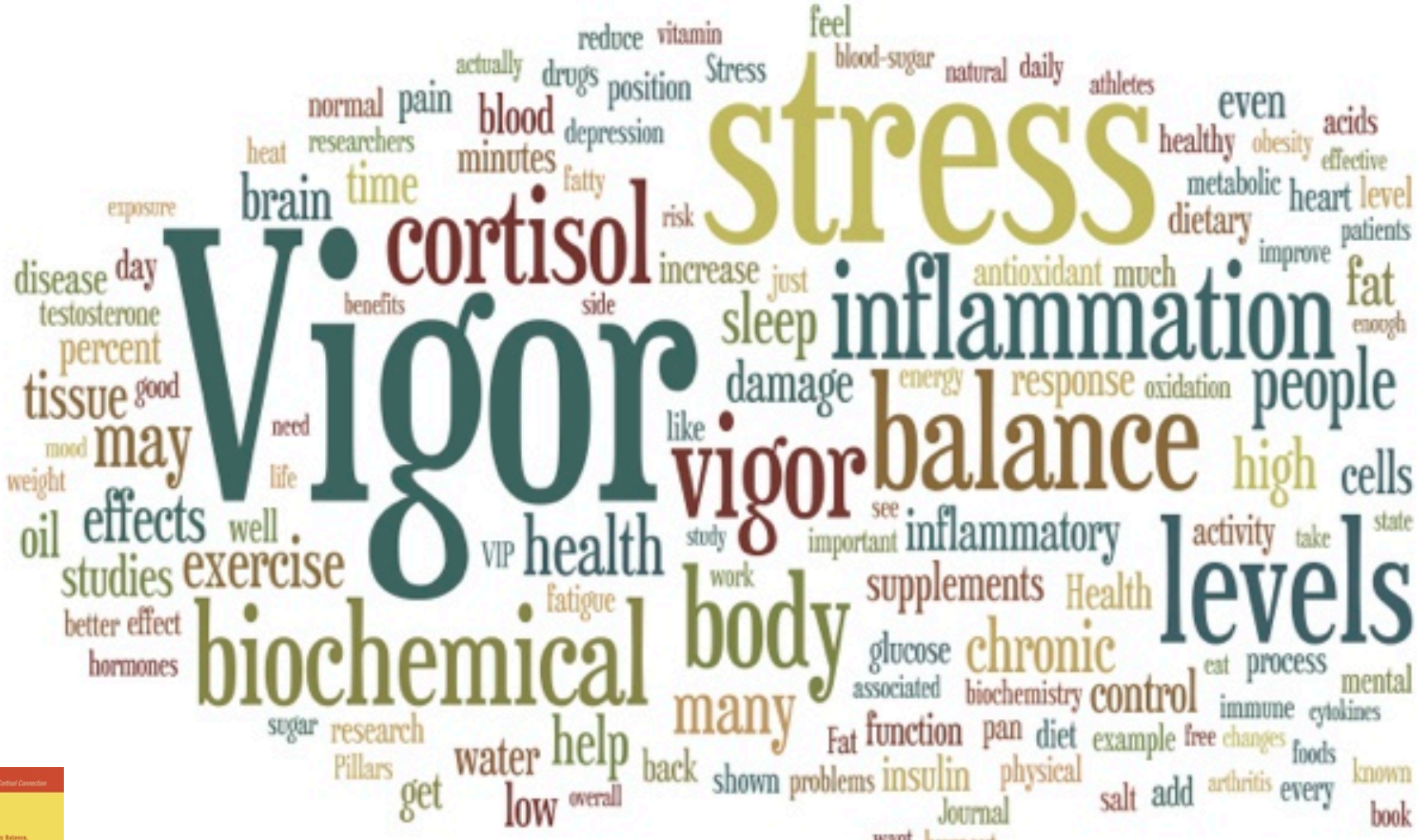
Influence of Nutrition on Mood State, Vigor, & Performance

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


feel
reduce
vitamin
blood-sugar
natural
daily
athletes
actually
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Stress
stress
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obesity
acids
heat
researchers
minutes
fatty
effective
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heart
level
brain
time
exposure
risk
dietary
patients
cortisol
improve
disease
day
increase
just
antioxidant
much
fat
Vigor
benefits
side
sleep
inflammation
testosterone
enough
percent
damage
energy
response
oxidation
people
tissue
good
need
like
vigor
balance
high
cells
may
mood
weight
life
see
oil
effects
well
VIP
health
study
important
inflammatory
activity
take
state
levels
studies
exercise
work
supplements
Health
better effect
fatigue
body
glucose
chronic
eat
process
mental
hormones
biochemical
associated
biochemistry
control
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cytokines
many
sugar
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function
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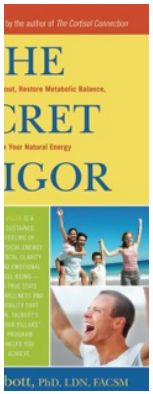

HE
CRET
IGOR

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

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 = Reduced Depression / Improved QOL
  - Kuczmarski et al. *J Am Diet Assoc*. 110(3): 383-389, 2010
- Fast Food / Commercial baked Goods = Higher Depression Risk
  - Sanchez-Vilegas et al. *Public Health Nutr* 15(3), 424-432, 2011
- Food restriction (lightweight athletes) = Reduced Vigor
  - Filaire et al. *Int J Sports Med*. Aug;22(6):454-9. 2001
- Bonito (tuna) Broth (EAAs) = Reduced Fatigue / Improved Vigor
  - Kuroda & Nozawa. *Biomed Res* 29(4), 175-179, 2008
- Positive Psychological Well-Being = longer survival (healthy/diseased)
  - Chida & Steptoe. *Psychosomatic Med* 70:741-756, 2008

Tired, Stressed, Depressed

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"

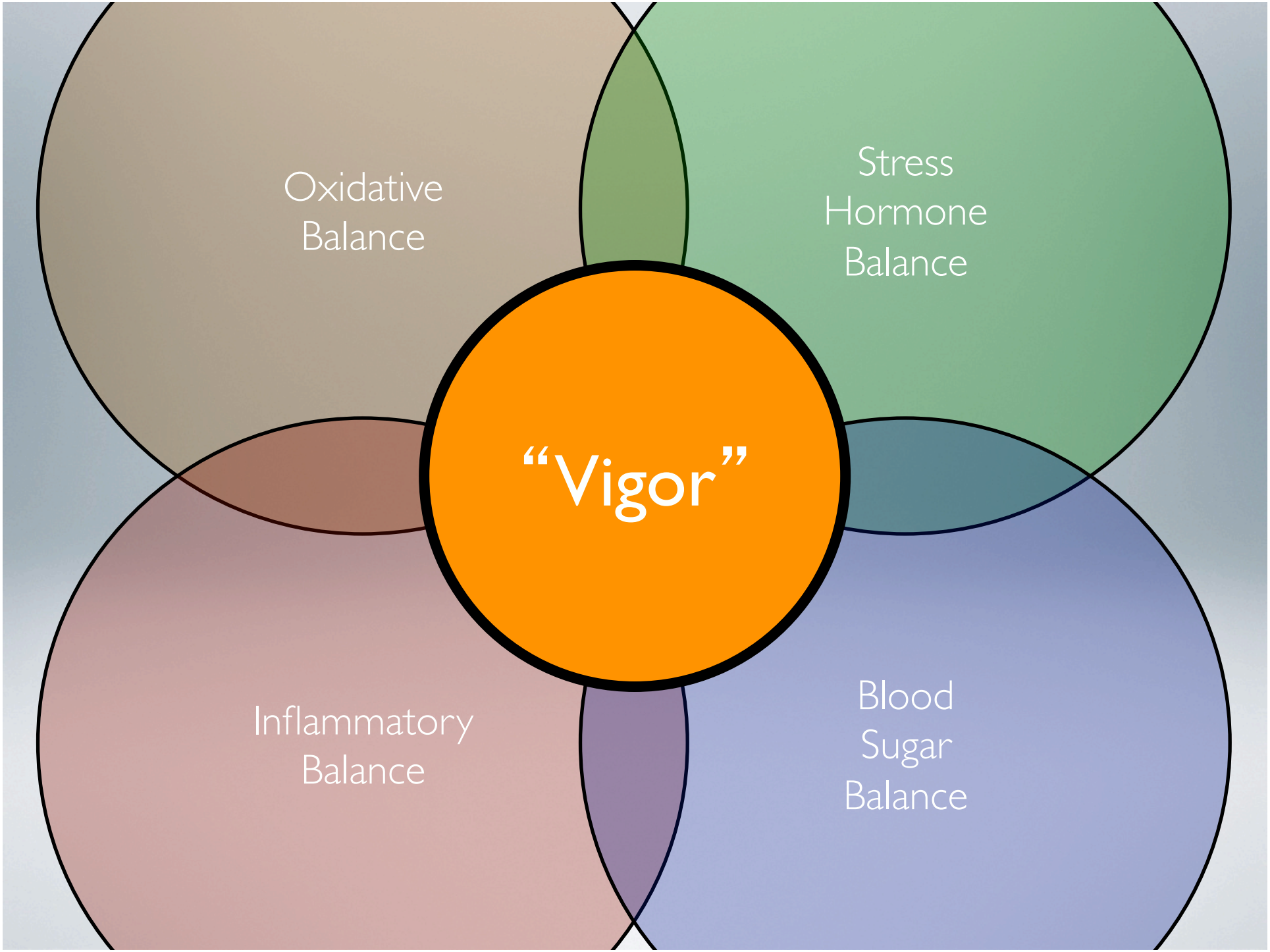
Stress-Related Conditions

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

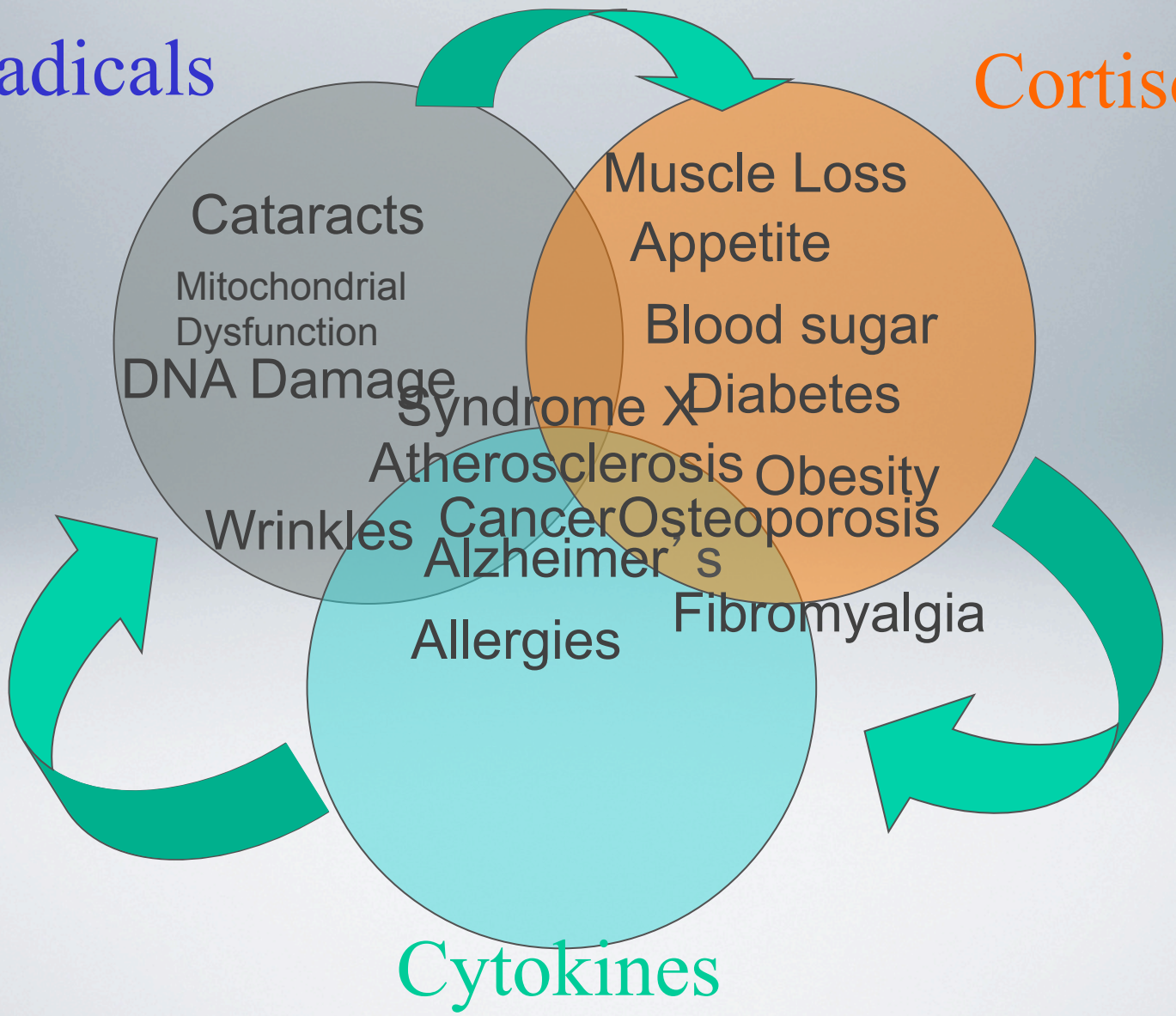
- Increased appetite, Accelerated muscle catabolism, Suppressed fat oxidation, Enhanced fat storage **(Obesity - 2,694)**
- Elevated cholesterol and triglyceride levels; Elevated blood pressure **(Heart disease - 4,604)**
- Alterations in brain neurochemistry [dopamine/serotonin/norepinephrine] **(Depression/Anxiety/ADHD - 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)**

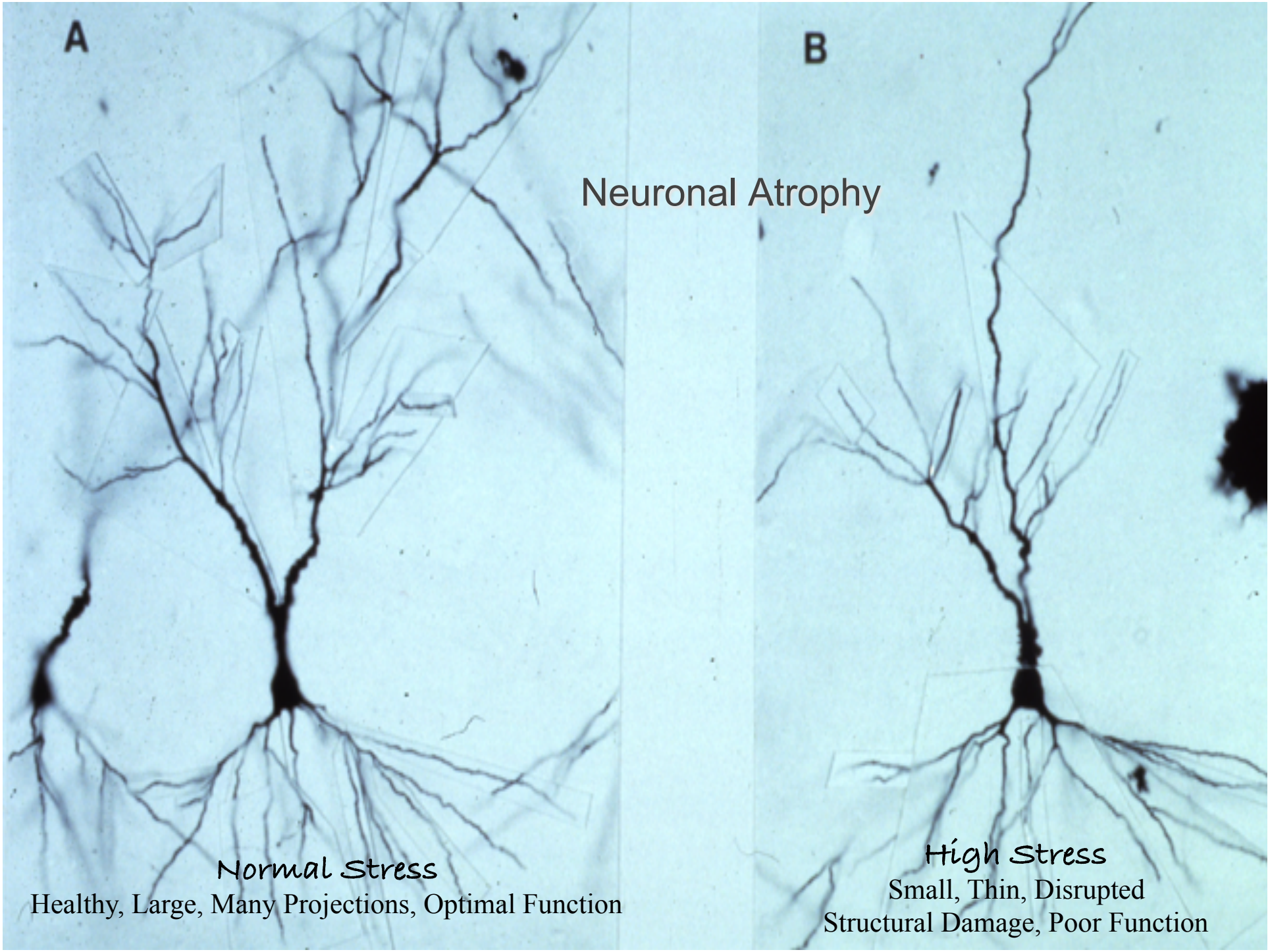
Causes of "Imbalance" (Stress)

- Emotional stress (deadlines, bills, traffic…)
- Physical stress (aging, sleep deprivation, exercise…)
- Environmental stress (air/water pollution, heat, cold…)
- Non-Optimal Diet (processed foods, inadequate (phyto)nutrients…)
- 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 biochemical balance*

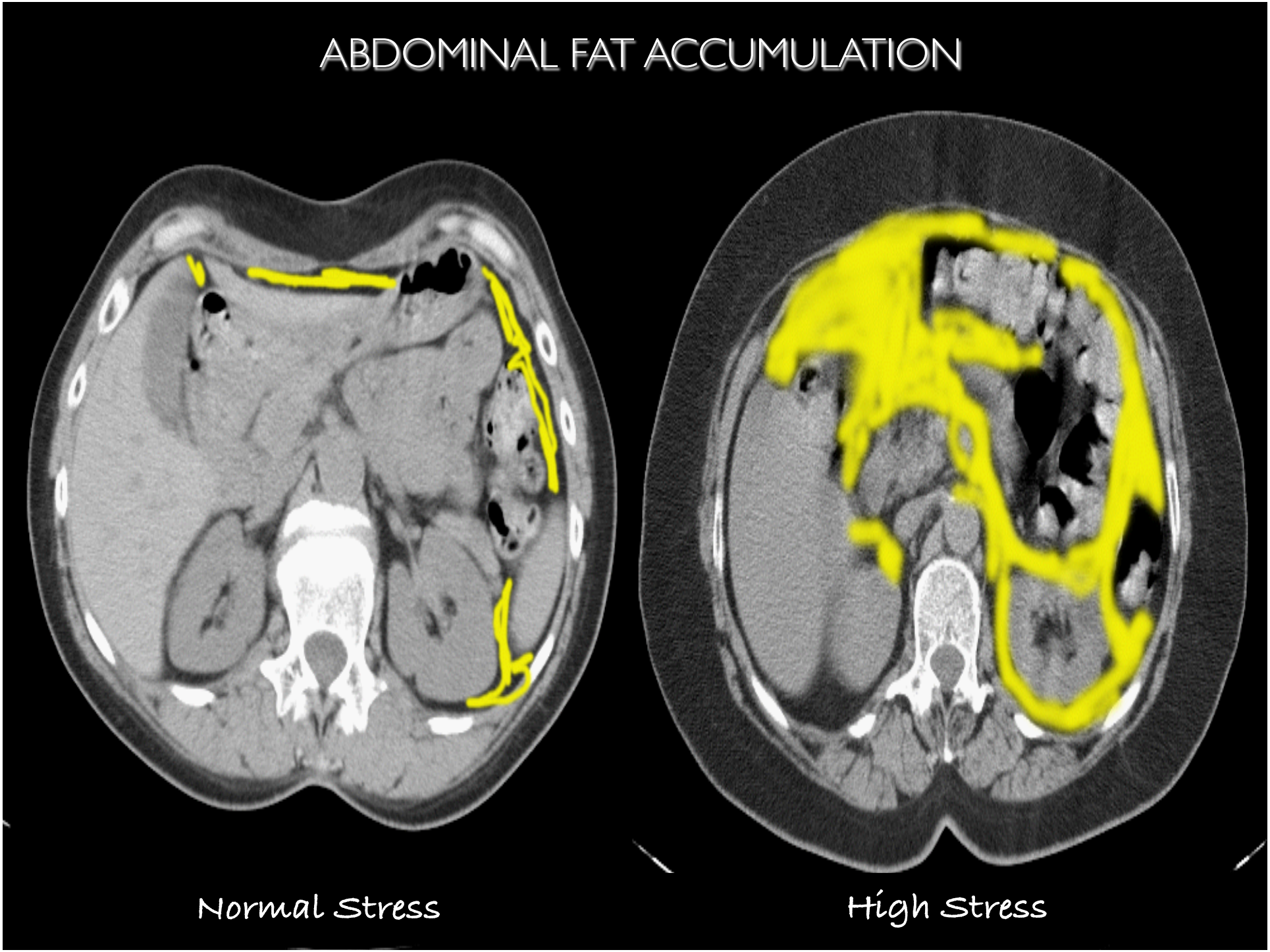

Oxidative
Balance
Stress
Hormone
Balance
"Vigor"
Inflammatory
Balance
Blood
Sugar
Balance

Pillars of Health




A
B
Neuronal Atrophy
Normal Stress
Healthy, Large, Many Projections, Optimal Function
High Stress
Small, Thin, Disrupted
Structural Damage, Poor Function

ABDOMINAL FAT ACCUMULATION



"A great diet will not make an average athlete great -

But an average diet will make a great athlete average."

Over-training / Over-reaching

Accumulation of training and/or non-training stress…

…resulting in a (short/long)-term decrement in performance capacity…

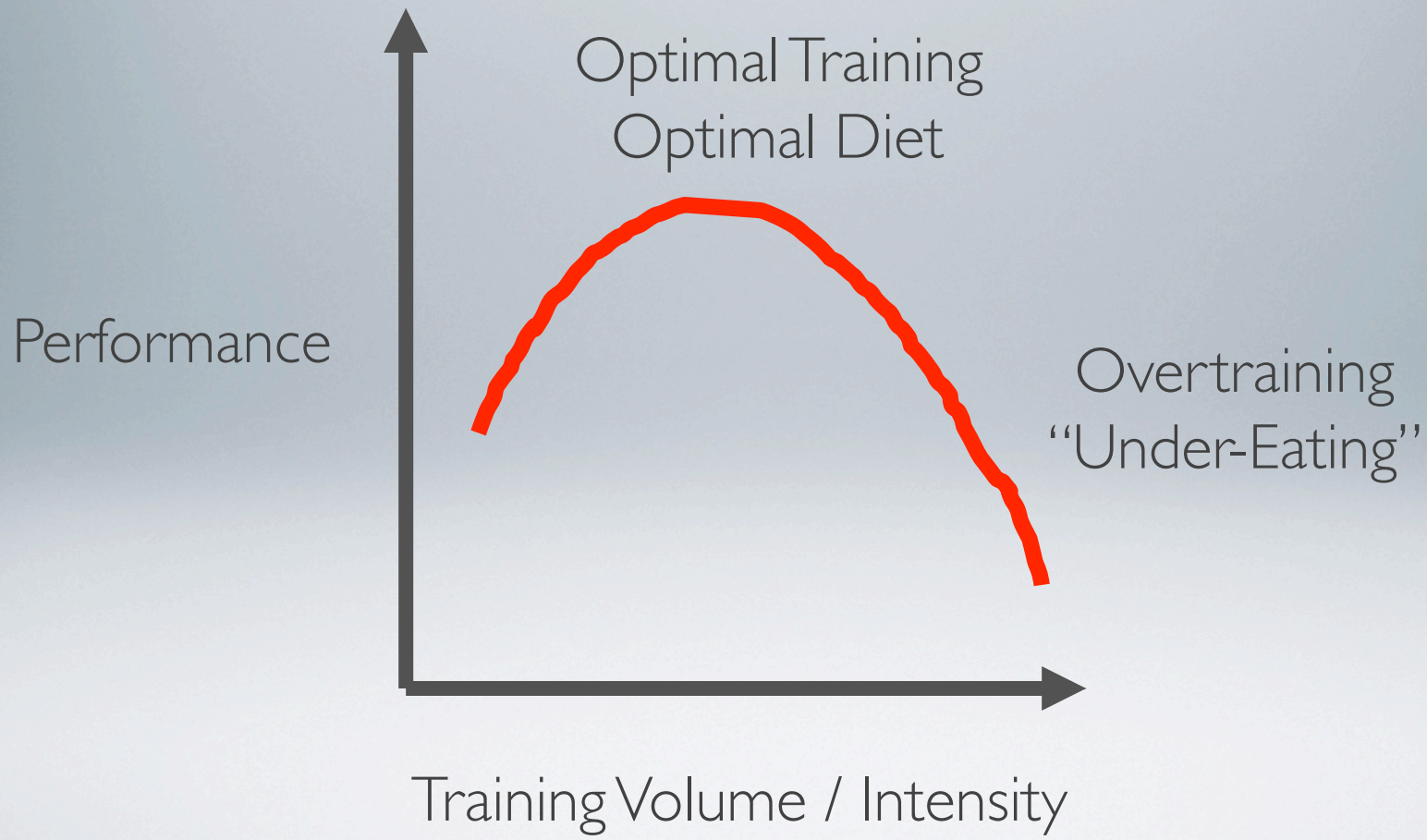
…with/without related physiological/psychological signs/ symptoms of overtraining…

…in which restoration of performance capacity may take several days/weeks/months

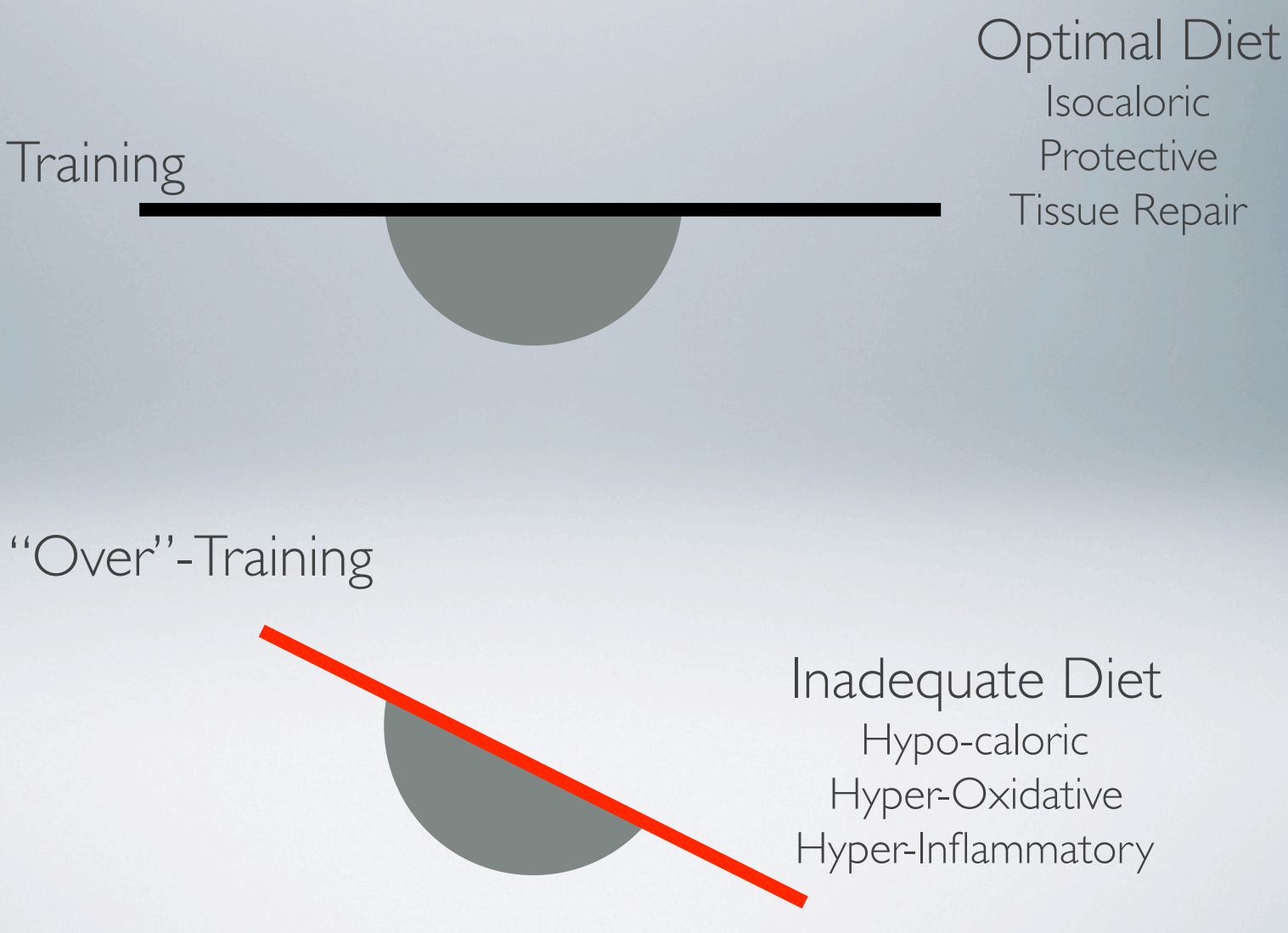
Overtraining Factors

- Sharp increase in training volume/intensity (too often, too intensely, too frequently)
- Lack of rest/recovery says (6:1)
- Inadequate diet (hypo-caloric / hypo-carbohydrate)
  - Negative energy state, Glycogen depletion, Central/peripheral fatigue
- Hyper-oxidative diet
  - Excessive processed foods (refined carbs)
  - Inadequate antioxidants (carotenoids, flavonoids, vits C/E, etc…)
- Hyper-Inflammatory
  - Fatty acid imbalances, High Omega 6 / Low Omega 3

Training – Diet Balance

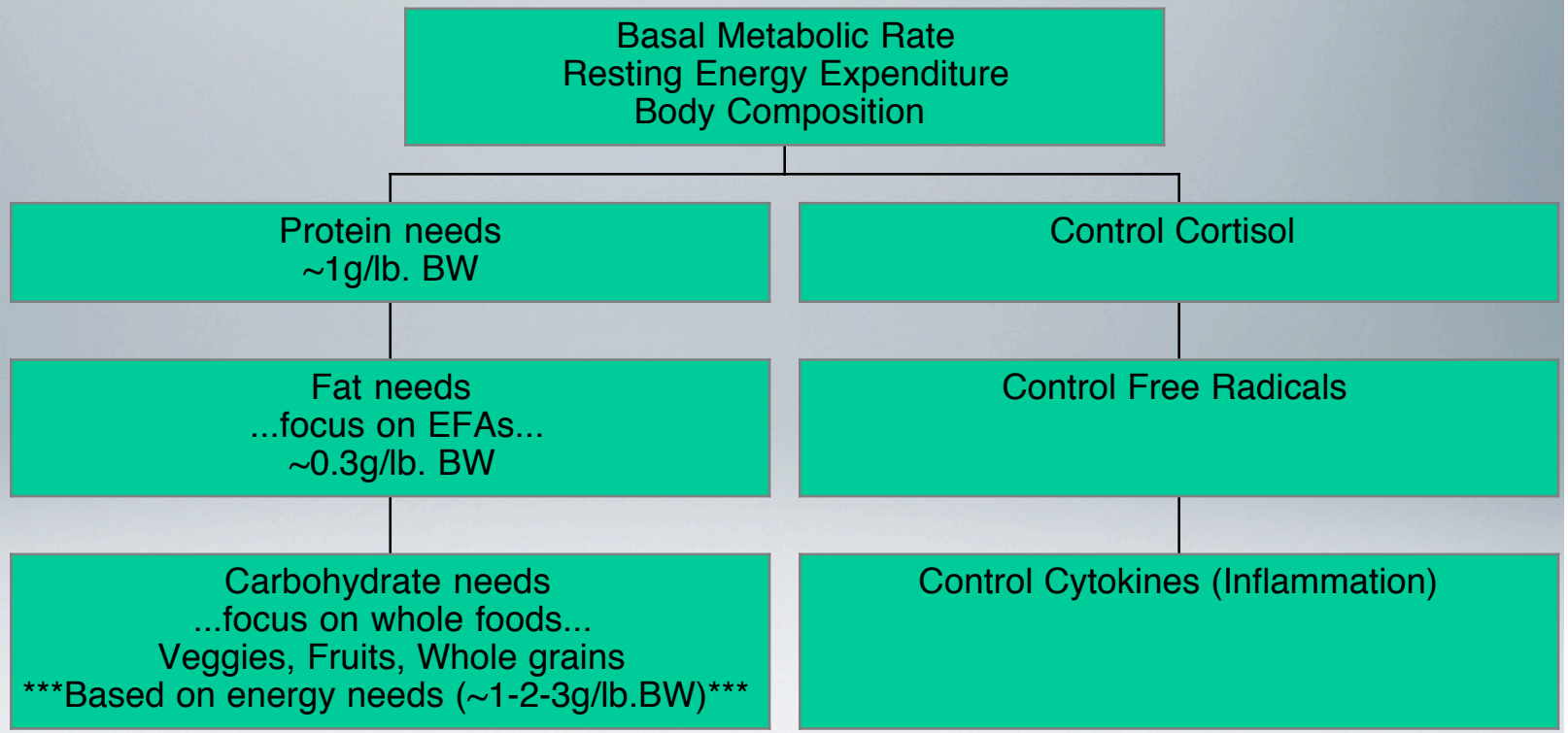


Periodized Eating



How to Eat???

Example (165lb athlete):
- 1765 kcal (weight loss)
- 2425 kcal (off-season weight maintenance)
- 3085 kcal (in-season performance enhancement)



How many athletes eat "grams"?

Most athletes eat FOODS!

Increased Needs for Athletes?

- Increased energy turnover
  - higher micronutrient turnover
    - Intake
    - Loss via sweat, feces, urine
- Increased building, repair, and tissue maintenance
- Increased oxidative stress
- Increased susceptibility for illness

At risk for marginal intakes?

- Disordered eating
  - Diuretics, laxatives
  - Elimination diets
- High carbohydrate intakes
  - Endurance athletes
- Poor dietary choices
  - Few Fruit & Vegetables
  - Few Whole Grains

Nutrition Against Overtraining

Intense Training Stress → Decreased Hunger / Appetite
Increased (long-term)

↓

Reduced Food Intake

↓

Reduced Nutrient Availability

↓

Reduced Glycogen
Elevated Free Radicals
Elevated Inflammatory Cytokines

←

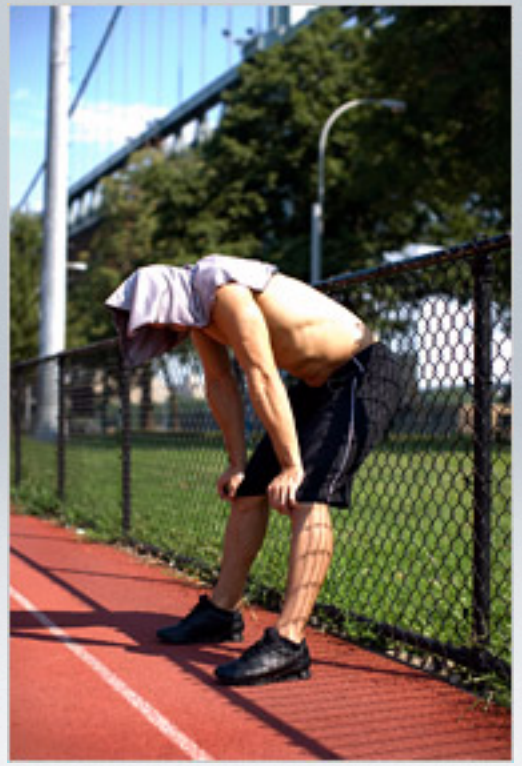
Fatigue
Muscle Loss
Reduced Immune Function
Tissue Damage
Slower Recovery

↑

Increased Injury/Illness Risk

↑

Reduced Vigor
Mental/Physical Deterioration
Poor Athletic Performance



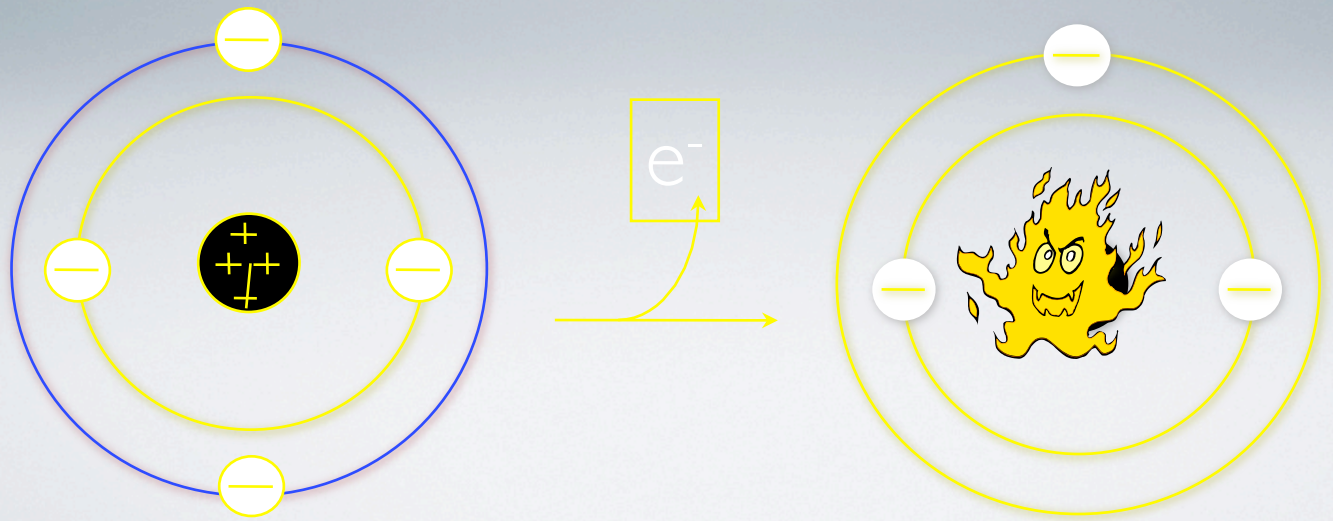
Free Radicals

- 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.

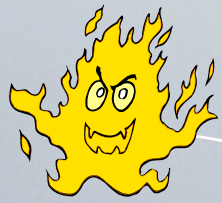
What Is a Free Radical?

Scientific definition

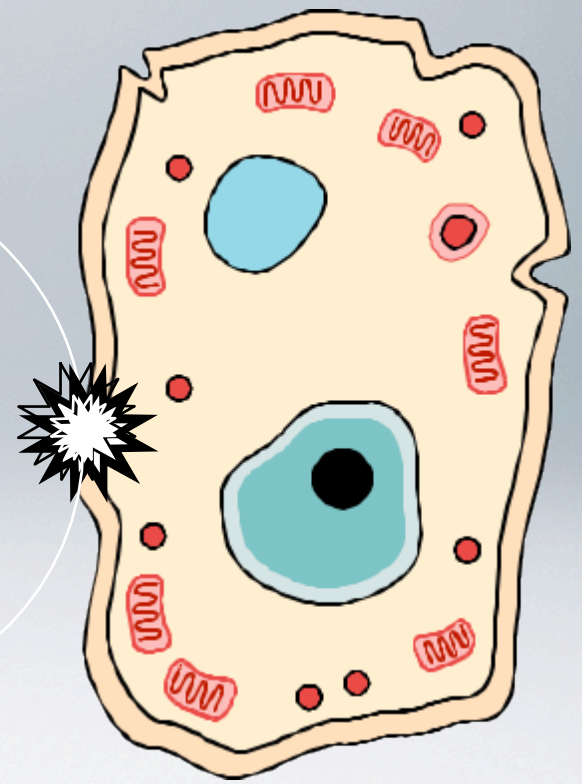
- A molecule or molecular fragment containing an unpaired electron in the valence orbital.



Free Radical Damage

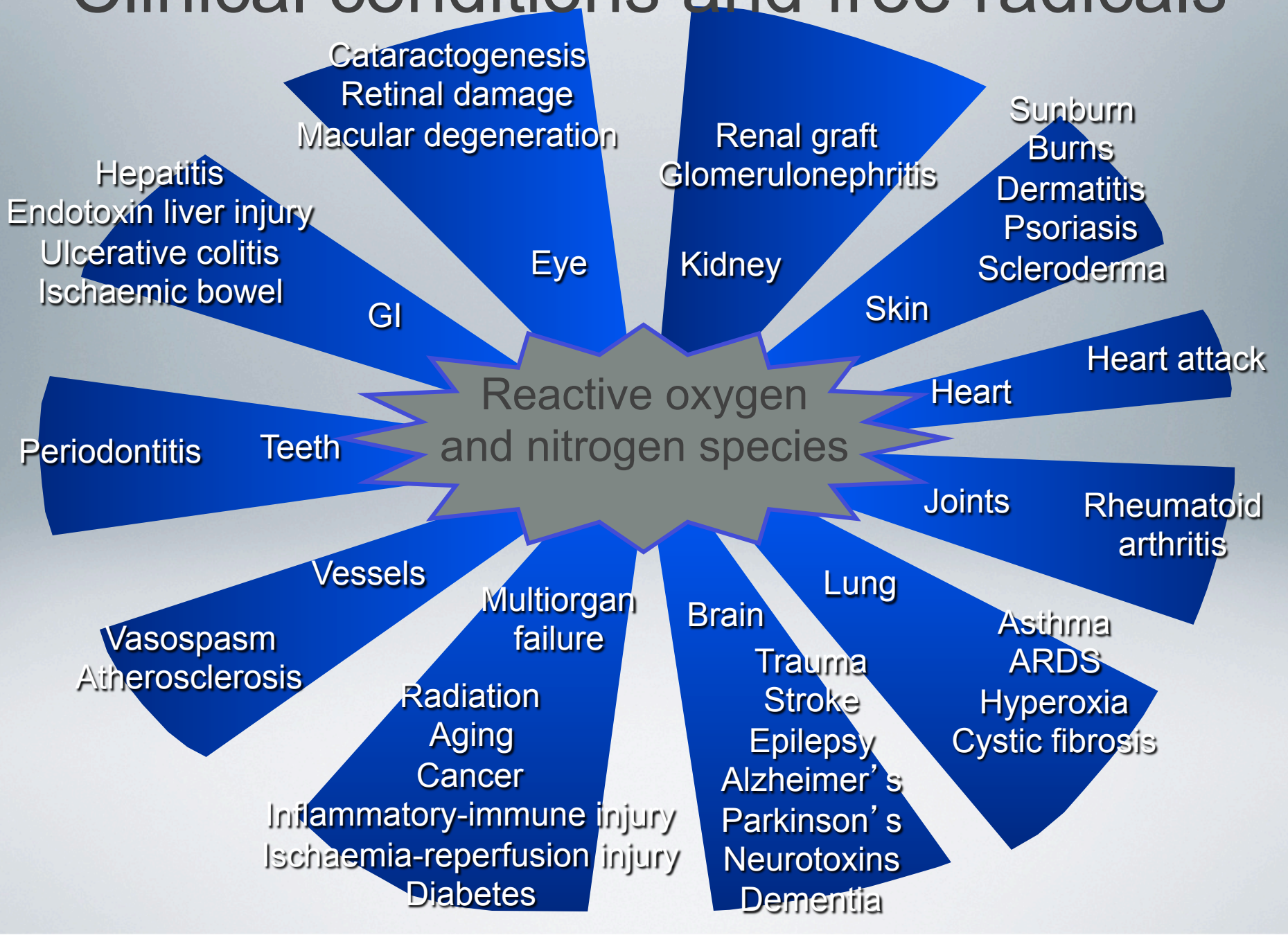


The free radical will steal electrons to stabilize itself.



Leads to damage of lipid membranes and proteins

Clinical conditions and free radicals



Antioxidant Nutrients

- Endogenous (enzyme) defense system
  - Enzymes: increased with training
- Dietary antioxidants
  - Interact with endogenous antioxidants and form a cooperative antioxidant network
    - Protect cell/nuclear/mitochondrial membranes from oxidative damage
- No clear consensus whether athletes have greater needs
  - Low fat diets, energy restriction, low fruit/vegetable intake

Endogenous Defense System

Requires co-factors for enzymes involved in antioxidant defense

- Up-regulated enzymes in athletes
- Superoxide Dismutase
- Glutathione Peroxidase
- Catalase

Copper
Iron
Manganese
Selenium
Zinc

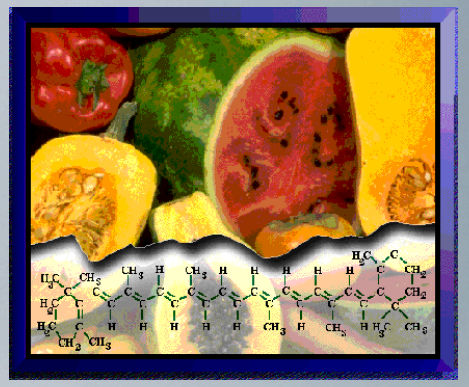
Selected Dietary Antioxidants

- Vitamin E
  - Lipid soluble compound; major chain-breaking antioxidant found in cell membranes

- Vitamin C
  - Located in aqueous phase of cell; acts as a radical scavenger and recycles vitamin E

Selected Dietary Antioxidants

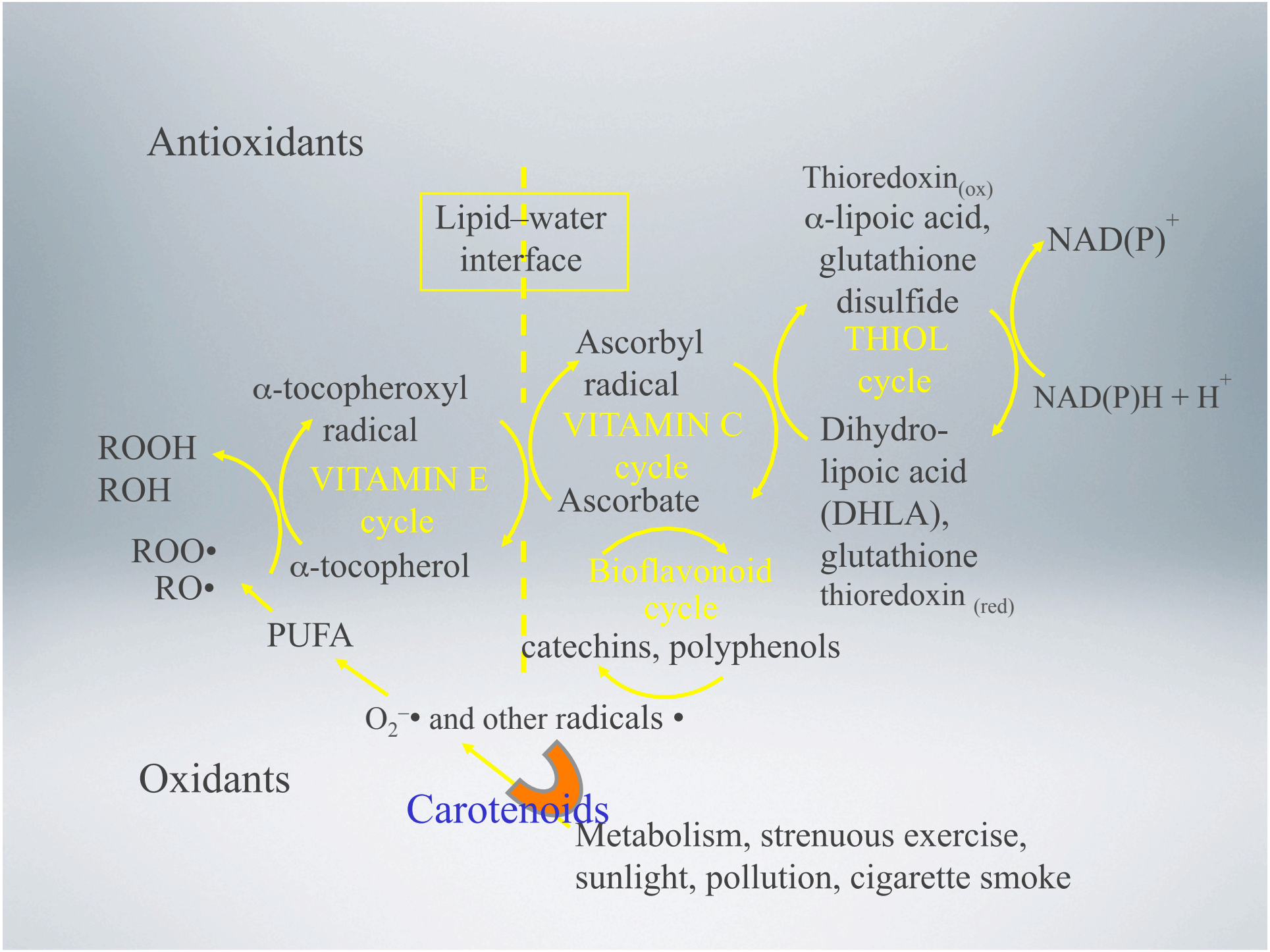
- Carotenoids
  - Lipid soluble antioxidant; located in tissue membranes
  - Examples: Yellow and Orange foods

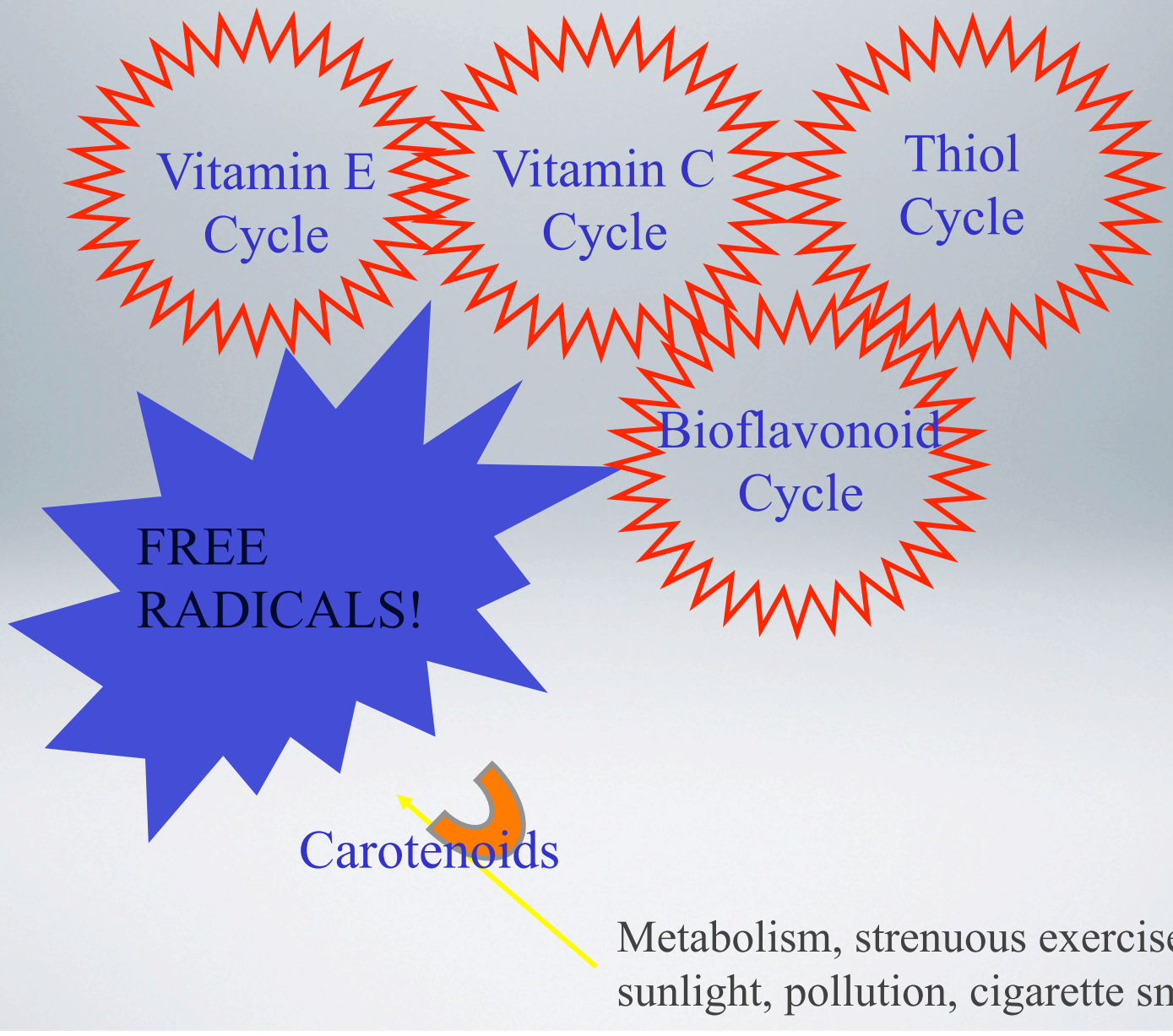


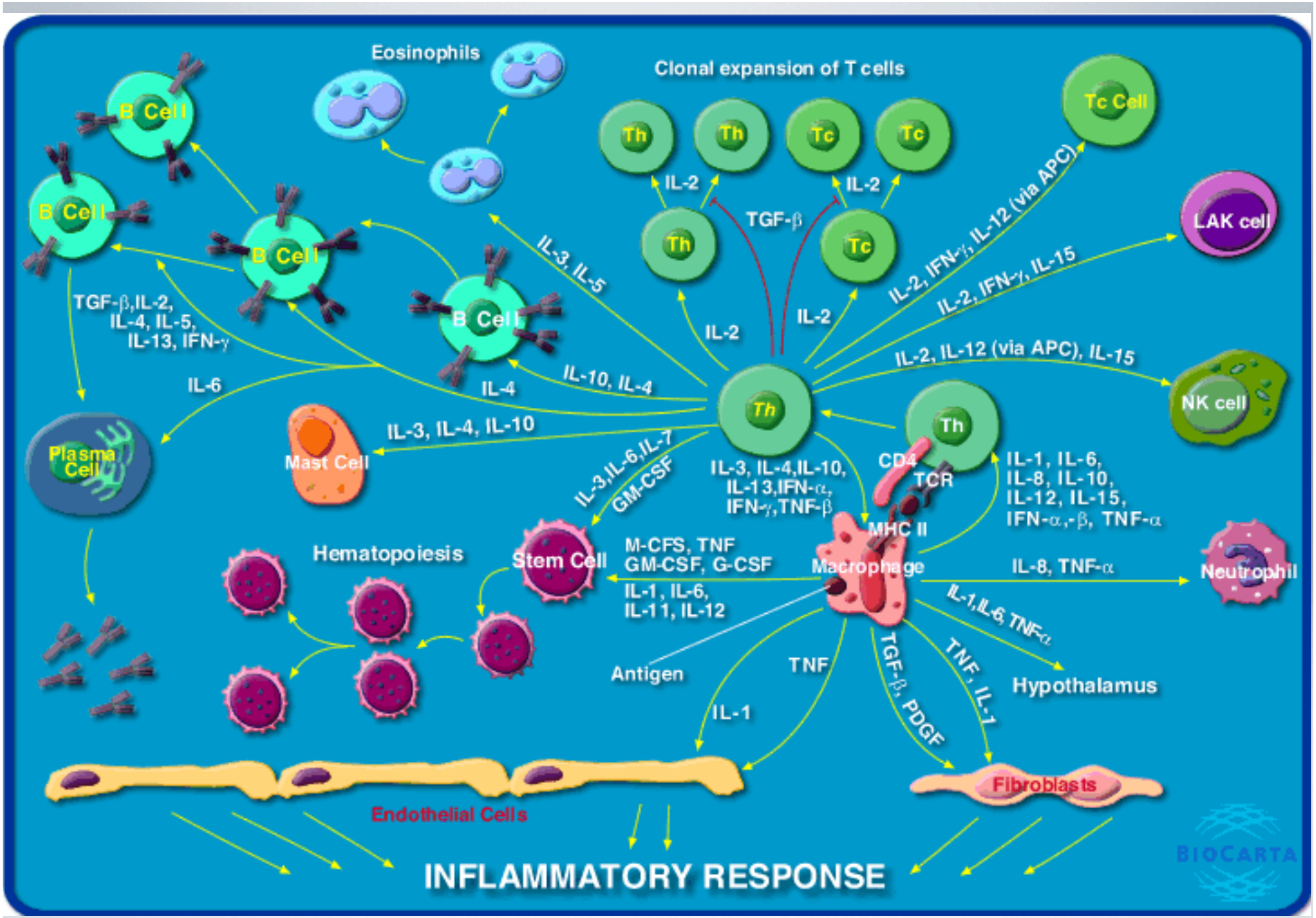
- Flavonoids
  - Antioxidants, located throughout the cell; able to scavenge radicals in lipid and aqueous phase
  - Examples: Blue and Purple Foods

Negative Aspects of Mega-Doses

- ↑ tissue damage
- ↑ oxidative stress
- Impaired contractile function
- Impaired performance


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•
PUFA
Bioflavonoid cycle
catechins, polyphenols
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


Eosinophils
Clonal expansion of T cells
B Cell
B Cell
B Cell
B Cell
Th
Th
Tc
Tc
Tc Cell
IL-2
IL-2
TGF-β
Th
Tc
IL-2, IFN-γ, IL-12 (via APC)
LAK cell
IL-2, IFN-γ, IL-15
IL-3, IL-5
TGF-β,IL-2,
IL-4, IL-5,
IL-13, IFN-γ
IL-2
IL-2
IL-2, IL-12 (via APC), IL-15
IL-6
IL-4
IL-10, IL-4
Th
NK cell
Plasma Cell
Mast Cell
IL-3, IL-4, IL-10
IL-3,IL-6,IL-7
GM-CSF
IL-3, IL-4,IL-10,
IL-13,IFN-α,
IFN-γ,TNF-β
Th
CD4
TCR
IL-1, IL-6,
IL-8, IL-10,
IL-12, IL-15,
IFN-α,-β, TNF-α
MHC II
Hematopoiesis
Stem Cell
M-CFS, TNF
GM-CSF, G-CSF
IL-1, IL-6,
IL-11, IL-12
Macrophage
IL-8, TNF-α
Neutrophil
IL-1,IL-6,TNF-α
Antigen
TNF
TGF-β, PDGF
TNF, IL-1
Hypothalamus
IL-1
Fibroblasts
Endothelial Cells
INFLAMMATORY RESPONSE
BIOCARTA

Palm Fruit Nutrients

- Fatty Acids (palmitic/oleic)
- Carotenoids
- Polyphenols
- Tocopherols/Tocotrienols
- Phytosterols

Antioxidant Education

The Helping Hand

Fruits & Veggies

Lean Protein

Concentrated Carbs

Added Fat

Metabolic Controllers

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)

"Healthy-Stressed" Subjects

Screened for "moderate" levels of psychological stress

- Followed for 8 weeks…
  - **S**tress Management
  - **E**xercise
  - **N**utrition
  - **S**upplementation
  - **E**valuation

Adaptogenic 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 Balance"
    - Cortisol:Testosterone, Dopamine:Norepinephrine, Serotonin, etc…
  - Deliver Healthy Energy (VIGOR)
  - Enhance Mood

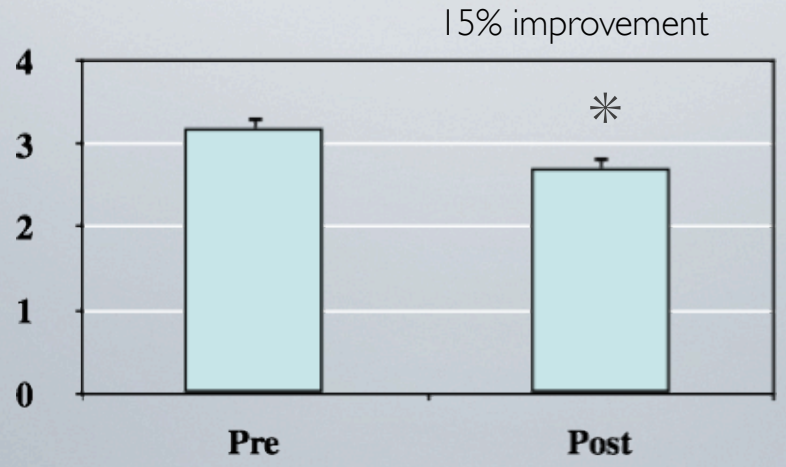
POMS Post-marathon

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

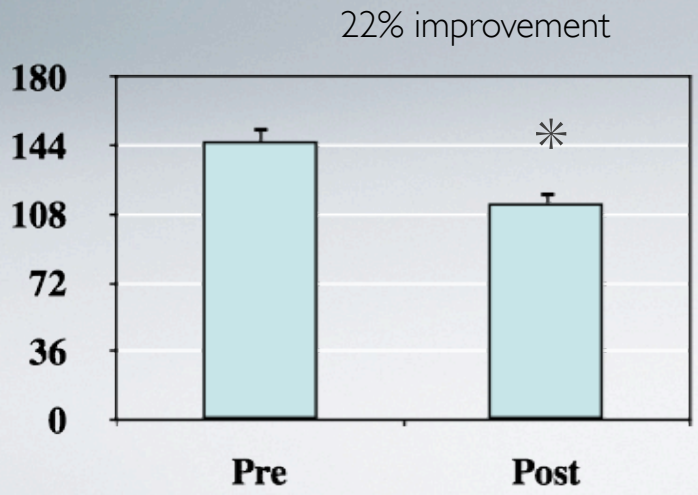
- Tension (-31%), Fatigue (-52%) and Confusion (-24%)
- Vigor (+38%) and Global Mood (+16%)
- NC on measures of Depression or Anger

RE = BCAA, glutamine, proteolytic enzymes, antioxidants

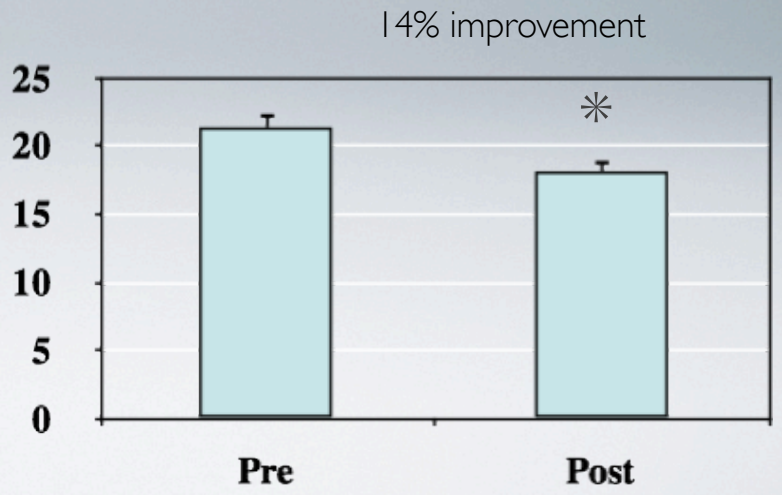
C:T Ratio (x1000)



Global Mood State (POMS)



Subjective Stress

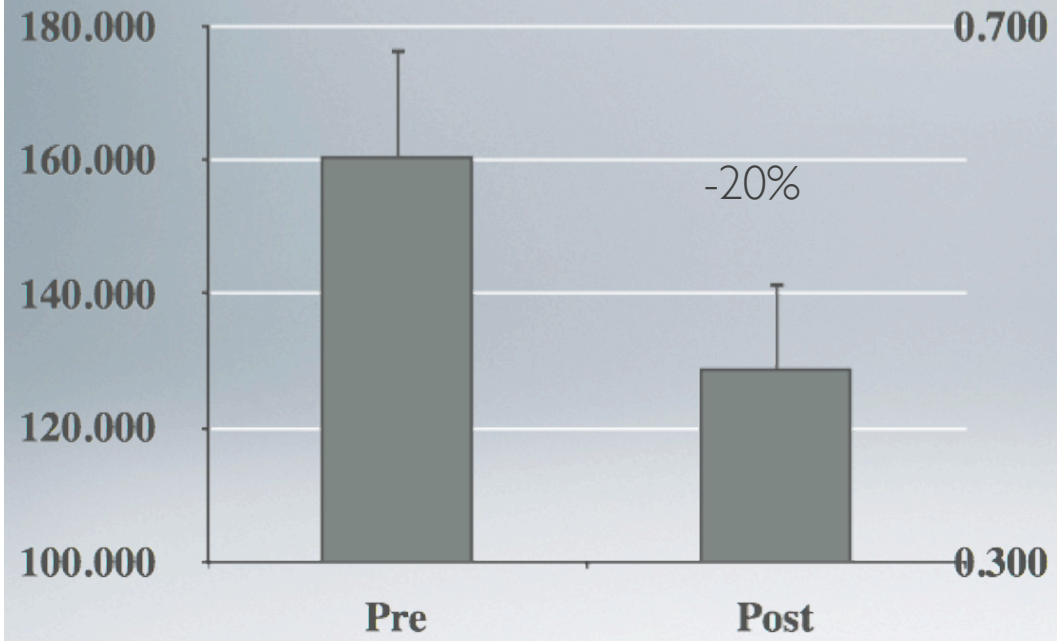


All, $p \leq 0.05$ compared to pre value

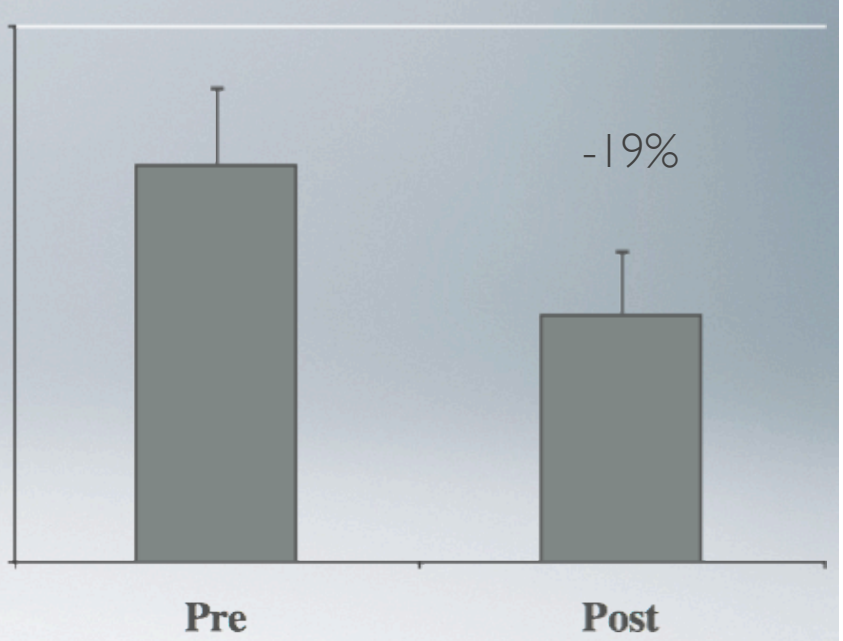
RESULTS

Global Mood State & Salivary Cortisol

Global Mood State (POMS)

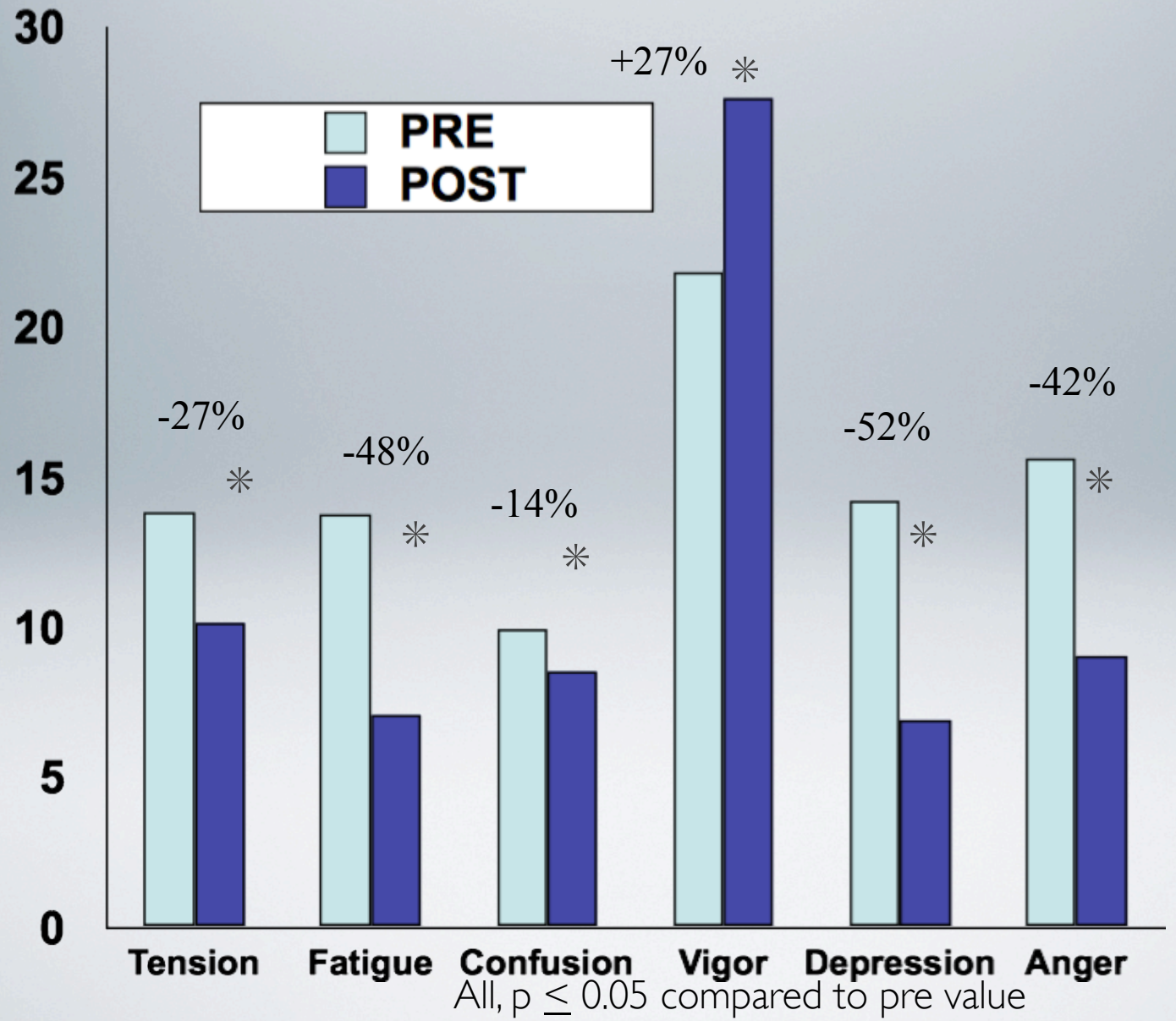


Salivary Cortisol (ug/dL)



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

Profile of Mood States (POMS)



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

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

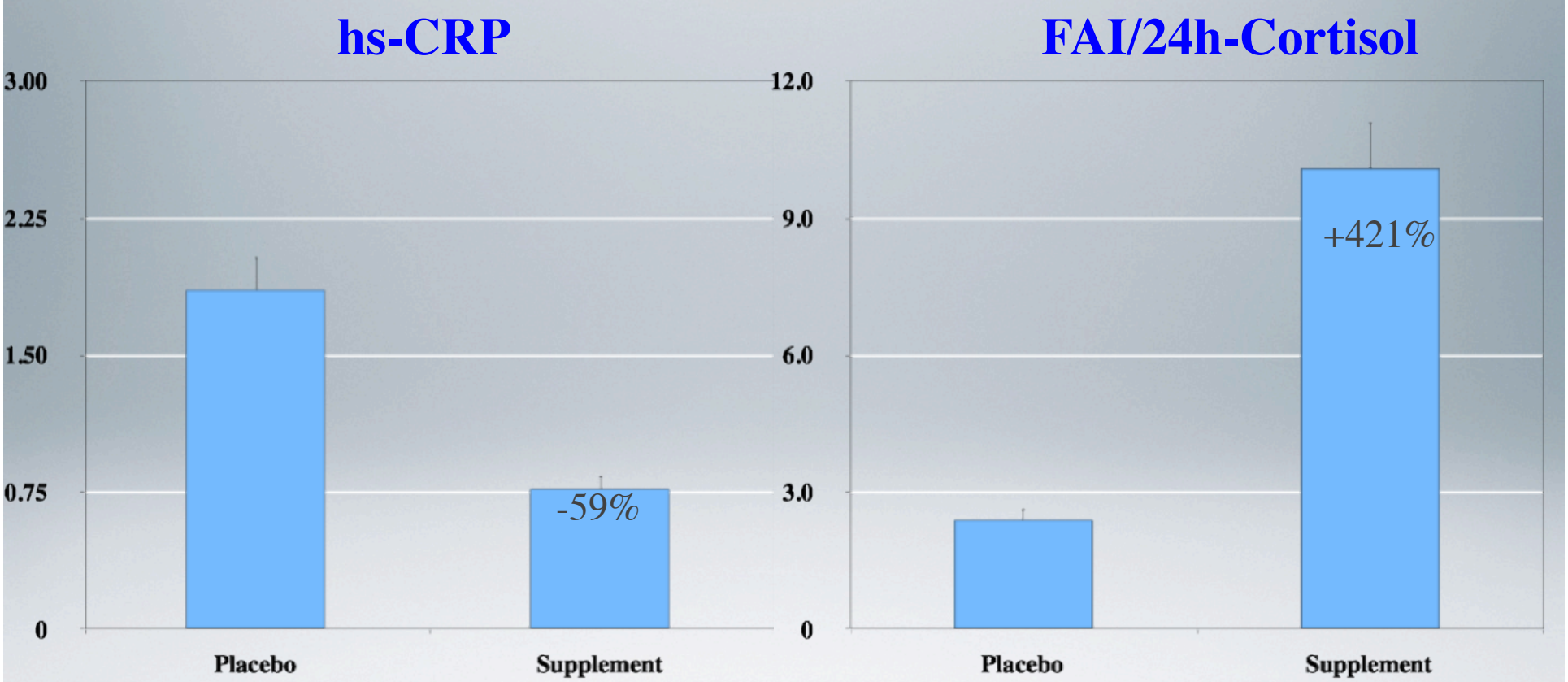
S. Talbott[1], J. Talbott[1], M. Vosti[2], & J. Anderson[2]

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

SUPPLEMENT WATCH
Supplement Decisions Made Easy

RESULTS (week 4)

Inflammation & Metabolic Balance

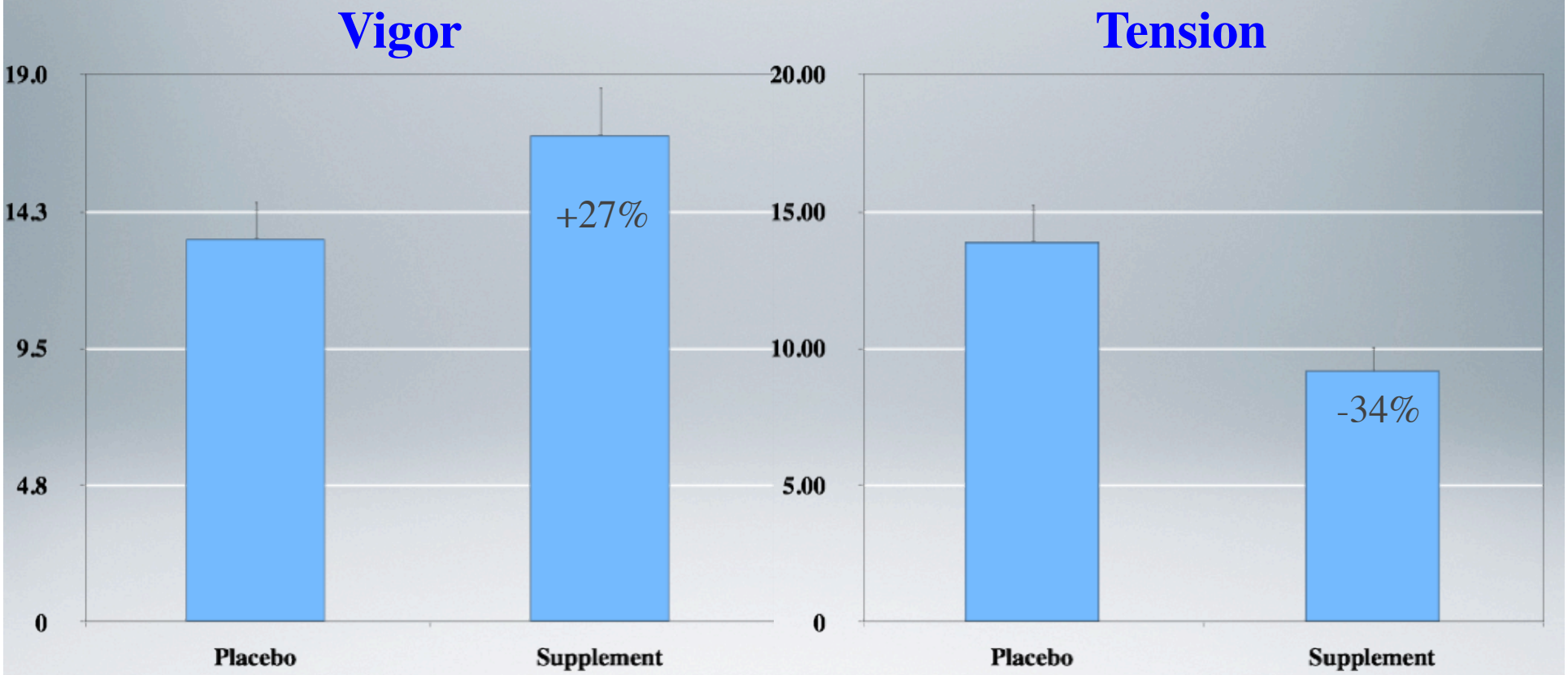


Both, $p \leq 0.05$ compared to Placebo

SUPPLEMENT WATCH
Supplement Decisions Made Easy

RESULTS (week 4)

Profile of Mood States (POMS)



Both, $p \leq 0.05$ compared to Placebo

SUPPLEMENT WATCH
Supplement Decisions Made Easy

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

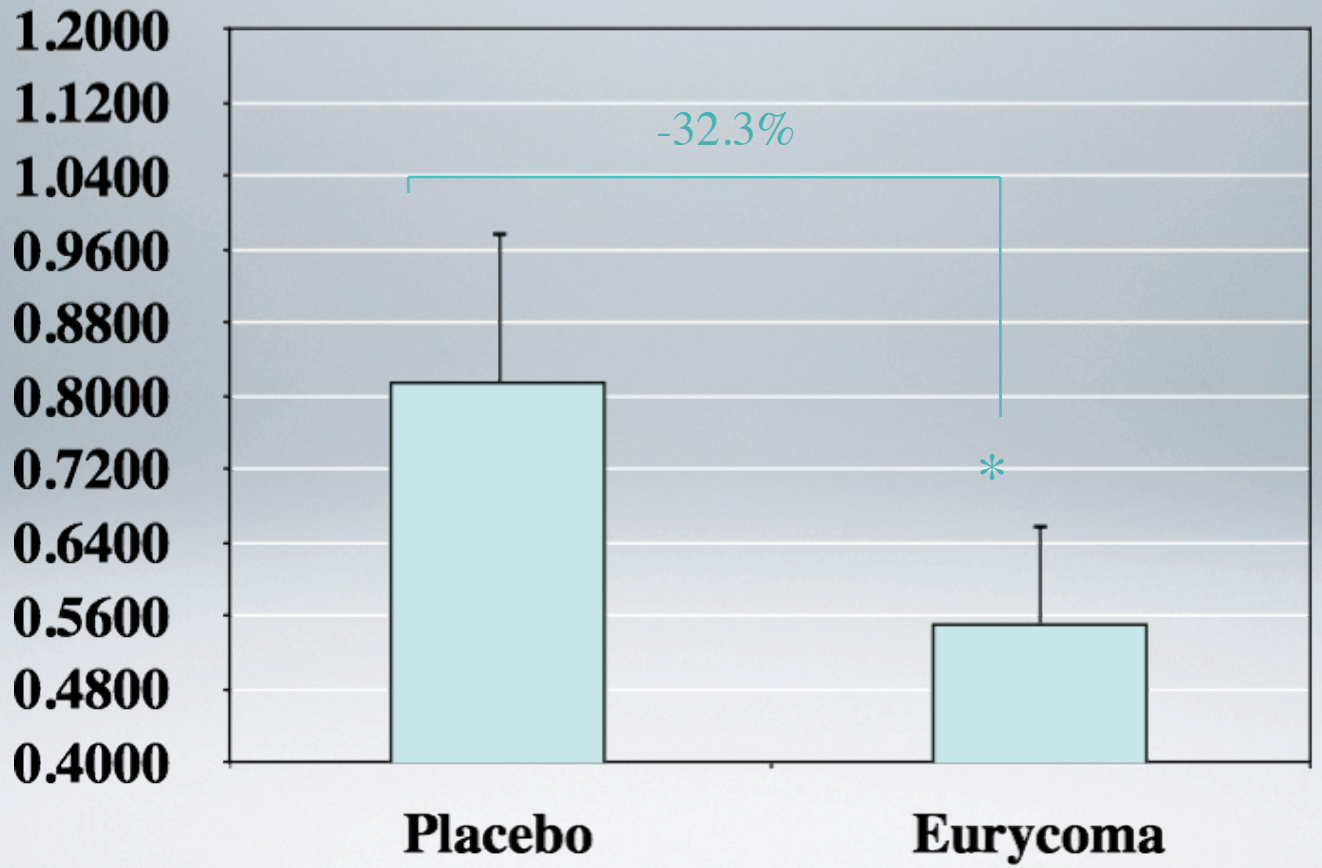
S. Talbott, J. Talbott, J. Negrete, M. Nichols, and J. Roza

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

& Source One Global, Chicago, IL

RESULTS

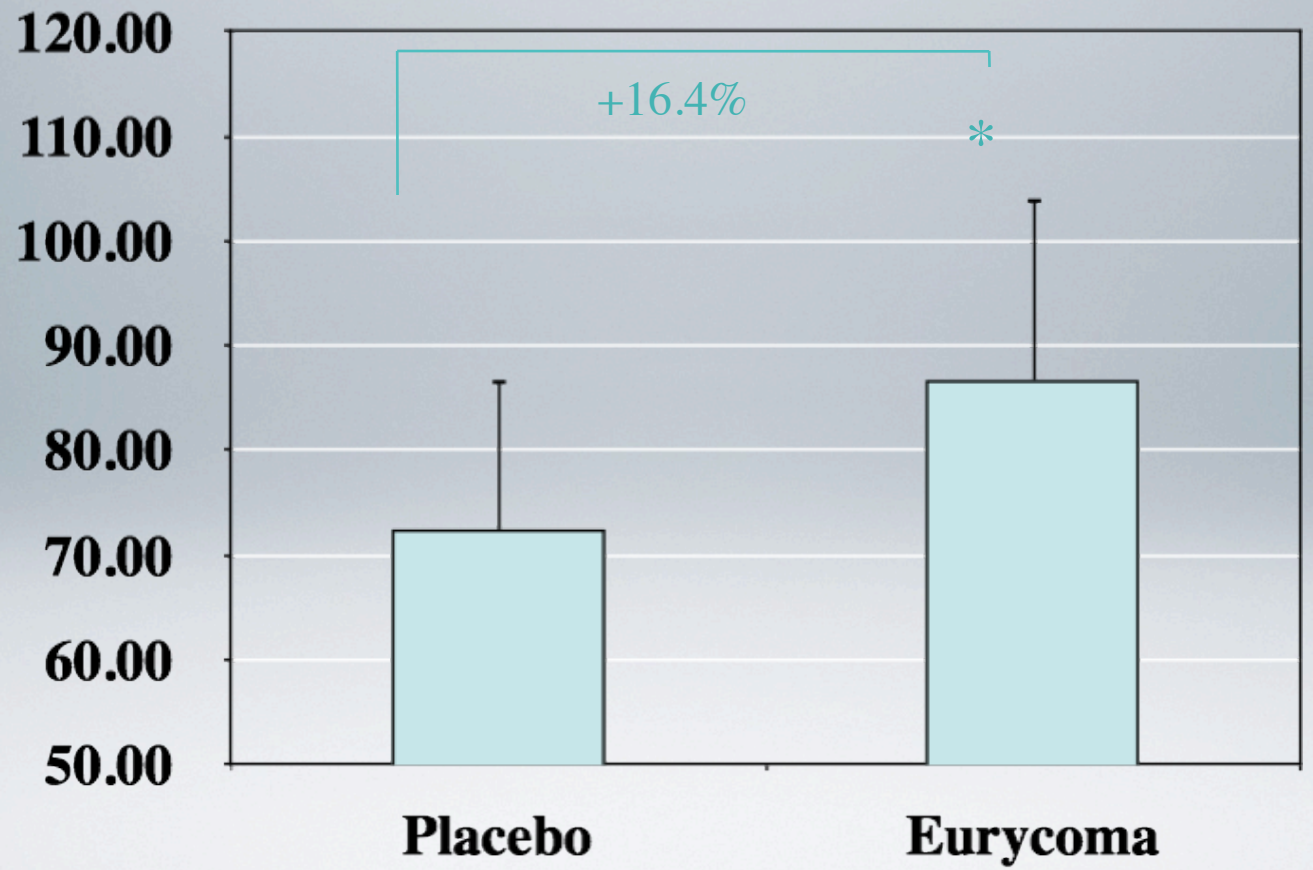
Salivary Cortisol (ug/dL)



*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

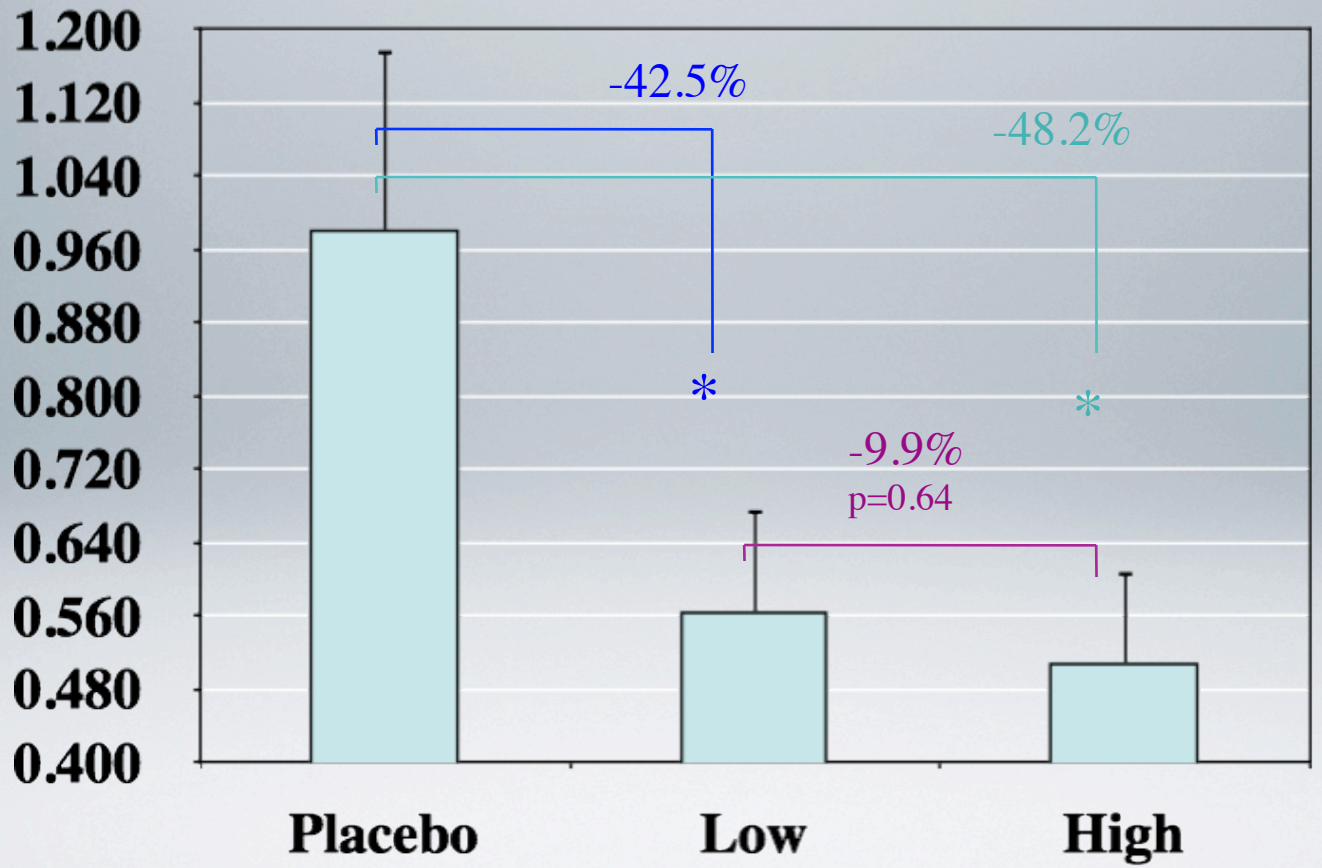
SupplementWatch, Inc.

Salt Lake City (Draper), UT

SUPPLEMENT WATCH
Supplement Decisions Made Easy

RESULTS

Salivary Cortisol (ug/dL)



*p ≤ 0.05 compared to Placebo

SUPPLEMENT WATCH
Supplement Decisions Made Easy

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
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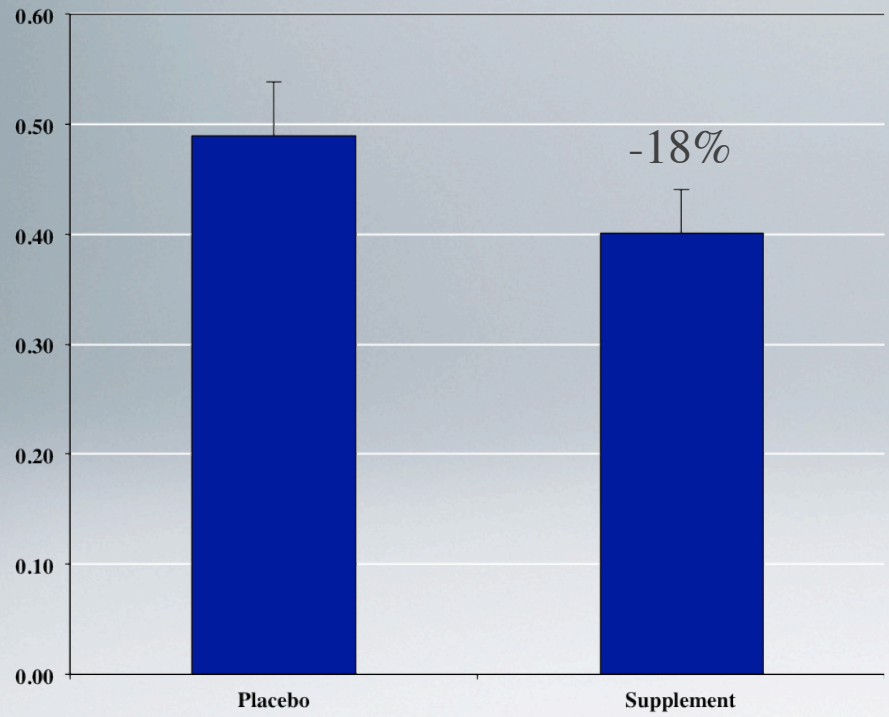
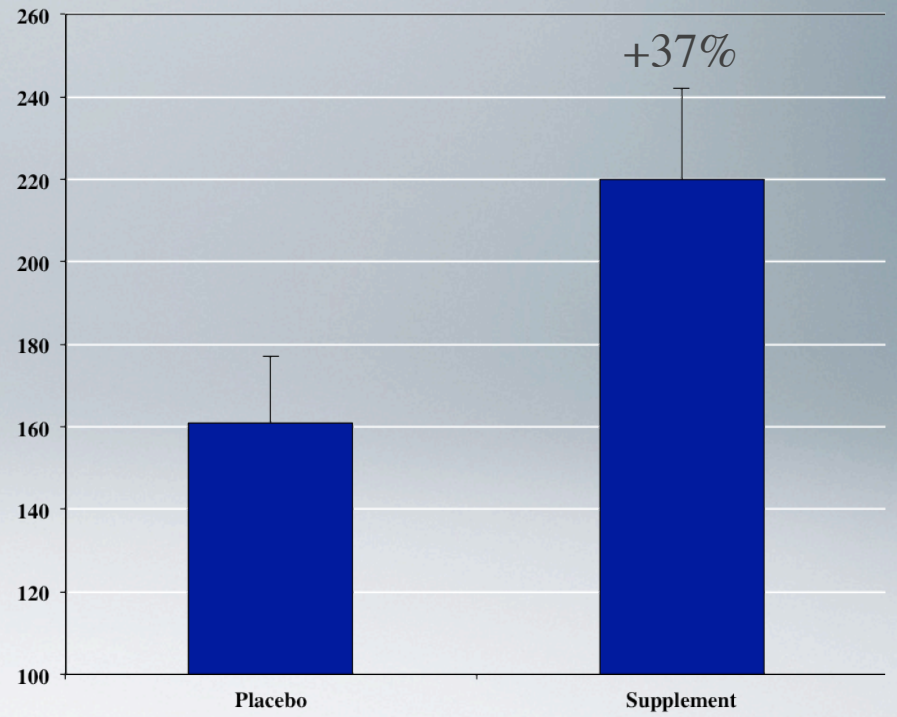
RESULTS (week 4)

Cortisol & Testosterone (% difference from Placebo)

Cortisol, ug/mL (Magnolia)



Testosterone, pg/mL (Eurycoma)



Both, $p \leq 0.05$ compared to Placebo

SUPPLEMENT WATCH
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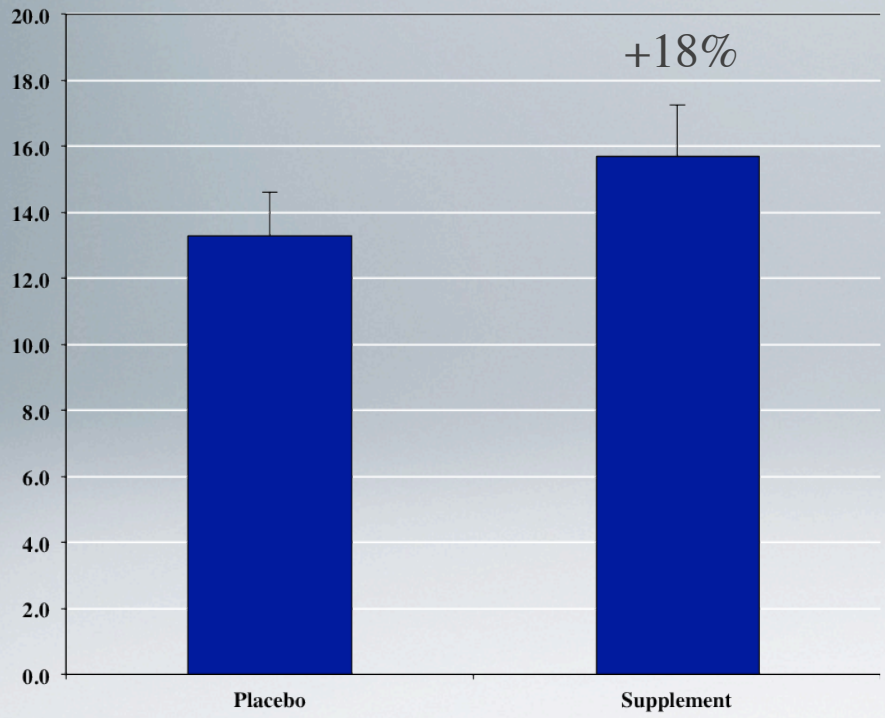
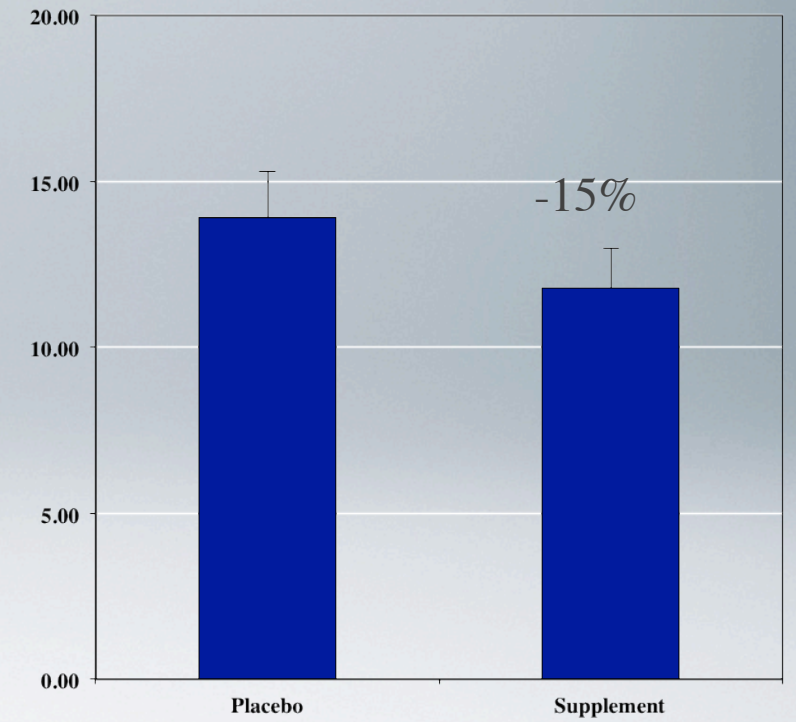
RESULTS (week 4)

Profile of Mood States (POMS)

Vigor (Magnolia)



Tension (Eurycoma)



Both, $p \leq 0.05$ compared to Placebo

SUPPLEMENT WATCH
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Conclusions

- Top reasons for primary care visits involve Stress, Fatigue, Depression
- There is a strong scientific association between chronic metabolic imbalance & stress-related diseases (stress, oxidation, inflammation).
- Effect **magnitude** (~20% Global Mood & Vigor) is equivalent to:
  - Pharmaceutical treatment (Prozac, Zoloft, Celexa, etc)
  - CBSM (cognitive behavioral stress management)
- Biochemical Balance:
  - enhances weight loss
    - metabolic effect
  - improves dietary compliance
    - behavioral effect
  - enhances mood state & vigor
    - psychological effect


Thank You!