Let's Excel Together

CANADIAN ACADEMY OF SPORTS NUTRITION

Lecture 44:

Sports Supplementation

Part 1

Copyright Protection:

Supplements to Discuss:

- **Alanine.**
- **Beta – Alanine.**
- **Beta – Sitosterol.**
- **BCAAs (Branched – Chain Amino Acids).**

Alanine:

- **Alanine is a nonessential amino acid produced in the body from mostly pyruvate and also BCAA (branched-chain amino acids).**

- **Known also as L – alanine, alanine is different from beta- alanine. Chemically and functionally, they are different.**

Athletic Benefits of Alanine:

Potential benefits of alanine in athletes are:

- **a) Protein synthesis.**
- **b) Rebuilding Glycogen storage.**
- **c) Endurance enhancer.**
- **d) Anti – catabolic agent during prolonged and intense training sessions.**

Non – Athletic Benefits of Alanine:

- **a) Alanine may support prostate health. Along with glycine and glutamic acid, helps reduce symptoms of enlarged prostate or BPH (benign prostatic hyperplasia).**

- **b) Alanine may be helpful in prevention of epileptic seizures by acting as an inhibitory neurotransmitter in the brain.**

Dosage:

- In people with BPH and epileptic seizures: 500 – 1000 mg a day.
- As a sport – performance enhancer: it is usually taken 5 – 10 grams starting from 30 minutes before exercise and continuing during exercise.
- Supplementing with pyruvate and BCAA could also increase alanine level.

Caution:

- There are few studies that have linked high levels of alanine to high blood pressure and diabetes type II.

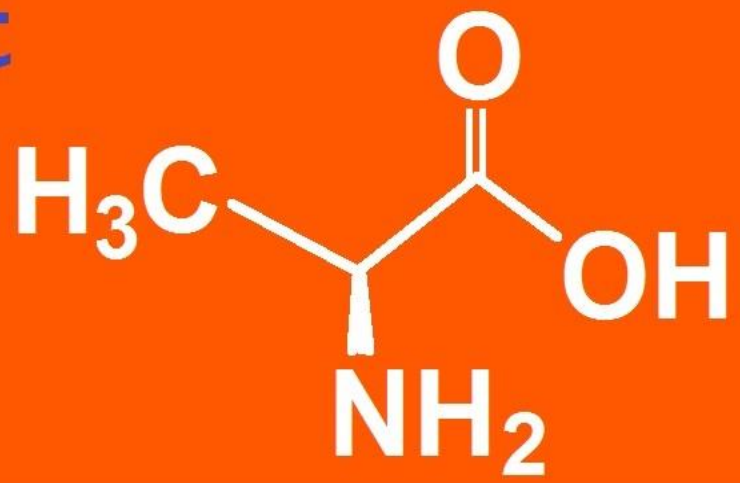
- This product is not recommended in people with liver and kidney diseases.

Alanine

Endurance Enhancer

Glycogen Support

Prostate Health



Beta – Alanine:

- **Beta- Alanine is a variant of L – alanine and naturally occurring beta-amino acid.**
- **It is not a constituent of proteins but is a component of carnosine and vitamin B5 (pantothenic acid).**
- **The popularity of Beta- Alanine among athletes is due to its ability to be a very efficient buffer in the muscles.**

Athletic Benefits of Beta – Alanine:

- **Beta – Alanine is the rate – limiting precursor of carnosine and anserine, which means supplementation with Beta – Alanine increases carnosine and anserine.**

- **They are potent "proton buffering agents" and delay fatigue and improve endurance in athletes by preventing from lactic acid build up.**

Athletic Benefits:

- **Increases muscle strength and total muscle work.**
- **Acts an anti – catabolic agent in long duration exercises.**
- **Enhances performance in short to medium but high intensity exercise.**

Dosage and Side Effects:

- **It is usually taken 3 – 5 grams about 30 – 60 minutes before exercise or competition.**

- **After taking Beta – Alanine, some experience numbness, tingling, and an allergic-type skin flushing. This is famous as "alanine reaction" and very similar to "niacin reaction".**

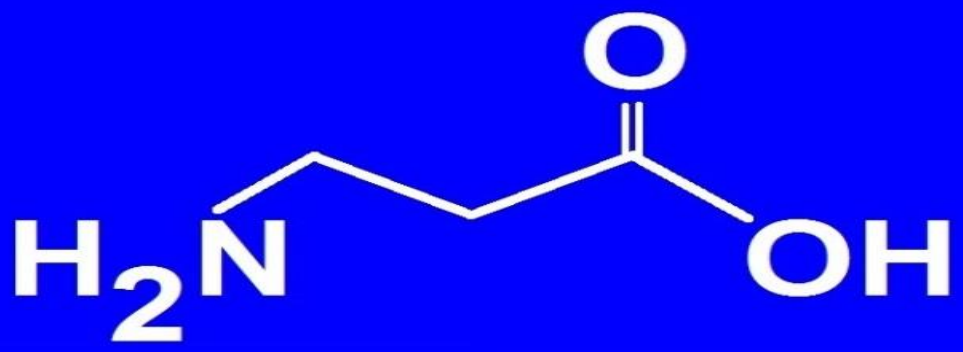
- **It is because the metabolism of Beta – Alanine releases histidine, which increases histamine production.**

Beta-Alanine

Potent Buffering Agent

Endurance Enhancer

Anti-Catabolic Agent



Beta – Sitosterol:

- **Beta- Sitosterol is a phytosterol (plant sterol) that has a chemical structure similar to that of cholesterol.**

Natural Sources:

- **Aloe vera, berries especially acai berry and goji berry, lemon, persimmon, sea buckthorn, alfalfa sprouts, amaranth, avocado, beets, pumpkin seeds, nuts especially peanuts, rice bran, soybeans, and wheat germ.**

Athletic Benefits of Beta – Sitosterol:

- **a) May prevent from athletic overtraining syndrome.**

- **b) May reduce post – exercise infection especially when combined with colostrum.**

Non – Athletic Benefits of Beta – Sitosterol:

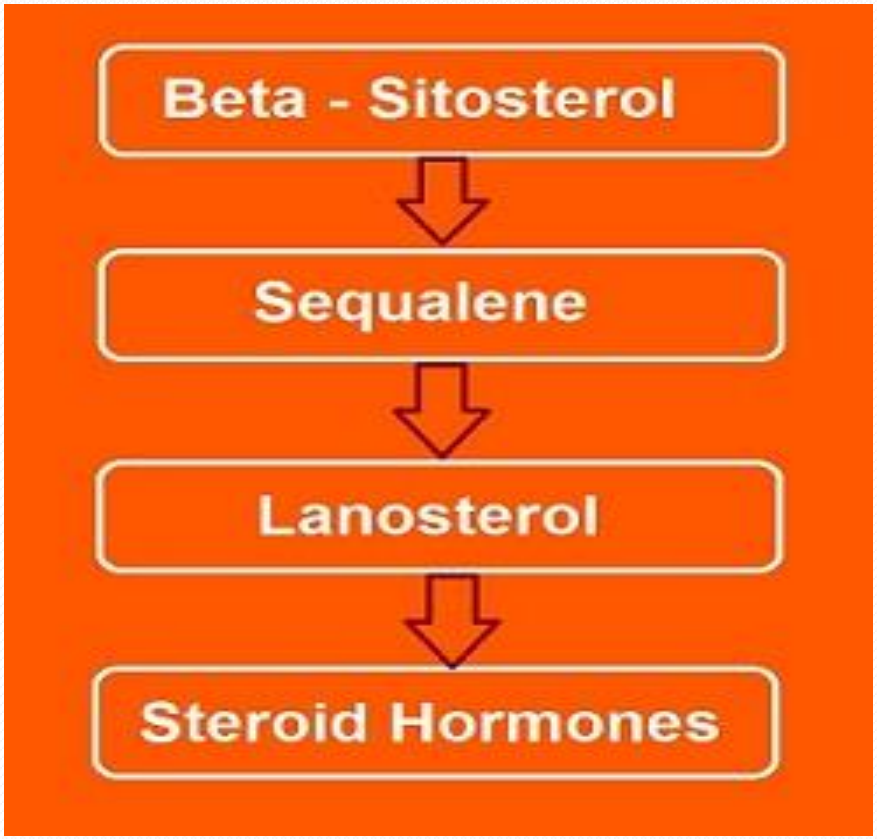
- 1) Reduces symptoms of enlarged prostate (BPH; benign prostatic hyperplasia) especially if combined with saw palmetto and nettle tea.
- 2) Promotes cardiovascular health.
- 3) May reduce cholesterol level by blocking absorption of cholesterol.
- 4) May have a protective effect against gallstone formation by lowering cholesterol in bile.

Dosage:

- **BPH and cardiovascular health: 100 – 500 mg a day.**
- **To help reduce cholesterol level: 500 – 1000 mg a day**
  .
- **For athletes: 1000 – 2000 mg a day. When combined with "colostrum", Beta – Sitosterol shows better results in athletes.**

Caution:

- **Beta – Sitosterol can convert in the body into squalene, which acts as a precursor for steroid hormones and vitamin D.**



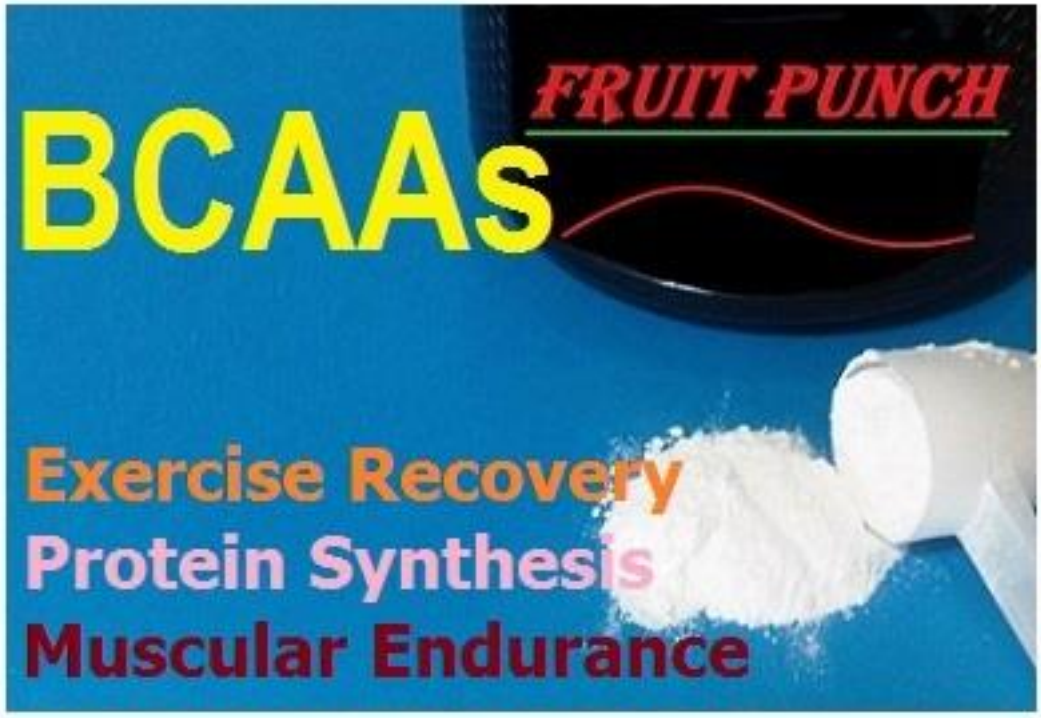
- **There are reports that taking Beta – Sitosterol might cause athletes to have positive tests for Equipoise (Boldenone).**

- **It is a veterinary steroid hormone abused by athletes and banned in sports.**

- **This is why you should exercise caution when taking Beta – Sitosterol during in-competition seasons.**

BCAAs (Branched – Chain Amino Acids):

- **BCAAs are one of the most commonly used products among athletes, body-builders, and Gym-goers.**



- **The three essential amino acids luecine, isoleucine, and valine are known as the branched-chain amino acids (BCAAs).**

- **Normally, BCAAs make about 35 – 40% of the total amino acids contents of the muscles.**

- **Act as the primary source of nitrogen for glutamine and alanine synthesis in the muscles.**

- **BCAAs are metabolized in the muscles rather than in the liver, which makes them safer to use in <u>people with liver diseases</u>.**

- **Since BCAAs do not have hepatic degradation, oral intake of BCAAs increases their levels in the blood and muscles.**

- **BCAAs also increase alanine level in the muscles. Then alanine enters into the alanine – glucose cycle, generating more energy and rebuilding glycogen stores.**

- **The most important cofactor for the proper metabolism of BCAAs is vitamin B6 followed by vitamin B3.**

- **Therefore, supplementation with vitamins B6 and B3 enhances the effectiveness of BCAAs.**

Athletic Benefits of BCAAs:

- **a) Increase protein synthesis.**
- **b) Help increase training strength and lean body mass.**
- **c) Improve exercise recovery.**
- **d) Delay muscle fatigue and onset of soreness after exercise.**

- **e) Improve muscular endurance.**

- **f) May act as insulin mimetic.**

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- **g) Enhance glucose synthesis via alanine-glucose cycle.**

- **h) Act as powerful anti – catabolic agents in prolonged and intense exercise.**

- **i) Are helpful in weight management. Leucine decreases appetite and increases basal metabolic rate (BMR).**

Non – Athletic Benefits of BCAAs:

BCAAs may be beneficial in the following conditions:

- **a) Liver cirrhosis.**
- **b) Hepatic encephalopathy.**
- **c) Phenylketonuria (PKU). It is a genetic disorder characterized by an increase in phenylalanine level in the blood and damage to the nervous system.**

- **d) As an anti – catabolic agent in severe burns, major surgeries, and trauma.**
- **e) Healing wounds and broken bones (leucine).**
- **f) May be helpful in treating addictions.**
- **g) May help control tardive dyskinesia. It is a movement disorder caused by antipsychotic medications and characterized by repetitive and involuntary movements.**
- **h) Useful in reducing symptoms of mania.**

Contraindications:

- a) Maple syrup urine disease (MSUD). It is a genetic disorder due to deficiency of an enzyme responsible for breaking down BCAAs and characterized by elevated blood levels of BCAAs and symptoms of involvement of the CNS (central nervous system).

- b) Amyotrophic lateral sclerosis (ALS) (Ice Bucket Challenge Disease).
- c) Sickle cell anemia.
- d) Pregnancy and breast feeding.

Interactions:

BCAAs should not be taken along with the following medications:

- **1) Levodopa (anti – Parkinson medication): BCAAs decrease the absorption of levodopa.**

- **2) Diazoxide (a medication for high blood pressure): it reduces effectiveness of BCAAs on protein synthesis by inhibiting the secretion of insulin from the pancreas and counteracting insulin-like activity of BCAAs.**

- **3) Insulin and anti-diabetic medications: BCAAs might lead to severe drop in blood sugar level.**

- **4) Corticosteroids: they decrease ability of BCAAs to synthesize proteins by offsetting their insulin-like activities.**

- **5) Thyroid hormones: they may decrease themetabolism of BCAAs.**

Dosage:

- **BCAAs are available as tablets, capsules, and powders. Athletes benefit from 5 – 15 grams a day taken before, during, and after exercise.**

- **BCAAs show better results when taken along with vitamin B – complex.**

- **Abazar`s Pentad: BCAAs, glutamine, arginine, creatine monohydrate, and vitamin B – complex.**

Homework:

- 1) Describe how an athlete benefits from taking BCAAs.

- 2) Describe how beta-alanine works.