Lecture 46:

Sports Supplementation

Part 3

Copyright Protection:

Supplements To Discuss:

- **MCT (Medium Chain Triglycerides).**
- **Octacosanol.**
- **Pyruvate.**
- **Ribose.**

MCT (Medium Chain Triglycerides):

- **Medium chain triglycerides (MCT) are a group of saturated fatty acids that are easily absorbed into the blood stream.**

- **They are not usually stored in the body and are metabolized by the liver and muscles to generate energy.**

Natural Sources:

- **Coconut oil and palm oil are excellent sources of MCTs.**
- **They can be found in small amounts in dairy products and butter.**

Coconut and coconut oil are excellent sources of medium chain triglycerides (MCTs). *Image: Copyright©Depositphotos.com/ Olga Yastremska*

Athletic Benefits of MCTs:

- **The fact that MCTs are absorbed quicker than long chain triglycerides (LCTs) has made them popular in bodybuilding.**

- **MCTs do not require carnitine to get into the mitochondria of the cells. In fact, they are potentially quick sources of high energy for the body during intense training.**

- **During intense and endurance training or competition, MCTs are easily accessible to be used for energy production after glycogen storages are used up.**

- **It has been also hypothesized that MCTs could spare muscle glycogen.**

- **A major drawback of MCTs is that they can convert in the body into ketones.**
- **The buildup of ketones in the body makes the body acidic and impairs energy systems.**
- **Thus, long term consumption of MCTs is not recommended. And endurance athletes should discontinue taking MCTs 2 – 3 weeks before a major event.**

Potential benefits of MCTs in athletes are:

- a) May provide energy during prolong and intense training.
- b) Improves athletic performance.
- c) May delay exhaustion time.

Non - Athletic Benefits of MCTs:

MCTs are claimed to be beneficial in the following conditions:

- **a) Hypothyroidism.**
- **b) Diabetes.**
- **c) Epilepsy (to produce ketosis via ketogenic diet).**
- **d) Neurodegenerative diseases:**
- **1) Alzheimer`s disease.**
- **2) Parkinson`s disease.**

- e) Weight loss associated with AIDS.
- f) As a support in:
- 1) Celiac disease.
- 2) Liver disease.
- 3) Steatorrhea (poor absorption of fat followed by an increased fat in stool).
- 4) Short bowel syndrome.
- 5) Chyluria (milky urine).
- 6) Cystic fibrosis.

Dosage and Side Effects:

- **The typical dosage is 15 – 30 grams per day.**
- **However, athletes generally use up to 50 grams a day.**
- **To reduce side effects and better absorption, it is better taken with foods.**
- **Some MCTS users may experience diarrhea, vomiting, irritability, nausea, stomach discomfort, and bloating.**

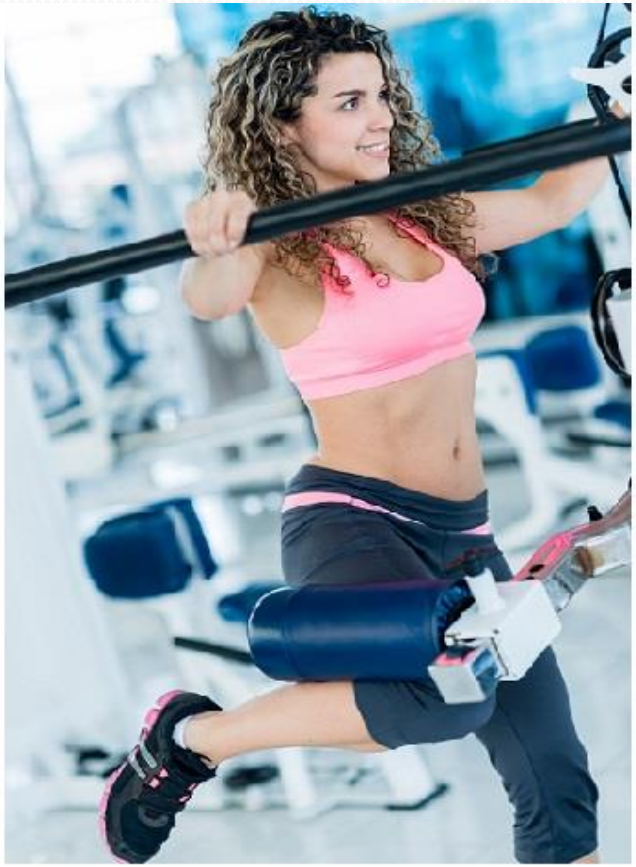
Octacosanol:

- **Octacosanol is a fatty alcohol with waxy nature and found in wheat germ oil, sugarcane extract, legumes and eucalyptus.**

- **It has been touted as "sports ergogenic aid", though the exact mechanism of action is unknown.**

Athletic Benefits of Octacosanol:

- a) May improve athletic reaction time.
- b) Promotes neuromuscular function.
- c) Improves endurance.
- d) May have a protective effect against overtraining syndrome.
- e) Supports glycogen replenishment.
- f) May delay exhaustion time.



Non – Athletic Benefits of Octacosanol:

- a) May decrease LDL cholesterol and increase HDL cholesterol.
- b) May be beneficial in Parkinson`s disease.

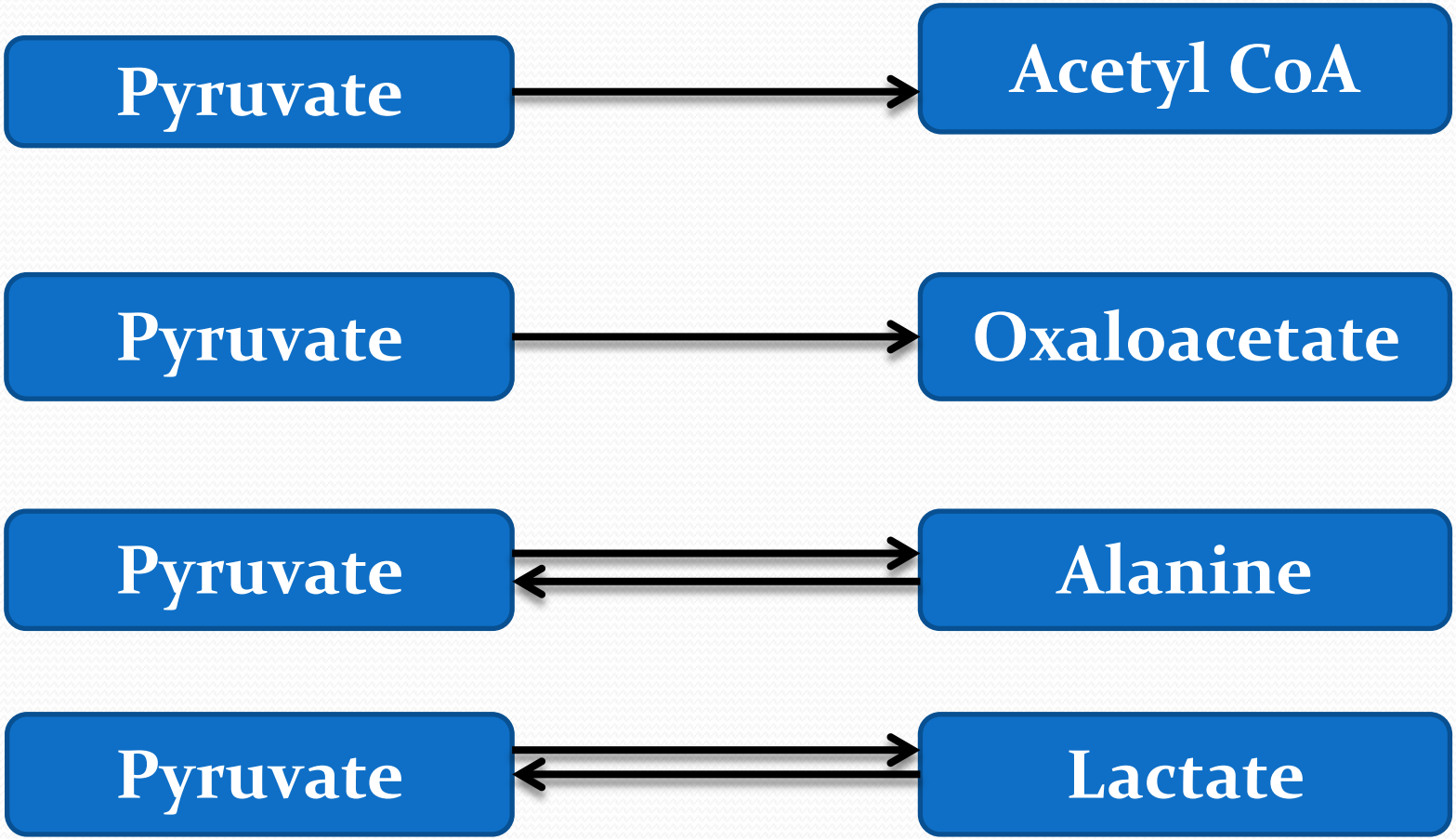
Dosage:

- The usual dosage is 2000 – 5000 mcg daily.

Pyruvate:

- **Pyruvate is a by-product of the metabolism of carbohydrates and protein in the body.**
- **Being extolled as an ergogenic aid, pyruvate provides energy to the cells via Krebs cycle in the presence of oxygen.**
- **It is an intermediate metabolite in glucose – alanine cycle and unites many important metabolic reactions in the body.**

- **After being produced from glucose through glycolysis, pyruvate can convert into other substances:**



Natural Sources:

- **Pyruvate is normally produced in the body.**
- **However, it can also be obtained from foods, ranging from 100 mg to 2000 mg daily.**
- **Foods high in pyruvate include fruits especially red apple (500 mg each), vegetables, most cheeses, dark beer, and red wine.**

Athletic Benefits of Pyruvate:

- Pyruvate supplementation enhances glucose transport into active muscles.

- This process is called "glucose extraction", which provides an energy source to sustain high-intensity aerobic exercise while sparing glycogen storages in the muscles.

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- **As the muscles exercise, the amino acids break down into nitrogen, which has to be removed.**

- **Alanine carries nitrogen back to the liver wherein it can be converted into urea and eventually excreted via urine. Pyruvate elevates alanine level in the muscles.**

- **Pyruvate exhibits better results when combined with dihydroxyacetone (DHA) and creatine monohydrate.**

Potential benefits of pyruvate in athletes are:

- **a) Improves athletic endurance.**
- **b) Delays exhaustion time and exercise – induced fatigue.**
- **c) Spares glycogen storages.**
- **d) Changes body composition.**

Non – Athletic Benefits of Pyruvate:

Pyruvate may be beneficial in the following conditions:

- **a) As a mild antioxidant.**
- **b) Aging skin. Applying a 50% pyruvate may smooth skin, decrease fine wrinkles, and decrease dark spots associated with aging due to sun exposure.**
- **c) Weight loss.**
- **d) Obesity.**
- **e) Cataract.**
- **f) Cancers.**

Dosage and Side Effects:

- **Athletes : 5 – 10 grams daily.**
- **As a weight loss aid: 10 – 30 grams a day.**
- **Some pyruvate consumers may experience stomach upset, bloating, diarrhea, and skin reaction if applied as pyruvic acid facial peel.**

Ribose:

- **Ribose is a natural sugar made in the body from glucose and stimulates the production of ATP.**

- **It is also used to synthesize DNA and RNA. In general, the body uses ribose as the starting point to replace the consumed ATP.**

Natural Sources:

- **Ribose is a natural monosaccharide in the body and cannot be directly found in foods.**

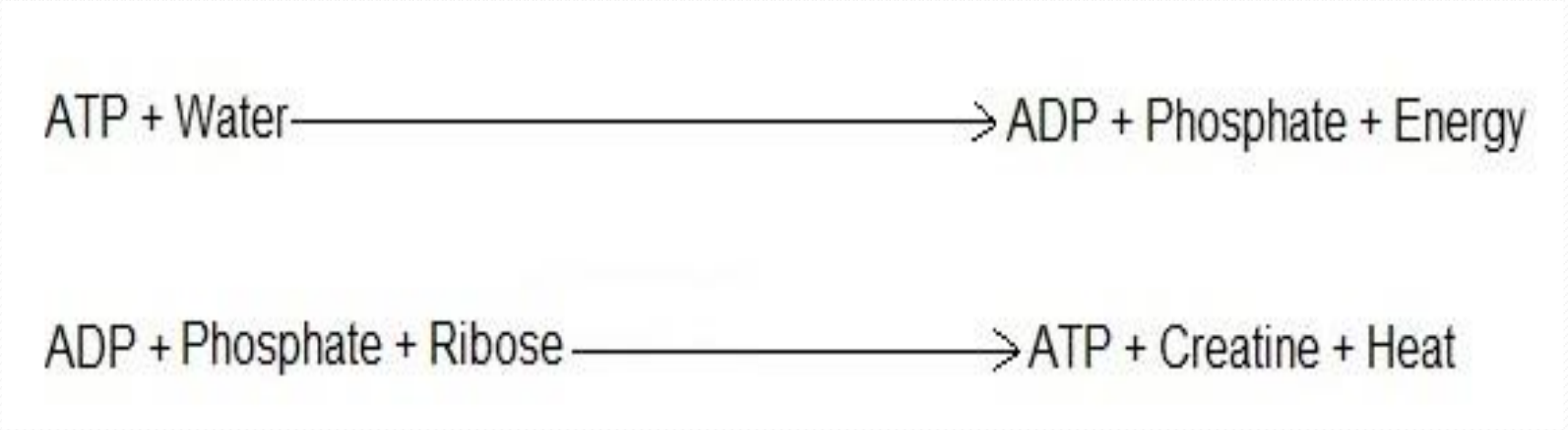
- **On average, a person has 1.5 mg of ribose per deciliter of blood at any given time.**

- **Ribose is a part of the structure of the vitamin B2 (riboflavin). So, foods high in vitamin B2 may increase ribose level in the body.**

Athletic Benefits of Ribose:

- **Ribose is highly important to maintain ATP pool in the body at its highest possible level.**

- **ATP pool is a vital factor for the skeletal muscles and heart to function optimally and keep their maximum performance.**



Potential athletic benefits are:

- a) Increases ATP re-synthesis.
- b) Enhances muscle power and strength.
- c) Elevates muscle tolerance to high intensity exercise.
- d) Improves recovery.
- e) Delays exhaustion time.
- f) Improves endurance.

Non- Athletic Benefits of Ribose:

Ribose is used in the following conditions:

- **a) Angina (coronary artery disease).**
- **b) Chronic fatigue syndrome.**
- **c) Fibromyalgia.**

Dosage:

- Ribose in powder form is more cost effective.
- It is recommended to start with 5 grams a day, and you could increase 2 – 3 grams a day until the maximum dose of 20 grams a day is achieved.

- You can start taking ribose from about 10 minutes before exercise to 30 minutes after exercise.

- Muscle soreness and cramps after exercise, take ribose 5 – 10 grams before exercise and continue taking additional 3 – 4 grams every 20 – 30 minutes.

Side Effects:

- **Ribose seems to be a safe product, as it is a natural sugar in the body and can be easily excreted via urine if there is too much of it in the body.**

- **Though up to 50 – 60 grams of ribose per day could be well tolerated, it may cause some side effects including diarrhea, stomach discomfort, nausea, headache, and low blood sugar level in some users.**

Interactions:

- **Ribose has interactions with anti – diabetic medications (including insulin) and beta – blockers.**

- **Taking ribose along with them may cause blood sugar level to drop too low.**

Homework:

- **1) Describe how coconut oil could benefit athletes.**

- **2) Describe the benefits of ribose supplementation.**