

DIETARY SUPPLEMENTS AS ERGOGENIC AIDS IN COLLEGIATE SPORTS

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Definition

- ▣ Meriam and Webster Definition
 - Supplement-
“something that is added to something else in order to make it complete”
 - Ergogenic Aid-
“enhancing physical performance”



Sport Supplement Market

- ▣ 89% of 203 Division 1 student athletes regularly or have regularly used sport supplements in 2004 (Burns et al, 2004)
- ▣ 55% of 596 Division 1 student athletes reported usage of sport supplements in the past year (Ratanapratum et al, 2016)



Supplement Examples

- ▣ Three General Categorical Examples
 - Body Composition
 - Performance Enhancing
 - Anabolic/ Anti-catabolic



Review of Last Year



- ▣ 2015
- ▣ Body Composition
 - Berberine
- ▣ Performance Enhancement
 - Caffeine
- ▣ Anabolic and Anticatabolic
 - HMB

Body Composition

- ▣ Two Classes
 - Stimulant- activate the sympathetic nervous system
 - ▣ Action- Increase in catecholamines resulting in rise in heart rate, rise in blood pressure, activation of UCP-1, activation of cAMP
 - ▣ Effect- Results in increased fat metabolism
 - ▣ Side Effects- General side effects can be significant and dangerous (CV events, stroke, death, psychiatric conditions). Ephedra banned in by FDA in dietary supplements in February 2004

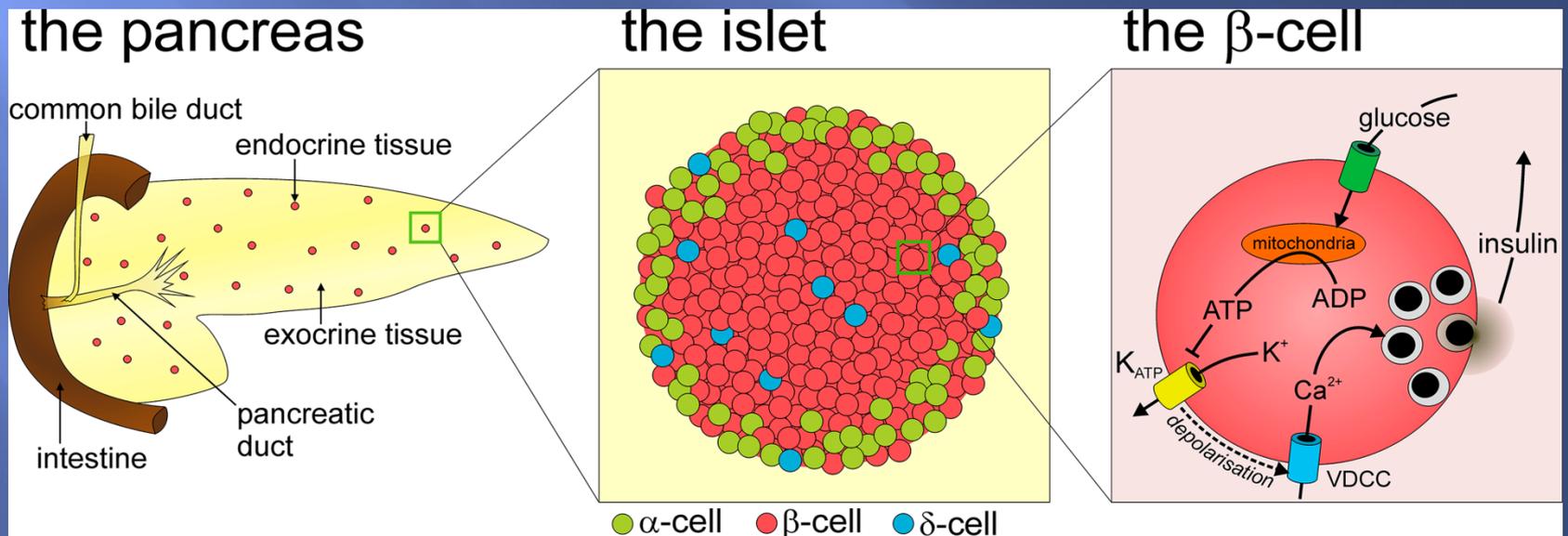
Body Composition

- ▣ Two Classes
 - Non-stimulants
 - ▣ Insulin Sensitizing Agents
 - ▣ Gynostemma Pentaphyllum (aka ActiveAMP)



Weight Loss

- ▣ Active AMP Gynostemma Pentaphyllum
 - Action
 - ▣ Stimulates release of insulin at the pancreas due to presence of the gypenoside Phanoside (Norberb et al, 2004; Hoa et al, 2007)

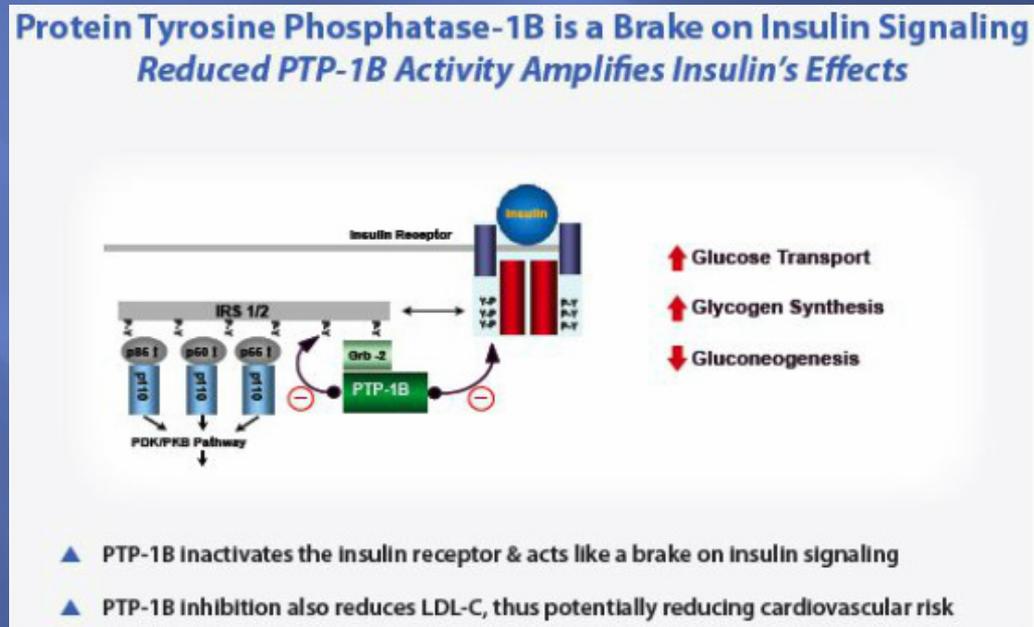


Weight Loss

▣ Active AMP Gynostemma Pentaphyllum

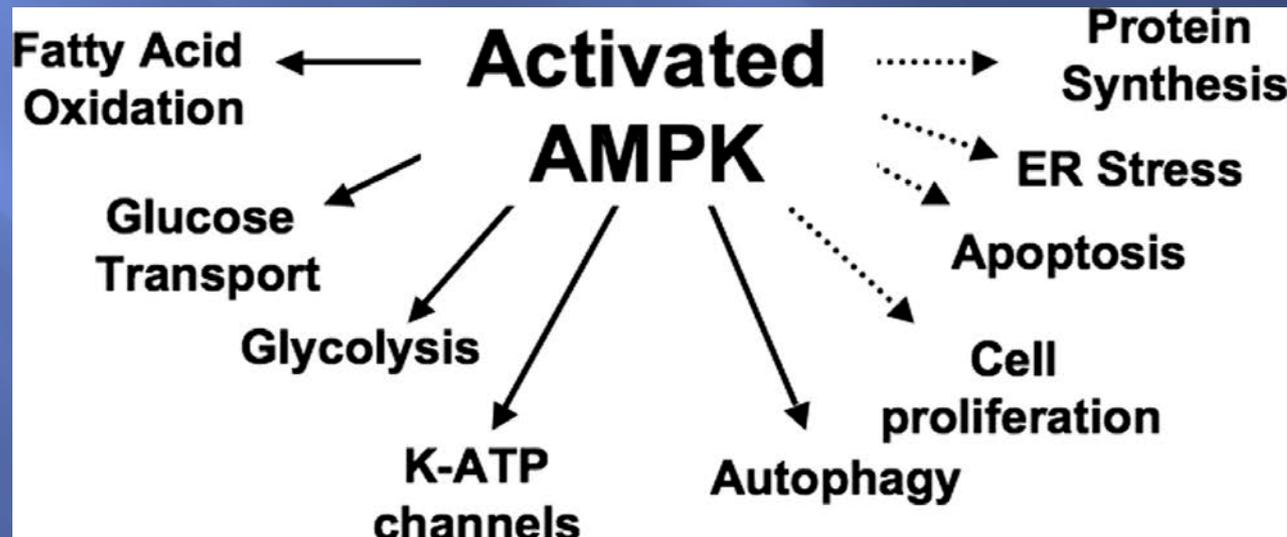
- Action

- ▣ Inhibits PTP1B enzyme (which has been found to have a role in increasing insulin resistance) (Goldstein et al, 2001; Hung et al, 2009; Xu et al, 2010; Zhang et al, 2013)



Weight Loss

- ▣ Active AMP Gynostemma Pentaphyllum
 - Action
 - ▣ Activator of AMPK in skeletal muscle due to presence of damulins A and B (Gauhar et al, 2012; Park 2014)



Body Composition

- ▣ Active AMP Gynostemma Pentaphyllum
 - Benefit
 - ▣ Increased insulin sensitivity (Norberg et al, 2004; Megalli 2006)
 - ▣ Improved glucose disposal (Gauhar et al, 2012)
 - ▣ Body fat loss (Park et al, 2013)



Body Composition

- ▣ Active AMP
Gynostemma
Pentaphyllum
 - ▣ Efficacy
 - ▣ Increased insulin production in a dose dependent fashion (Norberg et al, 2013) and activation of AMPK in animal models (Gauhar et al, 2012)
 - ▣ Fat loss of 7-8% in animal models (Gaughar et al, 2012)
 - ▣ Body fat loss was significantly greater in a single human trail (Park et al, 2014)
 - ▣ Questionable as to treatment in the obese vs lean (athletic) population (Megalli et al, 2006)

Body Composition

- ▣ Active AMP Gynostemma Pentaphyllum
 - Safety
 - ▣ In animal models no cytotoxicity in doses up to 750mg/kg of body per day for six months of dried leaf (Attawish et al, 2004)
 - ▣ In the only human trial no abnormalities in hematology results or vital signs (Park et al, 2014)
 - ▣ Limited data should encourage caution



Body Composition

- ▣ Active AMP Gynostemma Pentaphyllum

- Dosage

- ▣ 450mg/day of autoclaved extract (Actiponin) or 3-9g/day of dried G pentaphyllum leaves in tea form. (Huyen et al, 2012; Park et al, 2014)



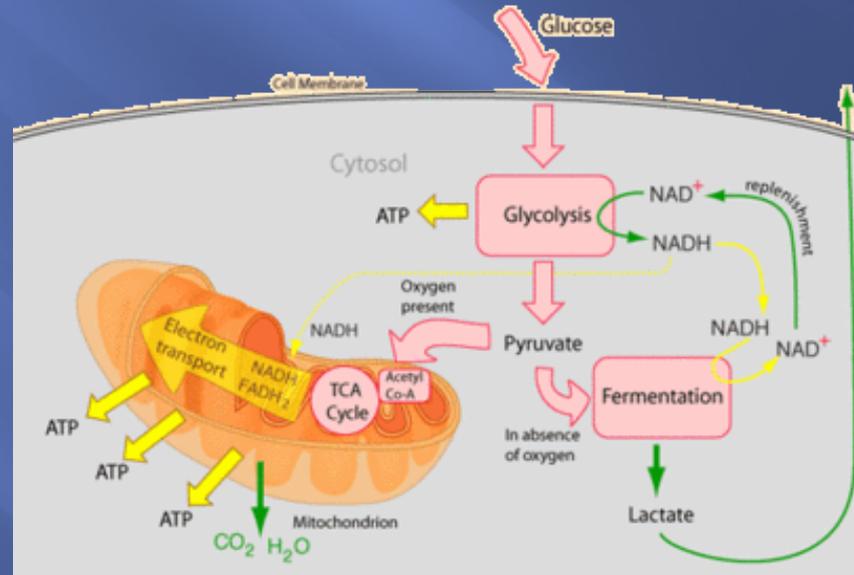
Performance Enhancement



- Sodium Bicarbonate (Baking Soda)
 - Benefit
 - Buffering agent that reduces fatigue due to changes in muscle pH. (Castell et al, 2010; Siegler et al, 2010; Ducker et al, 2013; Miller et al, 2016)

Performance Enhancement

- ▣ Sodium Bicarbonate (Baking Soda)
 - ▣ Action- as lactic acid converts to lactate and a free H ion muscle pH will drop. NaHCO_3 helps maintain pH levels (Costill et al, 1984; Castell et al, 2012; Driller et al, 2012; Peart et al, 2012;



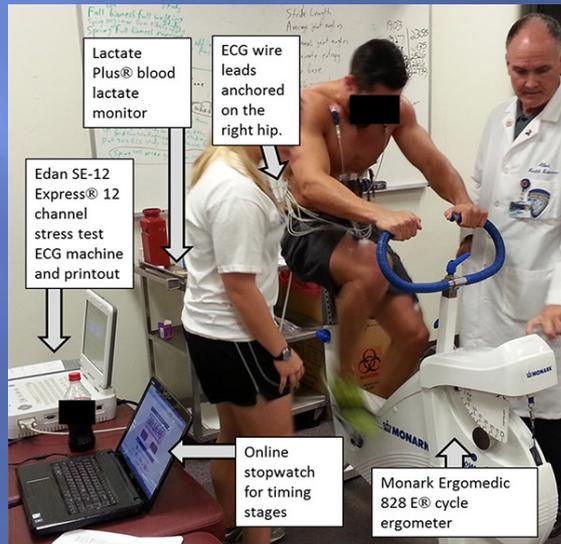
Performance Enhancement

- ▣ Sodium Bicarbonate (Baking Soda)
 - Efficacy
 - ▣ Meta-Analysis found a moderate effect size for repeated anaerobic activities which may be more pronounced in untrained subjects (Peart et al, 2012)
 - ▣ Systematic reviews found similar positive effects for high intensity intermittent exercise with longer total duration demonstrating greater effect than shorter duration (Castell et al, 2010)



Performance Enhancement

- ▣ Sodium Bicarbonate (Baking Soda)
 - Efficacy
 - ▣ In activities that require significant physical contact performance and elite athletic ability studies improvements are equivocal (Bishop et al, 2005; Cameron et al, 2010)



Performance Enhancement

□ Sodium Bicarbonate (Baking Soda)

■ Safety

□ Moderate GI distress (belching, stomach ache, stomach cramps, diarrhea, bloating, and flatulence) are the most commonly reported (Castell et al, 2010; Cameron et al, 2010; Peart et al, 2012) in a dose dependent fashion.

□ Sodium sensitive athletes should use with caution as plasma sodium content increases significantly (Siegler et al, 2010)

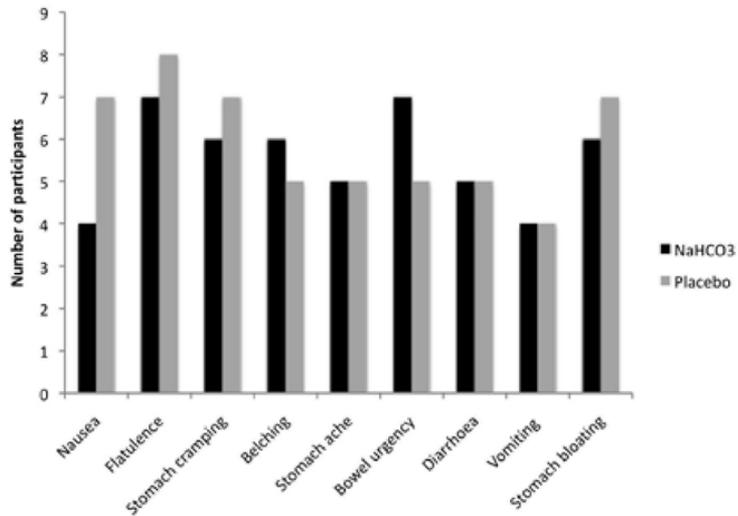


Figure 2(a) — Incidence of gastrointestinal-discomfort symptoms reported at baseline, $N = 25$. Values are $M \pm SEM$.

Performance Enhancement

- ▣ Sodium Bicarbonate (Baking Soda)
 - Dosage
 - ▣ 200-300mg/kg but up to 500mg/kg may have the optimal effect(Douroudos et al, 2006; Peart et al, 2012).
 - ▣ Taken 60-90 minutes prior to competition to reduce GI distress(Peart et al, 2012).
 - ▣ Serial loading with each meal may be just as effective as a single bolus (Driller et al, 2012)



Anabolic/Anticatabolic Agents

- ▣ SARMs (Selective Androgen Receptor Modulators)
 - Steroidal form
 - Non-steroidal form
- ▣ Attempt to replace anabolic-androgenic steroids



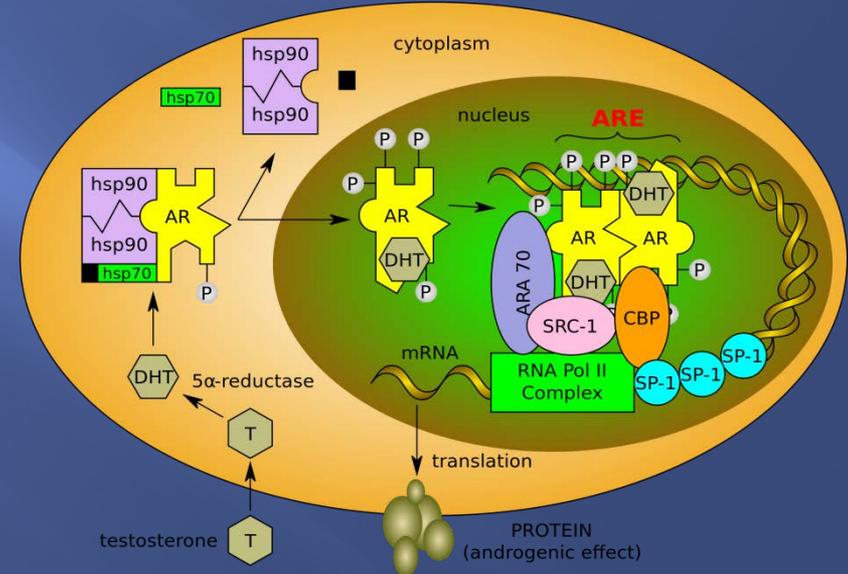
Anabolic/Anticatabolic Agents

- ▣ SARMs (Selective Androgen Receptor Modulators)
 - Non-steroidal forms in pre-clinical or clinical trials include:
 - ▣ Andarine (S4)
 - ▣ Enobosarm
 - ▣ Ostarine (MK 2866)
 - ▣ Ligandrol (LGD 4033)
 - ▣ Testolone (RAD 140)
 - ▣ BMS564929



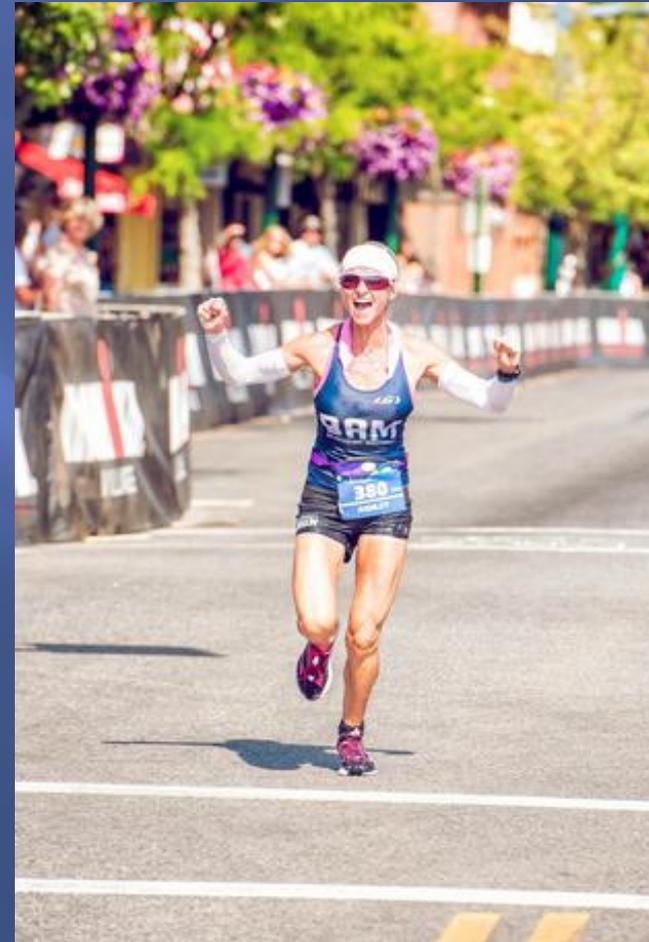
Anabolic/Anticatabolic Agents

- SARMs (Selective Androgen Receptor Modulators)
 - Action
 - Orally active non-steroidal anabolic therapy that produce an anabolic response on skeletal muscle and bone tissue with a greatly reduced androgenic side effects such as gynecomastia, hypogonadism, cardiomyopathy (Thevis et al, 2008; Bhasin et al, 2009; Pope et al, 2014)

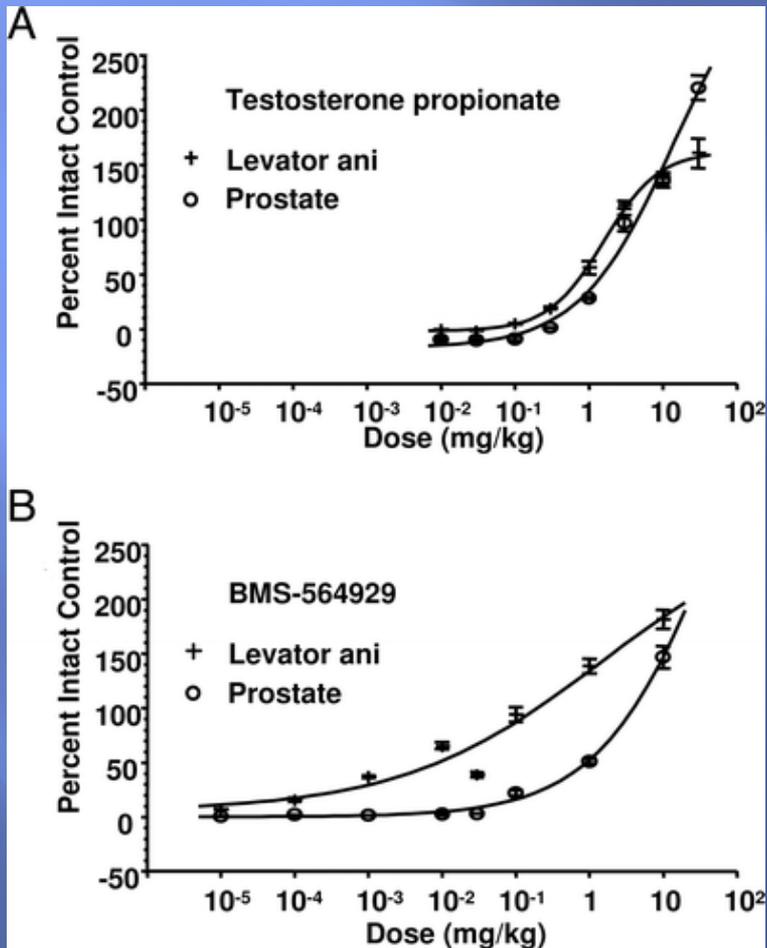


Anabolic/Anticatabolic Agents

- ▣ SARMs (Selective Androgen Receptor Modulators)
 - Efficacy
 - ▣ First generation SARMS report gains of 1.0-1.5kg vs 5.0-7.0kg fat-free mass in testosterone over 4-6 weeks (Bhasin et al, 2009; Dalton et al, 2011; Basaria et al, 2013)



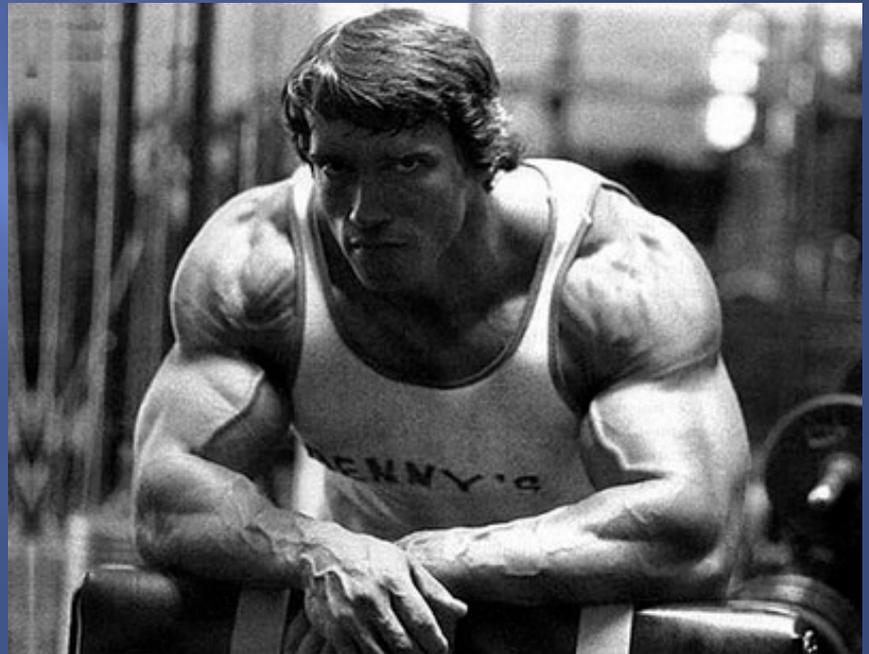
Anabolic/Anticatabolic Agents



- SARMs (Selective Androgen Receptor Modulators)
 - Efficacy
 - Second and third generation SARMs report gains of ratios of 3:1 and as high as 20:1 tissue selectivity in animal models (Ostrowski, 2006; Jones et al, 2010; Dalton et al, 2011; Blanque, 2014; Chisamore et al, 2015)

Anabolic/Anticatabolic Agents

- ▣ SARMs (Selective Androgen Receptor Modulators)
 - Safety/Dosage
 - ▣ Inaccurately thought that there are NO androgenic effects. Anabolic to androgenic ratio changes in a dose dependent fashion.
 - ▣ Difficult to answer as clinical trials are still ongoing and most trials are supported by the drug company.
 - ▣ Anecdotal evidence of vision difficulty (dose dependent) and bone growth.
 - ▣ Lowers HDL levels



Tips for the Sports Medicine Professional

- ❑ Sports Medicine Team are the front line for education.
- ❑ Sport governing bodies all have individual by-laws for banned substances (NCAA, NBA, MLB, etc.)



Role of the Sports Medicine Professional

- ▣ Let us apply wisdom with our intelligence.
 - 40% percent of collegiate athletes use the athletic training staff as primary nutritional counselor (Burns et al, 2004)
 - 79% Percent of doctors who recommend supplements to patients (Jenkinson et al, 2008)
 - 25% percent of doctors actively counsel their patients on how to use supplements (Jenkinson et al, 2008)
 - 52% percent of the general population that believe the FDA approves supplements (Ashar et al)
 - 15% percent of supplements (2004) that contained banned androgenic anabolic steroids (Geyer et al, 2011)

Helpful Resources- Appendix

- ▣ **Informed Choice-** third party testing for purity and accuracy of labeling. <http://www.informed-choice.org/>
- ▣ **MedWatch-** product recalls and safety warnings. <http://www.fda.gov/Safety/MedWatch/>
- ▣ **NSF safe for sport-** third party testing for purity and accuracy of labeling. <http://www.nsf-sport.com>
- ▣ **Resource Exchange Center-** affiliate of NCAA partner Drug Free Sport. <http://www.drugfreesport.com/rec>
- ▣ **Supplement 411-** guide for safely recommending supplements. <http://www.usada.org/substances/supplement-411/reduce-risk-testing-positive-experiencing-adverse-health-effects/>

Helpful Labels- Appendix

- ▣ Certify Purity ONLY
 - U.S. Pharmacopeia
Dietary Supplement
Verification Program
 - ConsumerLab.com
Quality Evaluation
 - NSF International
Dietary Supplements
Certification Program



Helpful Labels- Appendix

- ▣ Certify Purity and absence of Banned Substances
 - NSF Certified for Sport
 - Banned Substances Control Group partnered with Anti-Doping
 - Informed-Choice Trusted by Sport



THANK YOU

