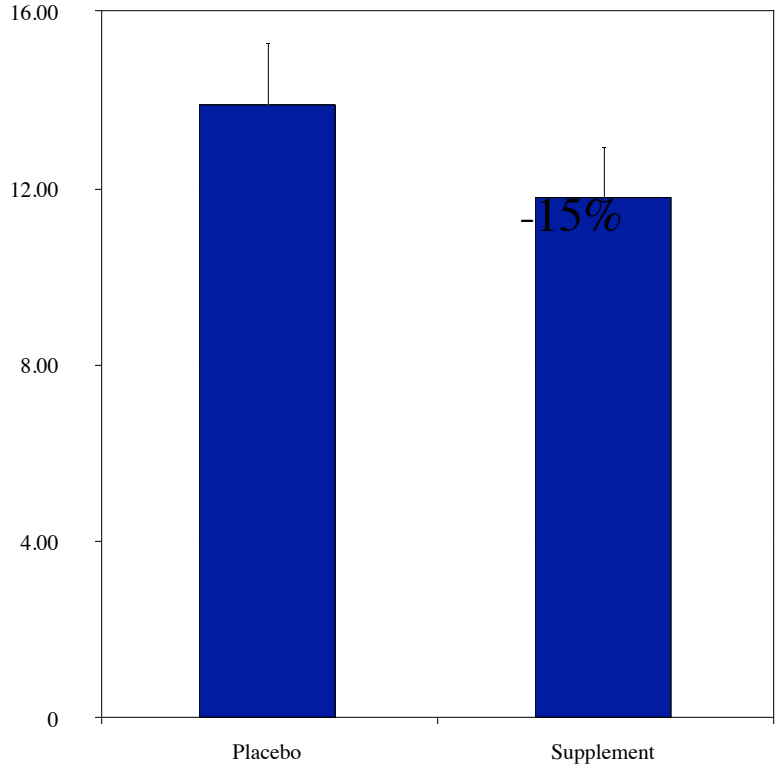
RESULTS (week 4)

Profile of Mood States (POMS)

Vigor (Magnolia)



Tension (Eurycoma)



Both, $p \leq 0.05$ compared to Placebo

Why Supplements?

Stress Management

- It works...

Exercise

- It works...

Nutrition

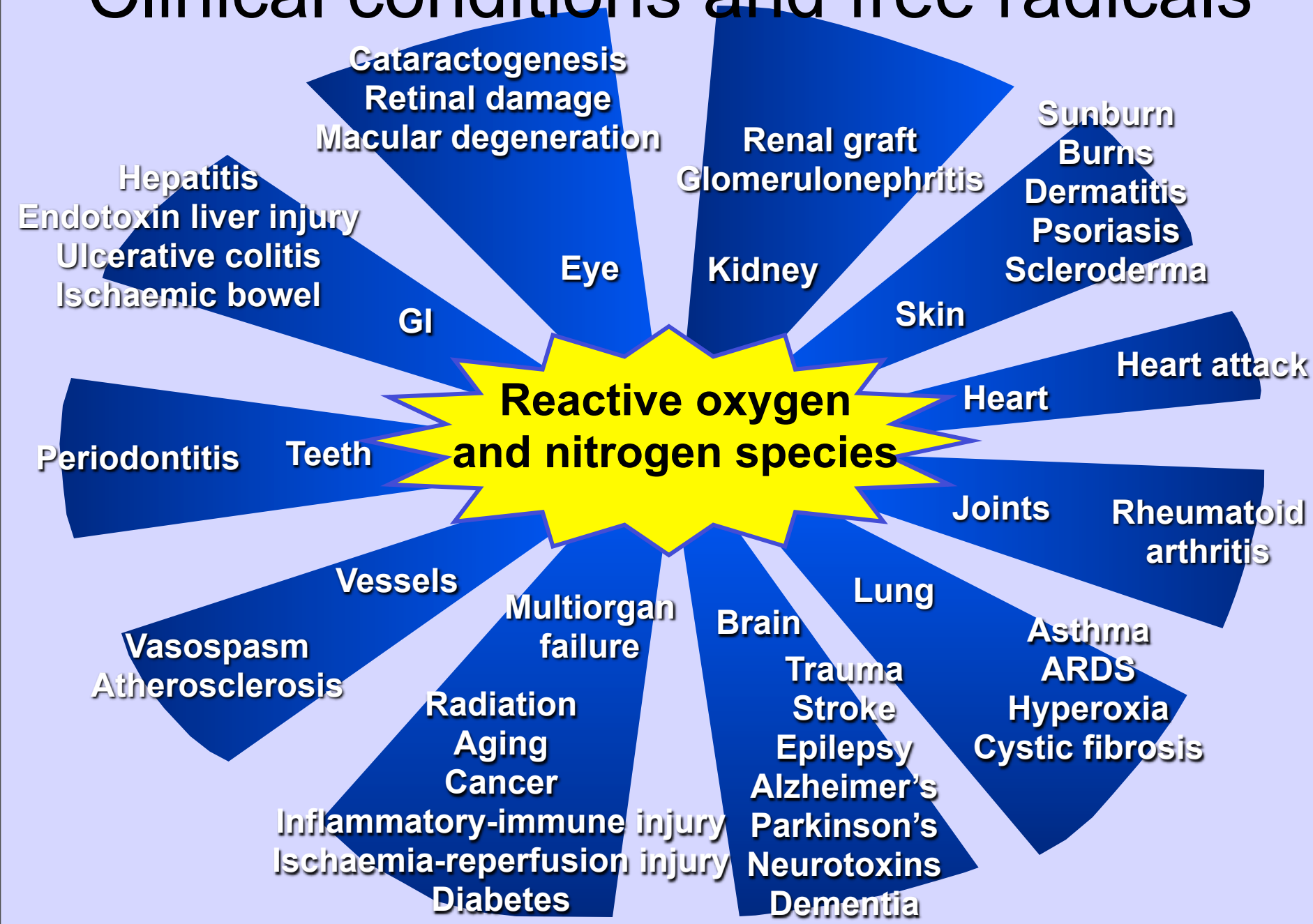
- It works

Supplements

- *IF* there is good evidence for Efficacy *AND* Safety...
- Supplements offer an “easy” first step in the right direction...
- Which may allow the other strategies to follow in time...
- Supplements offer an *additional* step when “SEN” is optimized…

- Oxidative stress is the result of an imbalance between oxidants and antioxidants
- This increases the susceptibility to oxidative damage of cell structure and function
- Restore balance between oxidants/antioxidants

Clinical conditions and free radicals

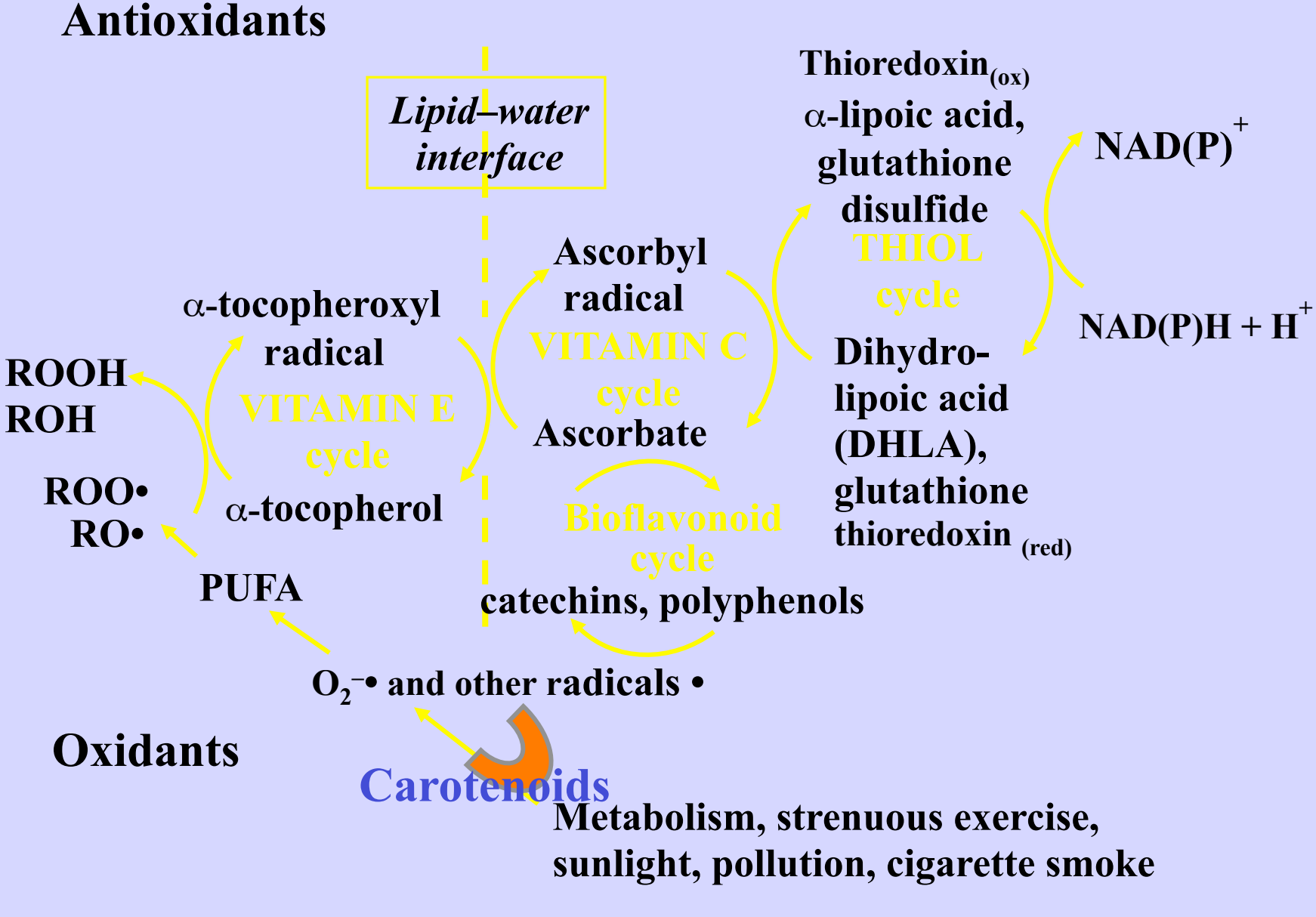


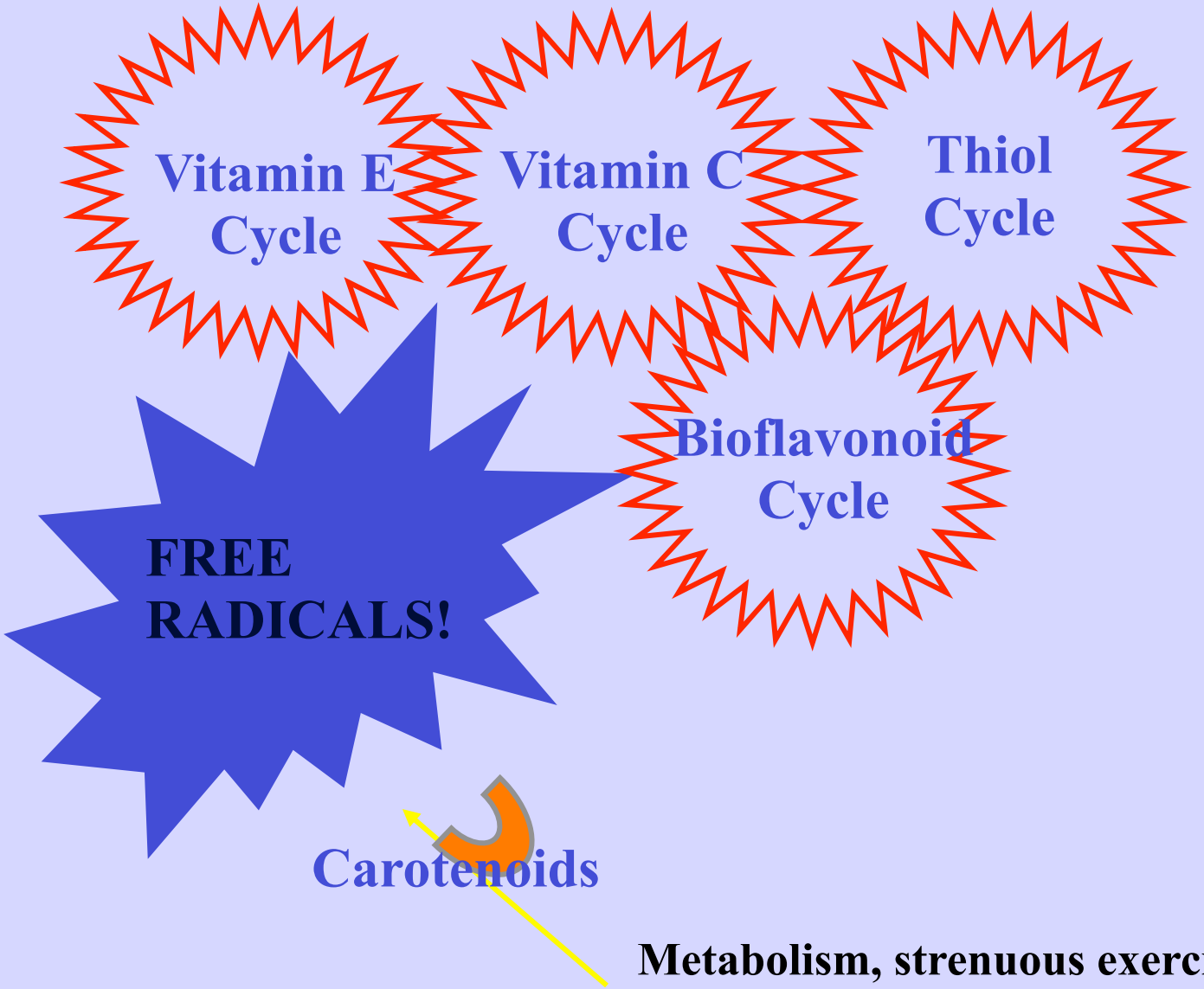
Free Radicals

- **Free radicals are highly reactive, short-lived compounds that can destroy the body's fats, proteins and nucleic acids (DNA).**
- **Free radicals affect:**
  - Cardiovascular health, brain and nervous system, eye health, blood sugar and insulin metabolism, cell rejuvenation and cell protection, aging process
- **Sources of free radicals**
  - Environmental pollution
  - Radiation: UV light, X-ray, g-ray
  - Smoking: 10^{16} free radicals/cigarette
  - Normal oxidative metabolism of carbohydrates, fats & proteins for energy production.

Dietary Antioxidants

- Vitamin C
- Vitamin E
- Carotenoids
- Polyphenols (flavonoids)
- Lipoic acid, co-enzyme Q, etc…
- Selenium, copper, zinc, manganese, iron


Antioxidants
Lipid–water interface
Thioredoxin(ox)
α-lipoic acid, glutathione disulfide
NAD(P)+
THIOL cycle
NAD(P)H + H+
Ascorbyl radical
VITAMIN C cycle
Ascorbate
Dihydro-lipoic acid (DHLA), glutathione thioredoxin (red)
α-tocopheroxyl radical
VITAMIN E cycle
α-tocopherol
ROOH
ROH
ROO•
RO•
Bioflavonoid cycle
catechins, polyphenols
PUFA
O2−• and other radicals •
Oxidants
Carotenoids
Metabolism, strenuous exercise, sunlight, pollution, cigarette smoke


Vitamin E Cycle
Vitamin C Cycle
Thiol Cycle
Bioflavonoid Cycle
FREE RADICALS!
Carotenoids
Metabolism, strenuous exercise, sunlight, pollution, cigarette smoke

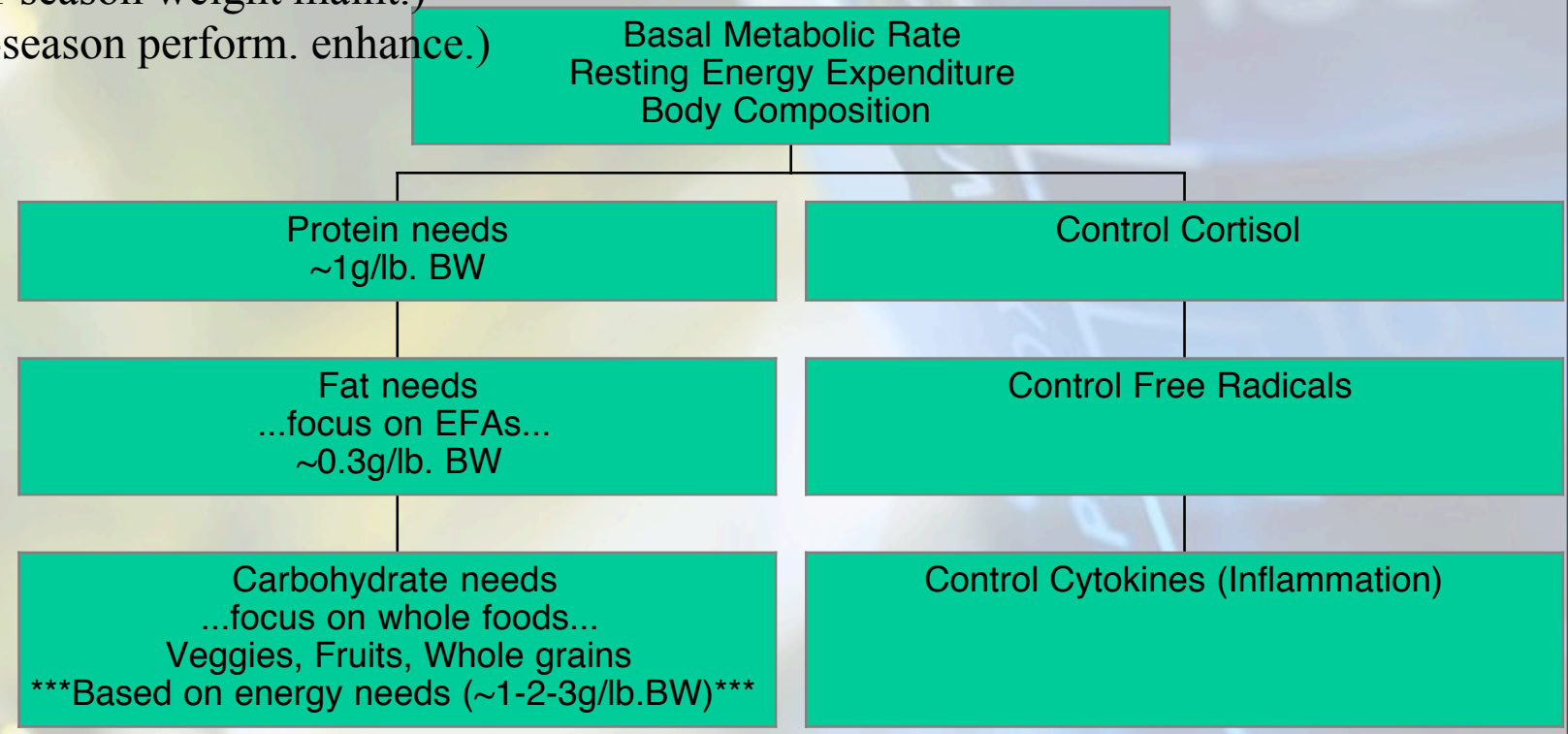
End of theoretical mumbo-jumbo…

What does this *mean*?

"A great diet will not make an average athlete great -
But an average diet will make a great athlete average."

How to eat???

Example (165lb athlete):
- 1765 kcal (weight loss)
- 2425 kcal (off-season weight maint.)
- 3085 kcal (in-season perform. enhance.)



How many athletes eat "grams"?

Most athletes eat FOODS!

What to eat???

(breakfast example)

Omelet/Oatmeal/Yogurt *(protein, carbs, fat, fiber)…*

- Eggs (choline - cytokine control)
- Salmon (omega-3 FAs - cytokine control)
- Cheese (calcium - cortisol control)
- Bright veggies (flav/carotenoids-free radical control)
- Whole grain oatmeal (lignans - cytokine control)…
  - …plus bright fruit (flavonoids - free radical control)
  - …plus yogurt (calcium + CLA - cortisol control)

Calories - to count or not?

(400-600 kcal/eating occasion)

Fruits & Veggies

Lean Protein

Added Fat

Concentrated Carbs

Metabolic Controllers

Sports Supplements

- Carbohydrates / Fluids / Protein are foremost
  - Needs can/should largely be met via "normal" foods
  - Convenience and Portability are a strength for supplements
- Additional supplements to "fine-tune" performance
  - Energy/Sprint Performance
    - Creatine / Ribose / Cordyceps / Rhodiola
  - Immune Enhancement (via prevention of post-competition immunosuppression)
    - Glutamine / BCAA / Beta-sitosterol
  - Reduce Oxidative Stress (less damage to repair)
    - Antioxidant nutrients (C/E/Se/Zn/Lipoic acid), Carotenoids, Flavonoids
  - Injury Prevention and Rehabilitation (??)
    - Maintain Glycogen stores and Plasma Glucose levels
    - Delay fatigue => Maintain Power => Reduce Injuries
    - Supply adequate protein for repair

After Exercise

- Recovery is hottest growth area in nutrition industry
- Replace fluids
- Replace carbs (glycogen / HGI)
- Repair tissue damage (protein)
  - "Best" combo = carb/pro drink (4:1)
  - PBJ + Skim milk
- Control inflammation (fat) + free radicals (antioxidants)
- Faster = Better (circulation/delivery/uptake/storage)

Recovery Aids

- Restore Electrolytes and Water (Na, K)
- Replenish Glycogen Stores (4:1 ratio CHO:PRO)
- Reduce Oxidative Stress (antioxidants, carnitine, carnosine)
- Rebuild Muscle Protein (whey isolate, HCP, amino acids...)
- Maintain Immune Function (glutamine, beta-sitosterol, BCAAs)

BCAAs

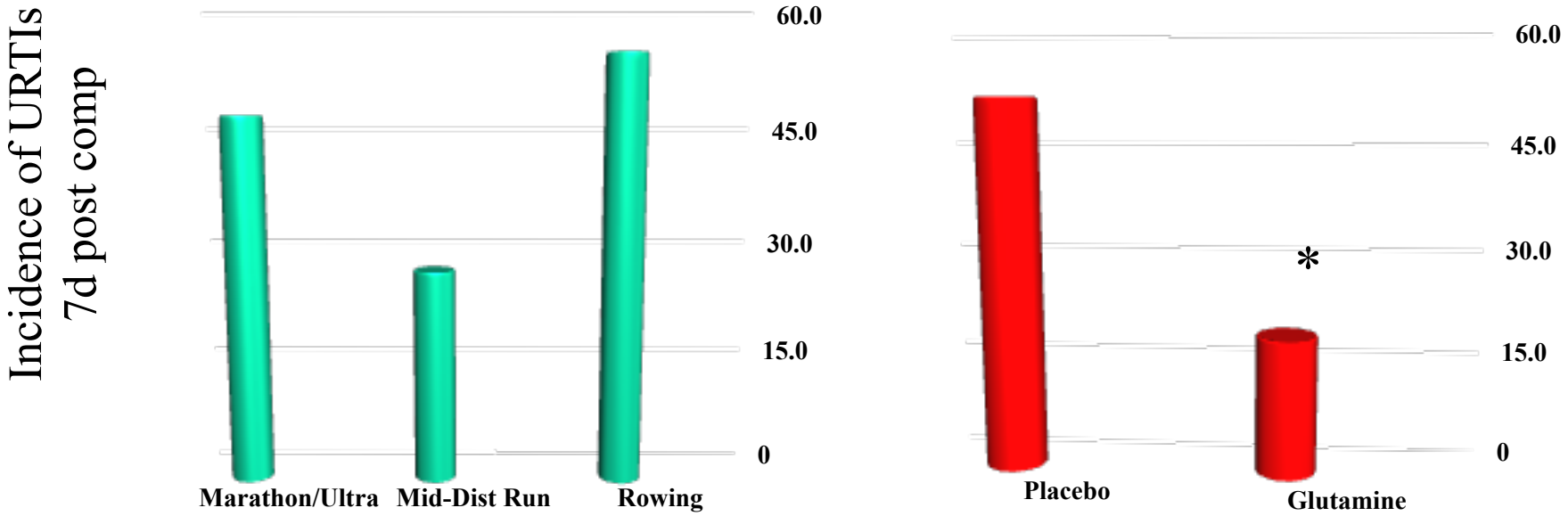
- "Anti-fatigue" (delay) and Immune system benefits in athletes
- Intermittent exercise increases plasma levels of free fatty acids and free tryptophan => which may accelerate central fatigue
- During soccer, 10g BCAA reduces RPE and improves mental performance (Blomstrand et al. *Acta Physiol Scand* 143, 225-6)
- In triathletes, 3-6g BCAA for 30d maintains plasma glutamine levels and reduces incidence of URTI (33.8%) following competition

Glutamine

- Most abundant amino acid in the body
  - 50% in blood and muscle
- Involved in immune function
- Body stores drop during intense exercise
- Muscle protein catabolism to supply needs
- 5-60 g/d post-exercise and post-surgery

Glutamine

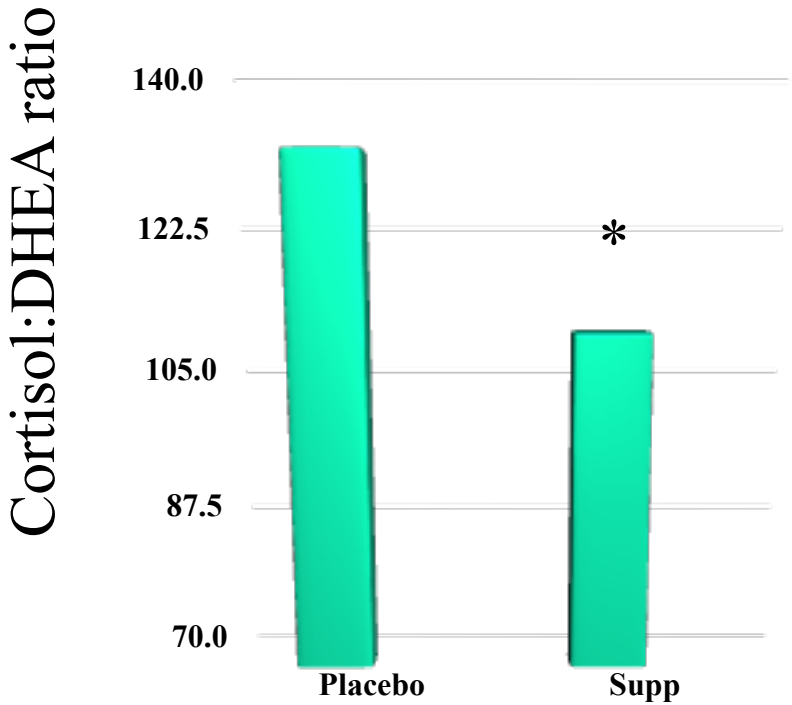
- Plasma levels reduced by prolonged, strenuous exercise & overtraining
  - 25% reduction following marathon
- Intense training => increased glutamine requirements (immune/repair)
- Reduced glutamine levels associated with immunosuppression
- Glutamine supplements (5-10g after marathon) can reduce the number of URTIs following intense competition



(Castell et al. 1996 *Eur J Appl Physiol* 75, 47-5)

Beta-sitosterol

- Promoted as “immune-system modulators”
- Pilot study of ultra-marathoners (n=17)
- 60mg/d beta-sitosterol + 0.6mg/d beta-sitosterol glucoside v. placebo
- Consumed supplement for 4 weeks prior and 3 days post competition
- Benefits on immune parameters (less neutrophilia, decreased IL-6)



Bouic et al. *Int J Sports Med* 1999; 20: 258-262.

POMS Post-marathon

Parameter	Placebo	Recover-Ease	P value
Tension	11.5±4.8	7.9±3.1	0.039
Depression	5.5±7.4	2.5±3.5	0.198
Anger	5.3±6.1	3.4±4.2	0.377
Vigor	14.9±4.1	20.5±4.8	0.005
Fatigue	9.4±5.5	4.5±2.9	0.009
Confusion	9.0±3.0	6.8±1.4	0.020
Global Mood	123.5±23.0	104.4±13.0	0.015

- Tension (-31%), Fatigue (-52%) and Confusion (-24%)
- Vigor (+38%) and Global Mood (+16%)
- NC on measures of Depression or Anger

RE = BCAA, glutamine, proteolytic enzymes, antioxidants

Post-marathon Symptoms

Parameter	Placebo	Recover-Ease	P value
Cold/Flu Symptoms	0.8±1.1	0.0±0.0	0.008
GI Complaints	0.9±1.6	0.4±0.5	0.293
Muscle/Joint Pain	6.8±3.7	3.3±2.3	0.007
Days to "Normal"	9.3±3.2	4.4±2.0	0.033

- **Cold/Flu symptoms** (2 week post-marathon period)
  - 20% of subjects in P reported symptoms
  - No reported cold/flu symptoms in RE
- RE reported 56% fewer **gastrointestinal problems**
- **Muscle/Joint pain** were reduced by 51% in RE compared to P
- RE resumed **normal training** 5 days earlier than P


Thank You!