ETTU COACHING CONFERENCE

NUTRITIONAL SUPPLEMENTS - USEFUL ADITIVES IN DAILY DIET OR UNNECESSARY SUBSTANCES?

Prague, 10. October 2016
The World Anti-Doping Agency (WADA) is not involved in the testing of dietary/nutritional supplements.

Extreme caution is recommended regarding supplement use.

The use of dietary supplements by athletes is a concern because in many countries the manufacturing and labeling of supplements may not follow strict rules, which may lead to a supplement containing an undeclared substance that is prohibited under anti-doping regulations. A significant number of positive tests have been attributed to the misuse of supplements and taking a poorly labeled dietary supplement is not an adequate defense in a doping hearing.

Athletes must take care by themselves if the supplement is on doping list!
NUTRITIONAL SUPPLEMENTS: INTRODUCTION

• Food additives: substances, which are intended to supply the organism with nutrients that would otherwise not get in the food in necessary quantities.

• As food supplements we use: proteins, amino acids, fatty acids, vitamins, minerals, carbohydrates, fiber ....

• Unnecessary in a balanced diet ???

• BRO – SCIENCE???
Proteins are made up of chains of amino acids (at least 50, typically > 100). They are a vital nutrient - amino acids are needed to build the body.

The source of the energy (1 gram of protein which is 4 kcal) - 8 to 10% of the daily energy introduced.

Average requirement of protein for an adult is 0.8 g/kg bw/day.

For adults is 2 g/kg bw/day, respectively. 2.5 - times the recommended daily allowance (RDA = recomended dietary allowance) the upper limit for protein intake, that did not expect side effects.

The protein in the food should have a high biological value, which means that they contain a sufficiently high proportion of the essential amino acids.
NUTRITIONAL SUPPLEMENTS: PROTEINS

Protein - shakes (powder), a protein plate.

- Varios types:
  1) Whey protein
  2) Casein
  3) Protein from soy
  4) Egg proteins,
  5) Proteins from Rice
  6) Protein from hemp
  7) Proteins from pears
NUTRITIONAL SUPPLEMENTS: PROTEINS

Whey protein

- Whey protein (milk - cheese - whey - protein); human milk 60% W, 40% C.
- It contains large amounts of essential amino acids and BCAAs.
- Higher concentrations of cysteine (helps in the synthesis of glutathione).
- Benefit from it to promote the regeneration of muscle tissue.

- Three basic types: concentrate (29-89% protein), isolate (> 90% protein) hydrolyzate (treated with enzymes - CISC).
- Rapid absorption from the gastrointestinal tract (30 minutes); digestive problems.
NUTRITIONAL SUPPLEMENTS: PROTEINS

Casein

- Protein derived from milk
- Participates in the metabolism of amino acids, carbohydrates, calcium and phosphorus.
- When digested in the human body it forms a mass in the stomach - slow absorption (a few hours).
NUTRITIONAL SUPPLEMENTS: PROTEINS

Protein from soy

- Soy protein isolated from soy granules so that the shell is removed soybeans and fat.
- Contains a lot of Legumins, enzymes, phytoestrogens.
- Forms: flour, concentrate (70% protein), isolate (90% protein).
- Gynecomastia?
- Suitable for vegans and vegetarians.

Protein from eggs

- They are located in eggwhite (in whole egg is about 10% protein constituent).
- Suitable for lactose intolerant.
Aminoacids

- Aminoacids: organic acids consisting of an amino group (-NH2) and a carboxylic acid (-COOH), and chain specific to each AMK
- **Essential**: the organism can not be synthesize itself and are essential for the organism
- **Conditionally essential**: arginine, cysteine, glutamine, ornithine, proline, selenocistein, serine, tyrosine (normal organism by itself is synthesized, in certain conditions to be entered in the diet).
- **Nonessential**: alanine, asparagine, aspartic acid, glutamic acid, glycine.

<table>
<thead>
<tr>
<th>Amino Acid</th>
<th>Main Food Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histidine</td>
<td>soy protein, eggs, parmesan, sesame, peanuts</td>
</tr>
<tr>
<td>Isoleucine</td>
<td>eggs, soy protein &amp; tofu, whitefish, pork, parmesan</td>
</tr>
<tr>
<td>Leucine</td>
<td>eggs, soy protein, whitefish, parmesan, sesame</td>
</tr>
<tr>
<td>Lysine</td>
<td>eggs, soy protein, whitefish, parmesan, smelts</td>
</tr>
<tr>
<td>Methionine</td>
<td>eggs, whitefish, sesame, smelts, soy protein</td>
</tr>
<tr>
<td>Cysteine</td>
<td>eggs, soy protein, sesame, mustard seeds, peanuts</td>
</tr>
<tr>
<td>Phenylalanine</td>
<td>eggs, soy protein, peanuts, sesame, whitefish</td>
</tr>
<tr>
<td>Tyrosine</td>
<td>soy protein, eggs, parmesan, peanuts, sesame</td>
</tr>
<tr>
<td>Threonine</td>
<td>eggs, soy protein, whitefish, smelts, sesame</td>
</tr>
<tr>
<td>Tryptophan</td>
<td>soy protein, sesame, eggs, winged beans, chia seeds</td>
</tr>
<tr>
<td>Valine</td>
<td>eggs, soy protein, parmesan, sesame, beef</td>
</tr>
</tbody>
</table>
BCAA - branched-chain amino acids

- Valine, leucine, isoleucine
- Essential amino acids: 33% of muscle mass.

a) The functions in the body:
b) Anabolism/anticatabolism of muscle tissue,
c) Effects on the brain (the treatment of hepatic encephalopathy, signaling)
d) Increases the level of glucose in the blood,
e) Reduces appetite.

- As nutritional supplements: powders, pills
- 10-20 grams / day
Creatine

- An amino acid that is found naturally in our body: helps supply cells with energy (primarily muscle) in a manner that increases the production of ATP (present in all animals and some plants).
- The organism produces it from AMK: glycine, methionine, arginine (50% receive from the food).
- It lowers the level of myostatin, raising the level of dihydrotestosterone, testosterone and IGF-1.
- As a dietary supplement: athletes of various profiles for the increase in body weight.
- European food safety authority (2004): 3 g daily do not cause any health problems, from 5 to 20 grams per day is safe, without side effects.
- Asthma, ICS, GI problems...
- Formats: monohydrate, gluconate (not the best), ethyl ester (worse) hydrochloride (more soluble), nitrate (no difference)
Carnitine

- Synthesised in body: in the body from lysine and methionine (liver, kidneys).
- Transports fatty acids in the cell, which are then used as an energy source.
- It reduces mortality and the incidence of arrhythmias in people after MI.
- Antioxidant.
- Research (as a medicine): MI, heart failure, angina pectoris, diabetic neuropathy
- Food: Red meat (beef 100 g = 95 mg carnitine, pork 28, chicken 4, cottage cheese 1, egg 0.01).
- Dosing: 1000 to 1500 mg 30 minutes before your workout
Magnesium

- Reduction of magnesium in the diet of modern Western countries (compared to earlier generations) may be related to food refining and modern fertilizers that contain no magnesium.
- Lack: the weakened muscles, tiredness, listlessness, tremors and muscle spasms, cardiac arrhythmias (one of the most dangerous).
- Dosing: up to 400 mg in form of fluids, tablets, powders...
B complex
- Lack: specific nutrition (a diet rich in carbohydrates and fat can cause vitamin B1 hypovitaminosis, especially among larger effort and sweating).
- 100% - 200% RDA

Vitamin D
- With normal healthy diet we get 100 IU of vitamin D / day (10% of daily needs).
- Vitamin D deficiency: rickets, increased risk of falls and fractures, reduction of muscle mass and strength, muscle aches, increase the risk of cancer, type 2 diabetes, cardiovascular disease ...
- Hypervitaminosis D - in patients taking the active forms of vitamin D: calcium increase.
- Dosing: 100% RDA.
Energy drinks

- type of beverage containing stimulanting drugs, chiefly caffeine, which is marketed as providing mental and physical stimulation.
- may or may not be carbonated and many also contain sugar or other sweeteners, herbal extracts and amino acids (taurin).
- Energy drink is not same as sports drink.
- Energy drinks have the effects caffeine and sugar provide, but there is little or no evidence that the wide variety of other ingredients have any effect.
- Most of the effects of energy drinks on cognitive performance, such as increased attention and reaction speed, are primarily due to the presence of caffeine.
- Advertising for energy drinks usually features increased muscle strength and endurance, but there is little evidence to support this in the scientific literature.
NUTRITIONAL SUPPLEMENTS: ENERGY DRINKS

- **Caffein:** up to 400 mg/day without adverse effects (individualization!)

- Adverse effects: nervousness, irritability, sleeplessness, increased urination, abnormal heart rhythms, and dyspepsia.

- Bupropion, caffeine, nicotine, phenylephrine, phenylpropanolamine, pipradol and synephrine: These substances are included in the 2016 WADA Monitoring Program, and are not considered Prohibited Substances (In-Competition only!).

- Excessive or repeated consumption of energy drinks can lead to cardiac problems, such as arrhythmias and heart attacks, and psychiatric conditions such as anxiety and phobias.

- In Europe, energy drinks containing taurine and caffeine have been associated with the deaths of athletes.
Sports drinks

• Beverages whose stated purpose is to help athletes replace water, electrolytes, and energy after training or competition, though their efficacy for that purpose has been questioned, particularly after exercise.

• Three major types:
  a) Isotonic sport drinks contain similar concentrations of salt and sugar as in the human body.
  b) Hypertonic sport drinks contain a higher concentration of salt and sugar than the human body.
  c) Hypotonic sport drinks contain a lower concentration of salt and sugar than the human body.

• Most sports drinks are approximately isotonic, having between 4 and 5 heaped teaspoons of sugar per five ounce (13 and 19 grams per 250ml) serving.
Sports drinks - do we really need them?

- Robert Robergs (an exercise physiologist at the University of New Mexico who studied Gatorade) - unless someone is exercising or competing in a sporting event for longer than 90 minutes, there is no reason to drink something with excess sugar and electrolytes.

- The Australian Institute of Sport: excessive salt supplementation during exercise may lead to "gastrointestinal problems or cause further impairment of fluid balance" and may cause salt-induced cramps.

- Stated purpose of sports drinks, which provide many calories of energy from sugars, is to improve performance and endurance:
  a) Matthew Thompson and colleagues from the Oxford Centre for Evidence Based Medicine: for the vast majority of people, drinking such products "could completely counteract exercising more, playing football more, going to the gym more".
CHOOSE WISELY!!!