

PERFORMANCE ENHANCING SUPPLEMENTS

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SUPPLEMENTS

History

- Definition – dietary supplement
Provide essential nutrients
- Nutrition Labeling and Education Act of 1990
- Dietary Supplement Health and Education Act of 1994

DIETARY SUPPLEMENT HEALTH AND EDUCATION ACT OF 1994

- Supplements not under FDA
- Includes herbs, plant derivatives and extracts
- No research or clinical trials for efficiency or adverse effects
- No independent agency verifying ingredients or purity

SUPPLEMENTS

- Basic Principles
 - Natural is not always safe
 - The dose makes the poison.

ANABOLIC AGENTS

- Testosterone, precursors and derivatives
- Amino acids
- Creatine

TESTOSTERONE, PRECURSORS, and DERIVATIVES

- Anabolic, Androgenic, Steroid
- Metabolic pathway (DHEA, androstenedione)
- Efficacy and adverse effects
- Positive drug test (increased T/E ratio)

AMINO ACIDS

- Building blocks and proteins
- Function by increasing protein substrate, increasing secretion of growth hormone and positively affecting energy production
- Efficacy research confusing and contradictory
- Minimal adverse effects – kidney, liver, ? purity

CREATINE

- Combination of three amino acids (ornithine, glycine and arginine)
- Synthesized in liver, pancreas and kidneys
- 95% stored in skeletal muscle

CREATINE

- Daily requirement of 2 grams per day

- Sources:

-Cod	3	gm/km
-Herring	6.5-10	gm/km
-Salmon	4.5	gm/km
-Tuna	4	gm/km
-Beef	4.5	gm/km
-Pork	5	gm/km

CREATINE

- Creatine phosphate
- Replenishes ATP
- Anaerobic and rapid
- Effects of creatine
 - Increased force and duration of contraction
 - Prolongs anaerobic activity
 - Increased buffering of lactic acid
 - Improved recovery from repetitive exercise

CREATINE

- Adverse effects
 - Gastrointestinal cramping
 - Muscle cramps
 - Muscle strains?
- Heat and creatine
 - Discontinue due to increased dehydration

CREATINE

- Dosage
 - Loading: 20 grams per day in four divided doses for five days with maintenance of 3 to 5 grams per day
 - Nonloading: 3 to 5 grams per day for one month

Dosage for the Jaguars

- Loading: 10 grams per day in two divided doses for ten days with maintenance of 3 to 5 grams per day
- Hot weather camp: 2 to 3 grams

CREATINE

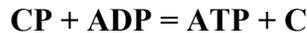
- No studies have been performed on children or adolescence
- Purity of product not controlled

SUPPLEMENTS

- Buyer beware
- No research
- No clinical trials
- No check on purity

CREATINE

Creatine monohydrate is by far the most popular of the ergogenic supplements. It is an amino acid found in meat and fish, and the estimated daily requirement is 2 grams. In the human body the highest concentration is found in skeletal muscle. Creatine can be synthesized from arginine and glycine in the liver, pancreas and kidney. In skeletal muscle, creatine (C) can be converted to creatine phosphate (CP) which helps to restore ATP by reacting with ADP.



Muscle fatigue during high intensity exercise has been shown to correlate with a fall in the concentration of ATP. The theory behind creatine supplementation is that if one can enhance the regeneration of ATP, one can delay the onset of muscle fatigue.

Creatine monohydrate supplementation has been shown to increase the concentration of creatine and creatine phosphate in skeletal muscle. The effect on increasing concentration appears to be more dynamic in subjects who have lower baseline muscle creatine levels.

The athletes' perception regarding the effects of creatine is that it will increase strength and lean body mass, in studies ranging from 5 to 28 days of supplementation. This was coupled with a strength training program.

Multiple studies have revealed that creatine supplementation improves performance during repetitive high intensity short duration cycling. The effects on repetitive running of sprints or swimming short distances appear variable. There appears to be no effect on single maximum sprints of swimming or running.

It is generally accepted that creatine does not enhance endurance activities. It may actually be detrimental to endurance activities because of the increase in lean body mass that can occur with use of this supplement.

In regard to side effects, several small studies have commented that no side effects have occurred. There is one case report of an adult male with acute renal insufficiency who was supplementing with creatine and had a known underlying glomerulosclerosis. Theoretic concern for renal dysfunction exists in persons who are using creatine and are slightly dehydrated. There are numerous anecdotal

reports of creatine causing diarrhea and muscle cramps, but no published studies have documented this.

Most studies of creatine and athletic performance have been performed on smaller numbers of adult male subjects. There have been a few small studies involving adolescent males and females. The longest study to date was of ten weeks' duration in young adult females involved in a strength training program.

Some of the manufacturers of creatine recommend that this be administered in a loading dose of 20 to 25 grams per day (usually 5 grams four to five times per day) orally for five days. This is followed by a maintenance dose of 5 to 10 mg per day. There are no studies to suggest that long term creatine supplementation is any more effective than just the five-day loading dose. The longest study revealing effectiveness in athletes was 28 days. Again, the safety of this compound, both short- and long-term, has yet to be established. The cost of the loading dose regimen is approximately \$7.00 per day and half of this for the maintenance regimen.