

# Supplement and Nutrition in Sport: A Guide for All Athletes

Matthew Steele, DO

Sports Medicine Fellow

University of Arizona College of Medicine Phoenix

Banner University Medical Center



# Goals and Objectives

1. Understand basic macronutrient needs for active individuals
2. Understand broadly which substances and supplements are banned in various sports
3. Be able to discuss with patients which supplements can safely enhance performance and those that cannot




# Physician Knowledge

- JAMA Internal medicine 2007
- One-third of physicians had no knowledge of:
  - Dietary supplements and FDA approval
  - Safety regulation of dietary supplements
  - Basic macronutrient diet needs


That one w

**MOVE FREE & EASY**

JOINT SUPPORT & HEALTHY INFLAMMATION



EU NATURAL



PRIMAL  
GLUCON & TURMERIC

**SUPERIOR INGREDIENTS FOR SUPERIOR RESULTS**




testoSTARone

**LOSE FAT**

100% NATURALLY




100% ALL NATURAL GREEN COFFEE BEAN EXTRACT

Pure Green COFFEE

START B...  
MADE FF...  
ENHANC...

**organic fat burning PROTEIN SHAKE**

- Accelerated Weight Loss
- Increased Metabolic Rate
- Enhanced Mood
- Sustained Energy
- Controlled Cravings

SHOP NOW




**EXPANDED BLOOD VESSELS**




HARD IRON LABS  
**N.O.**  
NITRIC OXIDE BOOSTER  
PREMIUM L-ARGININE  
60 CAPSULES

**L-ARGININE**  
IS AN ESSENTIAL AMINO ACID THAT CONVERTS INTO NITRIC OXIDE, BY RELAXING BLOOD VESSELS AND IMPROVING BLOOD FLOW. THIS IS VERY HEALTHY FOR YOUR HEART AND CAN ALSO BE USED AS A WORKOUT SUPPLEMENT.

**N.O. SUPPLEMENTATION**  
WILL IMPROVE BLOOD FLOW BY EXPANDING YOUR BLOOD VESSELS. THIS ALLOWS MORE OXYGEN TO YOUR MUSCLE, BRAIN, HEART, LUNGS, & OTHER ORGANS. THIS MEANS BETTER PERFORMANCE, MORE MUSCLE GAIN, AND MOST IMPORTANTLY MAKING YOU HEALTHIER.



Alto Stone

TRUE STRENGTH



GOLD STANDARD 100% CASEIN

24 10 0

THE GOLD STANDARD MICELLAR CASEIN

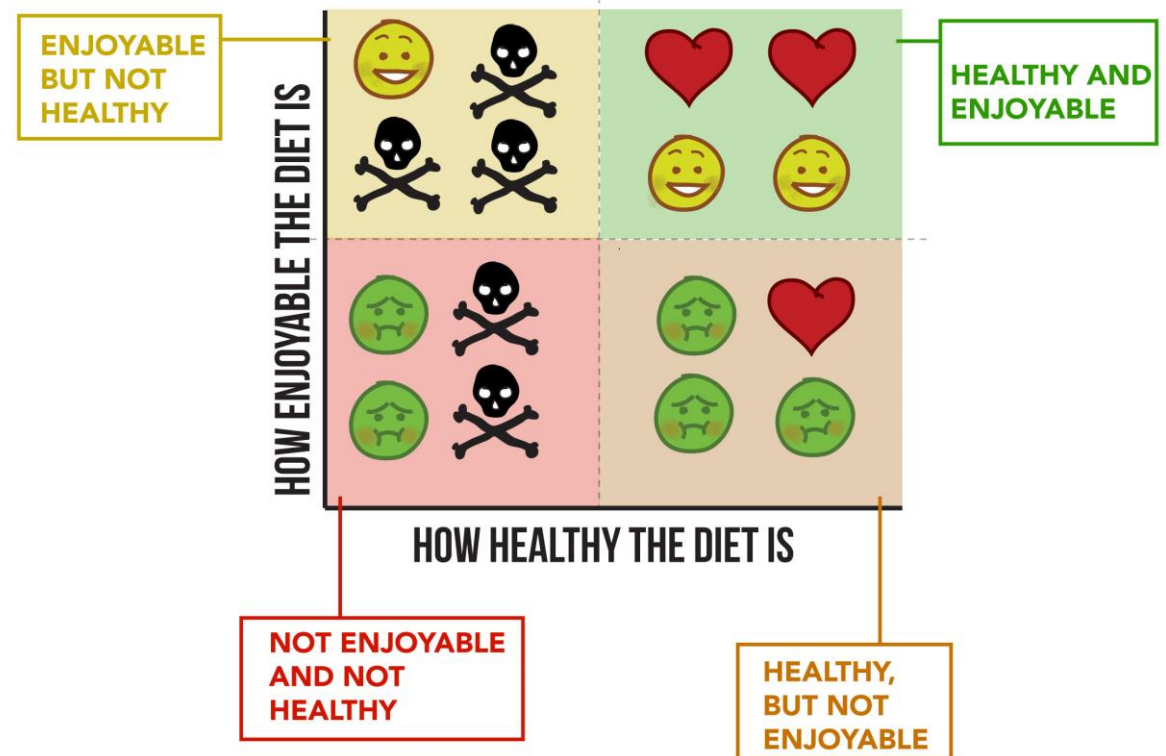
TRUE STRENGTH

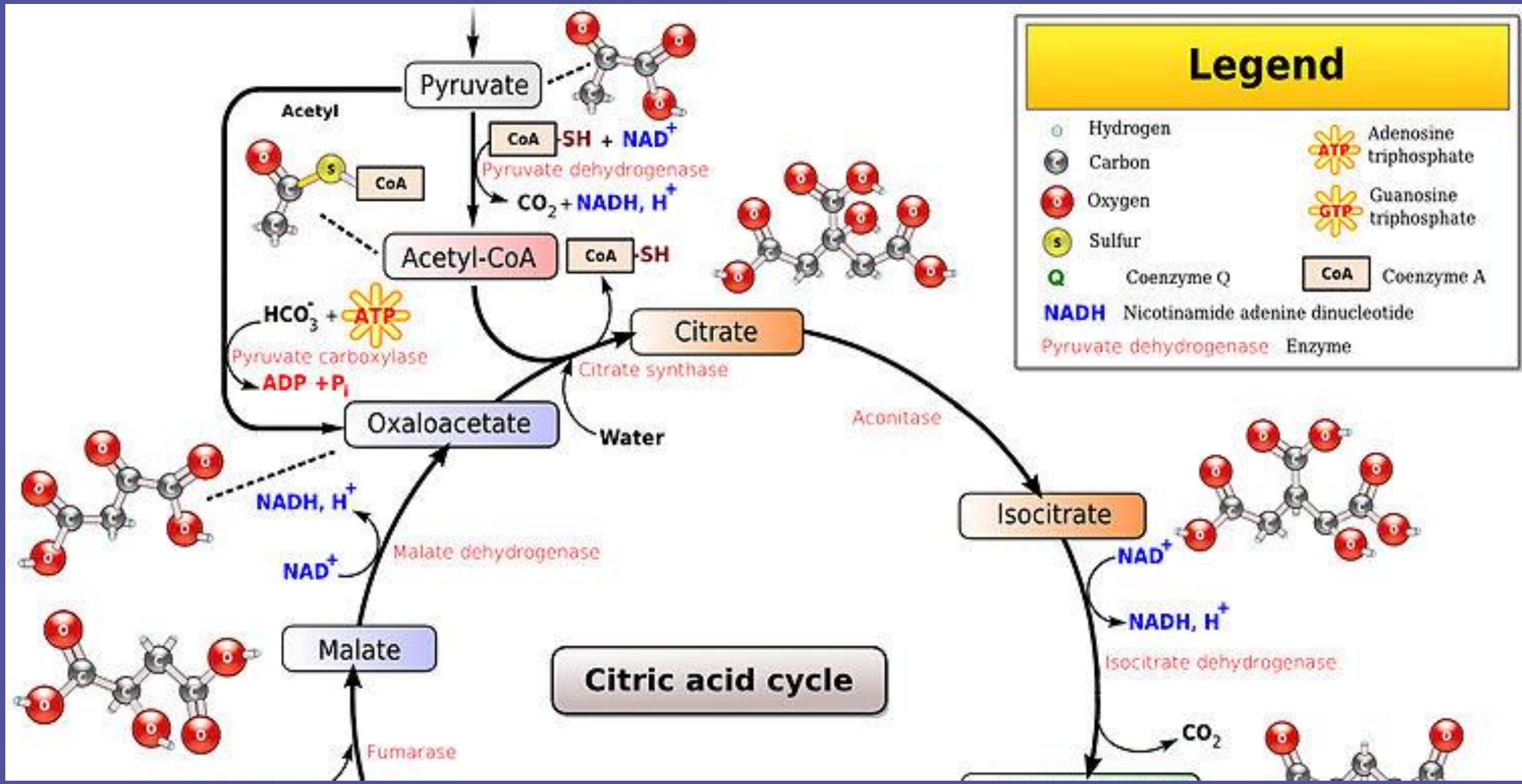
ONS

# Fantastic Diets and Where to Find Them

- Proteins
- Lipids
- Carbohydrates
- Alcohol

## The *How Dumb Is Your Diet* Graph





**Citric acid cycle**



# Carbohydrates

- ▶ High carb diets
  - ▶ Increase glycogen stores
  - ▶ Increase endurance
  - ▶ High caloric balance
- ▶ Low carb diets
  - ▶ Likely have negative effects in high-intensity sports
  - ▶ Comparable effects with very low intensity sports
- ▶ Carbs should be ~45-65% of your daily diet pending activity level



# Carbohydrates

- ▶ During Exercise
  - ▶ Replenish with carbohydrate rich drinks
- ▶ Post-Exercise
  - ▶ Replenish glycogen stores
  - ▶ 1.0-1.5 g/kg between 0-2 hours after exercise (pending intensity)





# Fats

- Major Fuel Source for endurance activities
- High fat diet not needed
- Limit saturated fat, strive for zero trans fat
- Fat ~ 20-25% of daily diet

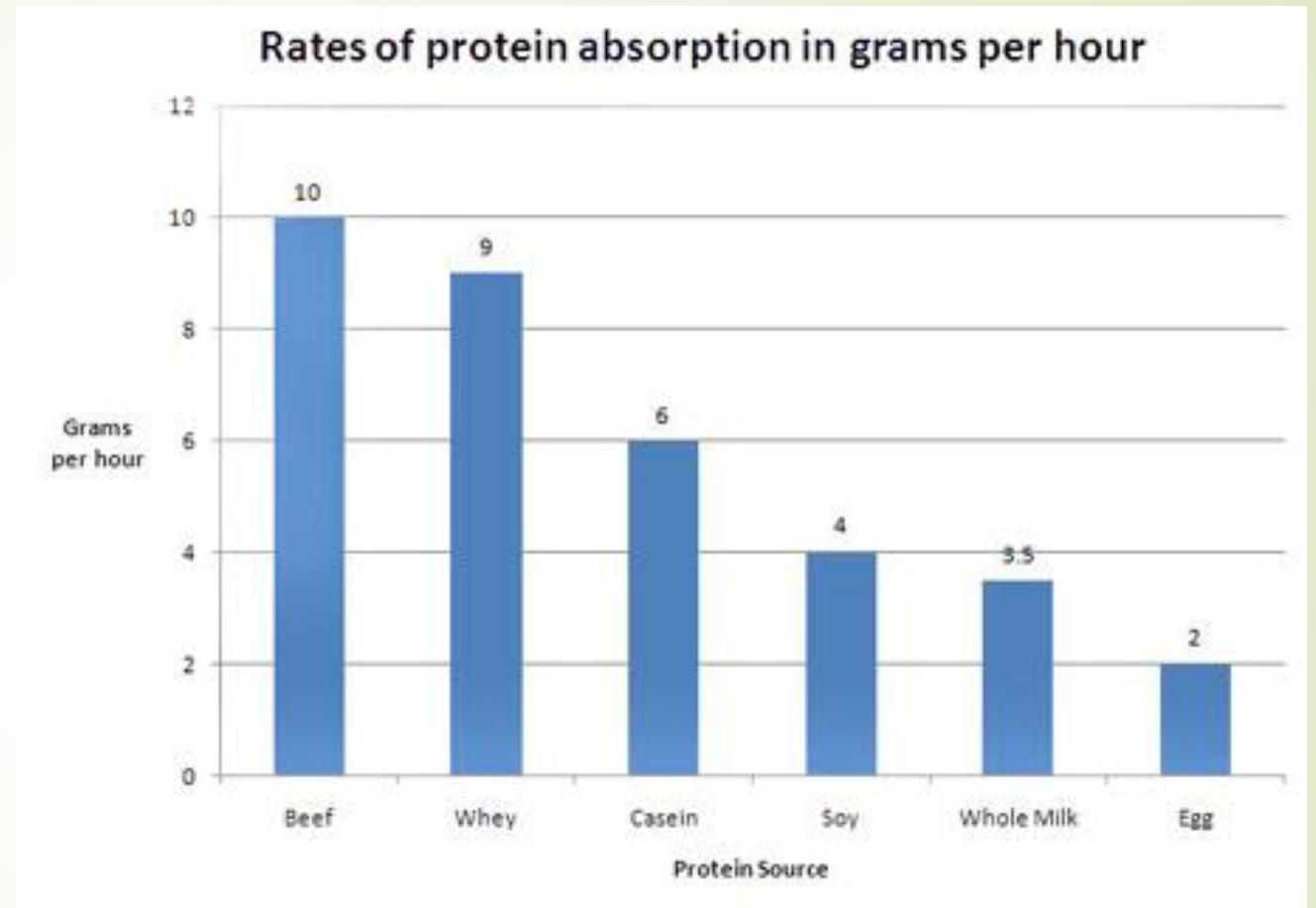


# Protein

- Necessary to prevent catabolic state
- Protein recommendations
  - Adults: 0.8 grams per kg body weight
  - Endurance athletes: 1.2–1.4 g/kg
  - Resistance-trained athletes: 1.6–1.7 g/kg
- Protein over 2.0g/kg per day not incorporated into muscle

# Protein

- Many sources of protein
- Protein shakes and bars are convenient
- Nutrient timing?
- Aids in replenishing glycogen





# Considerations

- High Protein
  - Kidney disease
  - CAD\*
  - Gout\*
  - Kidney Stones
- High Carb
  - Diabetes

- Low Carb
  - Caution in elderly
  - Most amount of short-term side effects
  - Insulin dependent diabetics
- High Fat
  - Decreased athletic performance\*

# Fad Diets





# Intermittent Fasting

- No difference in weight loss vs normal calorie restriction
- Shown to have effects on life span in animal models even in the absence of weight loss
- Allows the consumer to encounter food less
- Cannot be used in those taking insulin
- Difficult for those that need to take medications with food
- Should not be used if or attempting to get pregnant
- Socially ostracizing



# Ketogenic Diet

- No difference in weight loss compared to CR diets
- Possibly quicker to achieve weight loss, but must be maintained
- Steady state fuel vs swings in blood sugar
- Generally requires extensively planning
- Cannot be used in those who take insulin
- Negative effects on strength building



# Alkaline Diet

- No evidence that diet is beneficial in any way
- Does not alter pH
- Low quality studies show possible benefit in kidney disease
- Typically claimed to cure cancer or other ailments





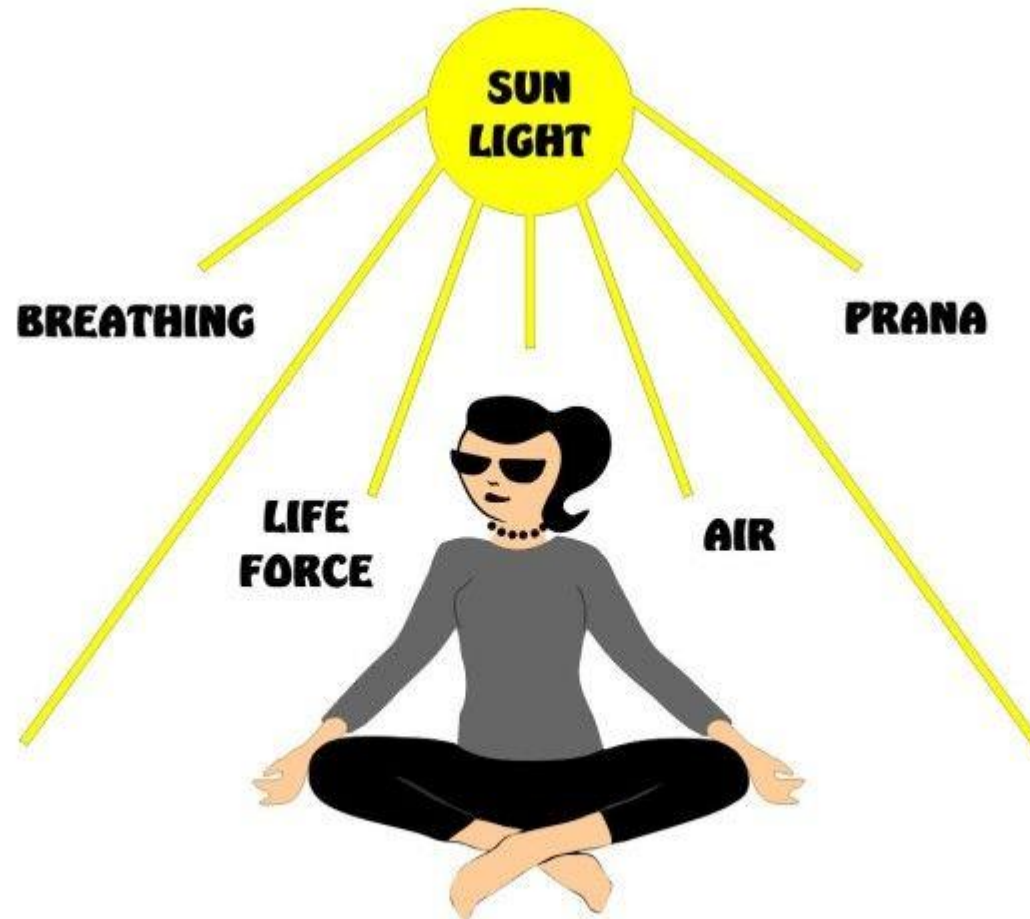
# hCG and Juice Diet

- hCG and 500 calorie diet
  - Lower daily intake to 500 calories was reducing weight
- Juice Diet
  - May have benefits in lowering cholesterol
  - No difference in calorie restricted diets



# Bottom Line

- Average adult? Athlete? Co-morbidities?
- Pick a diet that is sustainable and that can be enjoyed
- Explain the role of genetics and habits regarding diet
- Start with other modifiable factors (sleep, exercise, smoking)



**BREATHARIAN FOOD PYRAMID**

# Banned Substances





# Prevalence



- ▶ ~50% of high school athletes admit to using supplements to improve performance
- ▶ 59% of US general population uses vitamins and/or supplements
- ▶ 1-2 million US athletes use some form of anabolic steroids annually
- ▶ 10% of males will use some form of anabolic steroid in their lifetime



# Banned Substances

24 yo F playing NCAA  
Hockey

Synthroid  
HCTZ  
Tizanidine

41 yo M competes in  
biathlon (skiing and  
shooting)

Sertraline  
Propranolol  
Multi-vitamin

36 yo M Kayaker

Finasteride  
Pseudoephedrine-PRN  
Propranolol



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# Banned Substances by NCAA

- Stimulants (Adderall, Caffeine, ephedrine, synephrine, cocaine)
- Anabolic agents (-one drugs, stanozolol, SARMs)
- Beta-blockers (Rifle and archery only)
- Diuretics (masking pills) – finasteride is not banned
- Illicit drugs (THC, heroin, etc.) – CBD is not banned (yet)
- Peptide hormone and analogues (hCG, hGH, EPO)
- Anti-estrogen (Tamoxifen, clomiphene)
- Beta-2 Agonists (Clenbuterol, etc.)



# Prescription Medication Use

Narcotic Pain Medication			
	2009	2013	2017
<b>WITH</b> a prescription	13.7%	18.0%	10.5%
<b>WITHOUT</b> a prescription	5.1%	5.8%	2.9%

ADHD Stimulants			
	2009	2013	2017
<b>WITH</b> a prescription	4.5%	5.7%	6.6%
<b>WITHOUT</b> a prescription	6.7%	8.7%	7.5%



# Medical Exceptions

- Not for marijuana/illicit class\*
- Pre-approval required for anabolic agents (testosterone) and peptide hormones and analogues (EPO, hGH)
- Stimulants, diuretics, anti-estrogens, and beta blockers reviewed following a positive drug test
  - Documentation must be in place prior to test
- Transgender athletes



# Bottom Line

- Encourage healthy practices
- Discussed banned substances specific to sport if applicable
- Know the risks of substances considered just like any medication
- Know particular governing agency, state, federal regulations

# Supplements, Vitamins and Minerals

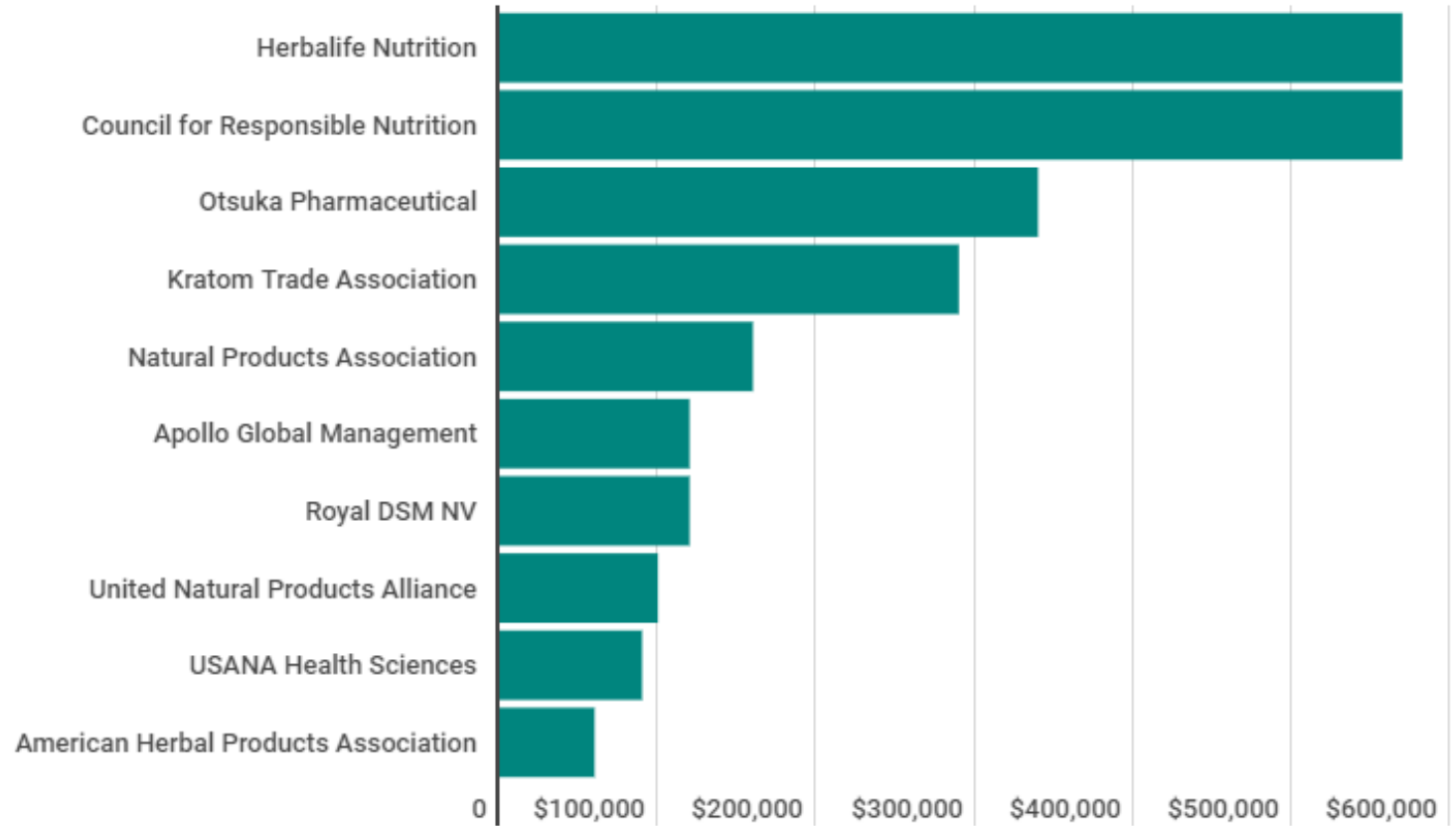





# Supplements, Vitamins and Minerals

- ▶ Not regulated by FDA
- ▶ Dietary Supplement Health and Education Act 1994
- ▶ In 2010, US Accountability Office report revealed 37 of 40 dietary supplements tested positive for the presence of lead, arsenic, mercury, cadmium, and/or pesticides.

## Nutritional & Dietary Supplements: Lobbying, 2018





Top Members (Includes campaign contributions to presidential campaigns)	Total from industry (1998-2018)
Orrin Hatch (R-Utah)	\$475,637
Mitt Romney (R-Utah)	\$412,675
Tom Harkin (D-Iowa)	\$306,343
Frank Pallone Jr. (D-N.J.)	\$122,850
Jason Chaffetz (R-Utah)	\$102,259



# Prevalence

66% take supplements regularly

36% take multiple vitamin/mineral

24% take single vitamins

23% take herbs

17% take specialty or sports supplements (SAM-e, creatine)



# Reasons for Use



- Improved health and Wellness (58%)
  - Feel better
  - Prevent Illness
  - Treat Illness
  - Live Longer
- Fill nutrient gaps (42%)
  - Sports Nutrition
  - Specific health reason



# Knowledge by Consumers

- 92% consult physicians regarding prescription drugs
- 48% consult physicians regarding supplement use




# Popular Supplements for Adults

- Green Tea
  - Valerian
  - Ephedra
  - Black Cohosh
  - Glucosamine
  - Turmeric
- 



# Popular Sports Supplements

- Creatine
  - Energy Drinks
  - Caffeine
  - Nitrate
  - Testosterone Precursors
- 



# What is the Evidence?





## Green Tea

- Mild thermogenic effect
- Catechin-polyphenols ↑ norepinephrine levels
- Green tea extract ↑ energy expenditure by 4% and fat use compared to caffeine + placebo

## Ephedrine

- Brand names: Bronk-aid
- Banned substance
- Structurally similar to amphetamines
- Increases heart rate and blood pressure
- May promote body fat loss



## Valerian

- Used to promote sleep
- CNS depressant, may increase GH
- Improvement in subjective sleep compared to placebo but not quantitative measure

## Black Cohosh

- Used to aid in relieving menopausal symptoms
- Binds to estrogen receptors
- No significant difference compared to placebo in the frequency of hot flashes or symptoms



# Glucosamine

- An amino sugar that is a constituent of glycosaminoglycans (GAGs), present in high quantities in articular cartilage.
- Minimal benefit in stiffness and pain
- No effect on progression of arthritis or joint function
- Large doses were studied
- No harm, side effects

# Turmeric

- Blocks NF- $\kappa$ B activation
- Several small RCTs show similar benefit to oral or topic NSAIDs on pain
- Requires large doses (2 g per day)
- Minimal harm and side effects





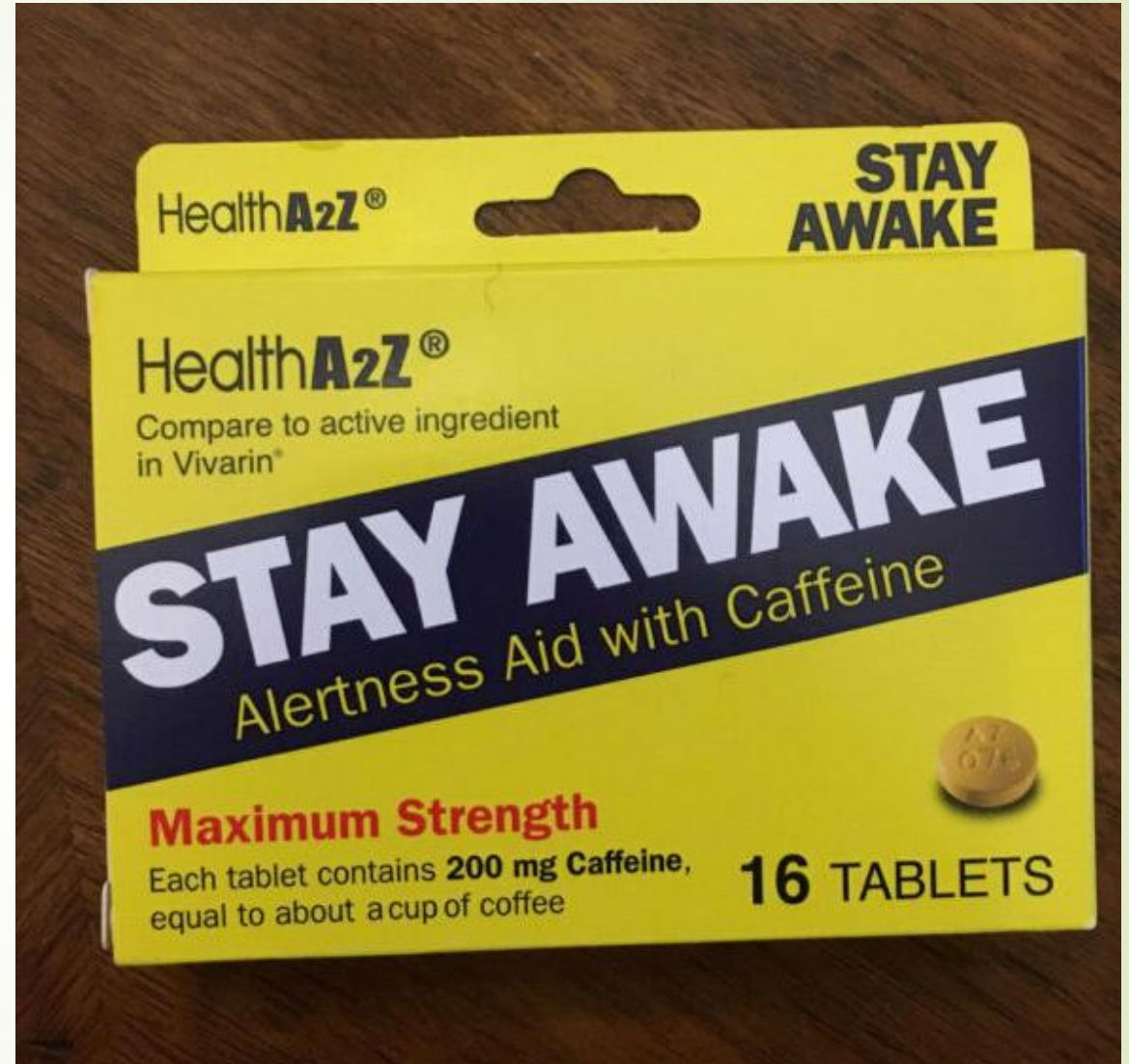
# Caffeine



- CNS stimulant ↑ epinephrine levels
- 3 to 6 mg of caffeine/kg 1 hour before exercise may improve endurance and alertness
- Does not promote body fat loss
- Slight diuretic effect

# Caffeine

- Side effects:
  - diuresis, nausea, muscle tremor, palpitations
  - Decreased REM sleep with long term use
  - Withdrawal headache





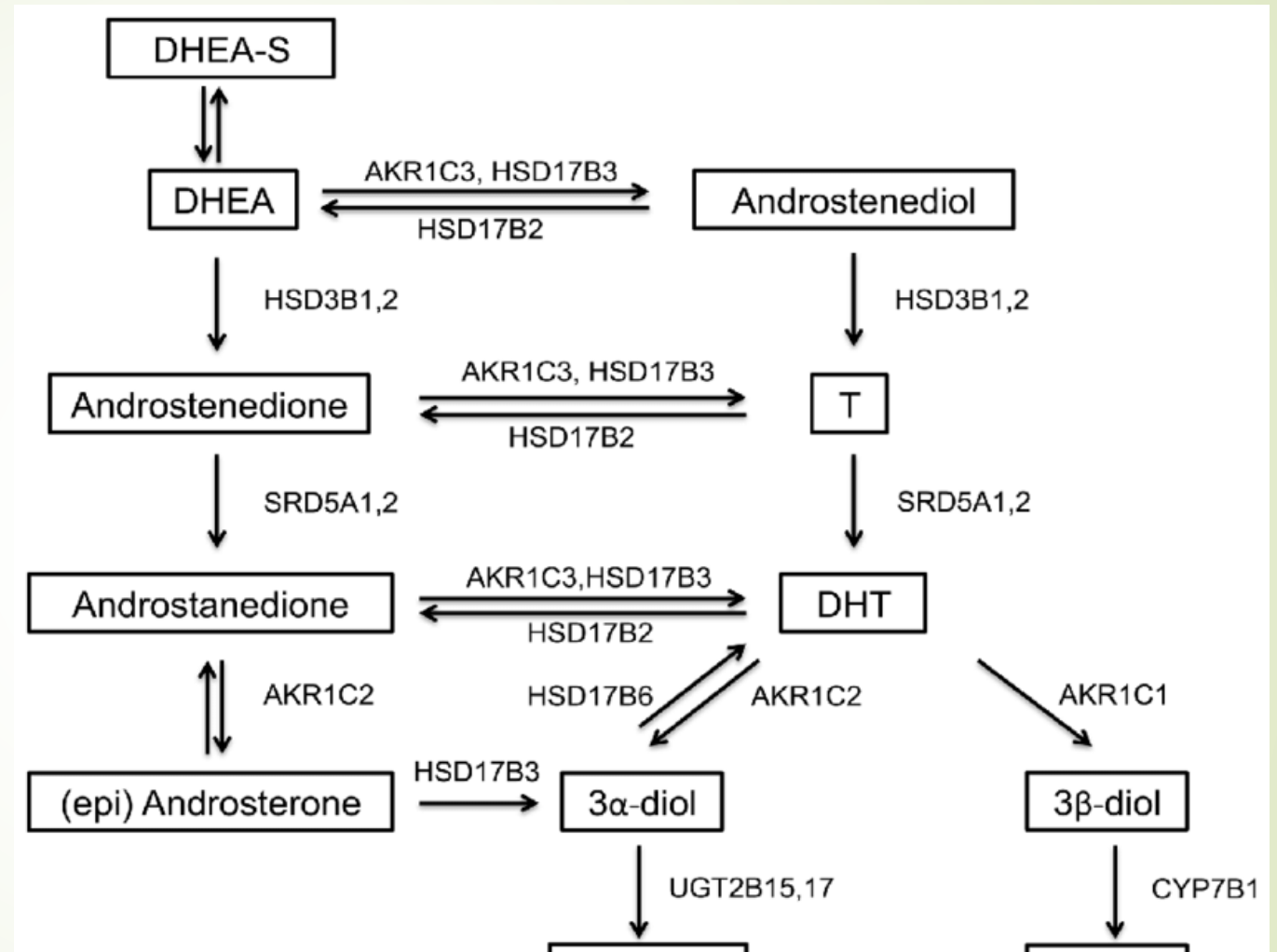
# Energy Drinks



- Increased performance similar to other caffeine products
- No significant increase in cardiovascular adverse effects compared to similar doses of caffeine
- Some evidence of additional stimulant effect of guarana
- GI and dental adverse events likely due to sugar
- No quality studies on adverse effects of other additives (i.e. taurine)

# Testosterone Precursors

- ▶ Weak androgens
- ▶ Banned by IOC and NCAA
- ▶ In many over the counter supplements that are not labeled (proprietary blend)
- ▶ May have effect on strength sports (limited studies)
- ▶ Poor side effect profile



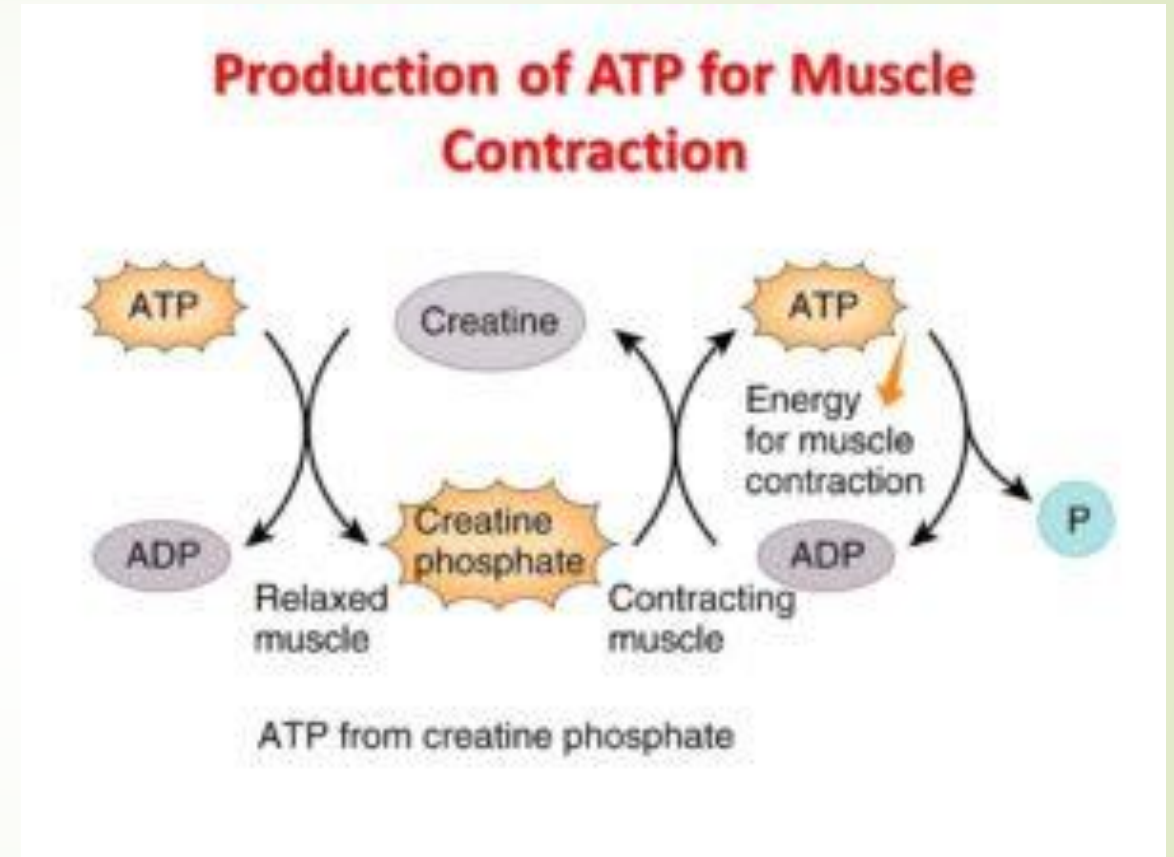


# Nitrate

- Dietary nitrate ( $\text{NO}_3^-$ )
- Shown to improve time to exhaustion in performances <40 min
- Leafy green and root vegetables
- Limited effectiveness of NO supplements (L-Arginine)

# Creatine

- Formed by natural AA found in body
- Naturally produced by liver, kidneys, pancreas
- Transported into muscle/heart/brain
- In muscle converted to phosphocreatine which provides energy to muscle





# Creatine

- Increases Cr and CP content in muscles
- May improve high-power performance  $\leq 30$  seconds and delay onset of fatigue
- Loading phase: 5grams  $\rightarrow$  4x/day x 5 days
- Maintenance: 2 grams/ day x 3 months
- Anything over excreted by kidneys
- 1 month abstinence after 3 months
- 6-8 glasses of H<sub>2</sub>O to avoid dehydration



# Creatine

- Weight gain ~ 5 lbs.
- GI discomfort and muscle cramps
- Rare cases of acute renal failure
  
- Legal
- Trainers/coaches not allowed to supply it anymore



# NSF Sport and Anti-Doping



## NSF Certified for Sport®: Before You Buy

### IN STORE:

- 1 Confirm that the product is labeled with one of these two logos only.



- 2 Scan the supplement label using the NSF Certified for Sport® app to make sure it's a certified product and lot number.



### ONLINE:

- 1 Confirm that the product is labeled with one of these two logos only.



- 2 Search the NSF Certified for Sport® App or the database at [NSFSport.com](http://NSFSport.com) for products you are interested in taking.



- 3 Once you've identified a supplement, use the contact information provided for the product to contact the supplement company.



- 4 Inform the supplement company that you want to order an NSF Certified for Sport® product with certified lot numbers.



- 5 Once you have the product, confirm that the lot number on the product matches the lot number listed in the NSF Certified for Sport® database.



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# Bottom Line

- ▶ There are few supplements that increase athletic performance significantly without... side effects
- ▶ Always discuss risks and benefits with patients in depth and discuss possible medication interactions
- ▶ Consider dietician referral for people who want to consider supplements along with high quality diet

# Role of Physician-Patient Relationship



- 23-year-old female
- Took 4 tabs of “liver supplement” daily
- No other medications
- Acute liver failure
- Needed liver transplant
- Pathology tied to herbal supplement



Questions?

Thank you to:


PD: Dr. Steve Erickson

Faculty: Dr. Leah Hillier and Dr. Evan Werk



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