"SPORT NUTRITION HAS BEEN WELL DOCUMENTED AS BEING AN INVALUABLE TOOL TO BE USED IN ANY ATHLETE’S TRAINING PROGRAMME AND COMPETITION"

IT IS THE SINGLE MOST COMPLEMENTARY FACTOR TO ANY PHYSICALLY ACTIVE INDIVIDUAL OR ELITE ATHLETE

Well-chosen eating practices have much to offer the athlete:

• Fuel to train and perform at the elite level in order to obtain optimum gains from the training programme

• Enhanced recovery between workouts and between events

• Achievement and maintenance of an ideal body mass and physique

• A reduced risk of injury, overtraining fatigue and illness
• Confidence in being well-prepared to face competition

• Consistency in achieving high-level competition performances

• Benefit from the many components of the diet that can promote health

• Reduce the risk of trauma, overtraining syndrome and diseases

• Enjoyment of food and social eating occasions at home and during travel
CRITICAL POINTS

✓ Poor knowledge of foods and inadequate cooking skills
✓ Poor or outdated knowledge of sports nutrition
✓ Lack of access to dietitians/nutritionists or other credible resources
✓ Inadequate finances
✓ Busy lifestyle leading to inadequate time to obtain or consume appropriate foods
✓ Poor availability of good food choices
✓ Frequent travel
CRITICAL POINTS

✓ Indiscriminate use of large amounts of supplements or failure to use evidence-based supplements and sports foods in an appropriate way

✓ Or, in specific sports risk of inadequate intake of energy and nutrients such as female athletes playing skill sports (gymnastics, skating...) or endurance sports

✓ Or males and females engaged in sports with weight categories
THE ATHLETE?

- We Can Not Consider A Unique Athlete Model

TRAINING
COMPETITION

Endurance Sports
Power Sports
Skill Sports

Sport individuali
Team Sports
PERSONALIZED NUTRITION IN RELATIONSHIP TO TRAINING/COMPETITION

Taking into account QUANTITY, QUALITY, NUTRIENTS, BODY COMPOSITION

Close ET AL. New strategies in sport nutrition to increase exercise performance. 2016

1700-2000 Kcal/die  2200-3200 Kcal/die  3500-5000 Kcal
Weight-sensitive sports can be classified into three main groups:

- **Gravitational sports**, in which high body weight restricts performance because moving the body against gravity is an essential part of these sports. Among these sports are long-distance running, cross-country skiing, road and mountain bike cycling, ski jumping and jumping in athletics.

- **Weight-class sports**, including combat sports such as wrestling, judo, boxing, taekwondo, as well as weight lifting and lightweight rowing.

- **Aesthetically judged sports** such as rhythmic and artistic gymnastics, figure skating, diving and synchronised swimming.

on the other hand it is good never to underestimate the risk of malnutrition for defect, quantitative and qualitative in particular in weight-sensitive sports

LINEE GUIDA COMMISSIONE MEDICA COMITATO INTERNAZIONALE OLIMPICO
DEHYDRATION:

- Loss of adequate thermoregulatory capacity.
- Training with "forced" dehydration techniques ("sauna or wet suit") significantly increases the risk of heat illness up to heatstroke.

INCORRECT INTAKE OF NUTRIENTS

- **CHO:** impaired glycogen reserves, inadequate recovery, ↓ immune function
- **PRO:** further risk of reducing lean body mass (LBM)
- **LIPIDS:** risk of deficiency of essential fatty acids (linoleic, linolenic, omega 3, omega 6)
- **IRON AND CALCIUM, OTHER VITAMINS AND MINERALS.** Risk in caloric restriction and in repeated rapid weight loss diets.
COGNITIVE FUNCTION AND PSYCHOLOGICAL FACTORS

Early onset of fatigue due to dehydration and caloric restriction can change mood

INCREASED STRESS AND IMMUNE FUNCTION

High training loads, caloric restriction, high oxidative stress, low CHO intake can depress immune function

METABOLIC CHANGES

Basal metabolism in athletes who undergo weight changes during the season, however it is a reversible phenomenon
EATING DESORDERS, HORMONAL CHANGES

Orthorexia, dysmorphophobia, anorexia, bulimia "simple" or with compensatory behaviors (procured vomit)

Primary and secondary amenorrhea, oligomenorrhea

LOW BONE DENSITY (osteopenia e osteoporosis) periostitis, fratture da stress (diversa densità ossea in sport a carico gravitazionale e non descritte anche a carico del distretto superiore)
FEMALE ATHLETE TRIAD

caloric restriction, amenorrhea, ↓ bone density

MALE ATHLETE TRIAD

caloric restriction, ↓ testosterone, ↓ bone density
(running, cycling, horse riding)

GROWTH AND MATURATION DISORDERS

Caloric restriction in developmental age induce delayed in pubertal development and growth, risk of eating disorders (more frequent in aesthetic "weight-sensitive" disciplines, or combat sports with specific anthropometric characteristics)
<table>
<thead>
<tr>
<th>Weight control behaviour</th>
<th>Physiological effects and health consequences</th>
<th>Effect on performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting or starvation</td>
<td>Energy and nutrient deficiency, glycogen depletion, loss of lean body mass, a decrease in metabolic rate and reduced bone mineral density</td>
<td>Poor exercise performance due to general weakness, reduced ability to cope with pressure, decreased muscle force, and increased susceptibility for diseases and injuries</td>
</tr>
<tr>
<td>Diet pills</td>
<td>Typically function by suppressing appetite and may cause a slight increase in metabolic rate. May induce rapid heart rate, anxiety, nervousness, inability to sleep and dehydration. Any weight lost is quickly regained once use is discontinued</td>
<td>Indirectly results in poor performance and may be classified as doping</td>
</tr>
<tr>
<td>Laxatives or enemas</td>
<td>Weight loss is primarily water and any weight lost is regained once use is discontinued. Dehydration and electrolyte imbalances, constipation, cathartic colon and steatorrhoea (excessive fat in the faeces) are common</td>
<td>May affect concentration and hydration status. May be addictive and athlete can develop resistance, thus requiring larger and larger doses to produce the same effect</td>
</tr>
<tr>
<td>Diuretics</td>
<td>Weight loss is primarily water and any weight lost is quickly regained once use is discontinued. Dehydration and electrolyte imbalances are not uncommon</td>
<td>Poor performance and classified as doping</td>
</tr>
<tr>
<td>Self-induced vomiting</td>
<td>Large body water losses can lead to dehydration and electrolyte imbalances. Gastrointestinal problems, including oesophagitis, oesophageal perforation and oesophageal ulcers may occur</td>
<td>May lead to electrolyte imbalance. Largely ineffective in promoting weight (body fat) loss</td>
</tr>
<tr>
<td>Saunas</td>
<td>Dehydration and electrolyte imbalances can occur in extreme cases</td>
<td>Weight loss is primarily water and any weight lost is quickly regained once fluids are replaced</td>
</tr>
<tr>
<td>Excessive exercise</td>
<td>If combined with low energy availability it will increase risk of staleness, chronic fatigue, illness, overuse, injury and menstrual dysfunction</td>
<td>Experience the effect of lack of recovery</td>
</tr>
</tbody>
</table>

Modified from Beals.30
ABUSE OF DRUGS AND SUPPLEMENTS AND DOPING RISK!

ETHICAL IMPLICATIONS: it builds a mentality that tends to seek external help to improve performance (even more in the amateur world and often in young athletes)

HEALTH IMPLICATIONS: use of drugs in absence of pathologies and without appropriate prescription

- access to uncontrolled markets (eg internet) where doping substances may be proposed or
NUTRITIONAL ASSESSMENT

- CLINICAL ASSESSMENT
- LABORATORY ASSESSMENT
- ANTHROPOMETRIC MEASUREMENT AND BODY COMPOSITION
- EATING HABITS AND DIETARY INTAKE

IN ORDER TO PRESCRIBE TAILORED: - General Dietary Advice - A Diet Prescription
NUTRITIONAL ASSESSMENT | OUR PROTOCOL

CLINICAL ASSESSMENT

- Medical history
- Physical examination

FOCUSED ON:
- General conditions
- Nutrition related diseases
- Allergies
- Under and over nutrition

LABORATORY ASSESSMENT
(blood and urine)

- Glucose metabolism
- Iron status
- Renal function
- Liver function
- Lipid profile
- Thyroid hormones
- Vitamin D status
BODY COMPOSITION MODELS

TISSUE
Skeletal muscle
Bone
Other

ATOMIC
Oxygen
Carbon
Hydrogen
Others

CELLULAR
Cell mass
Extracellular solids
Extracellular fluids

MOLECULAR
Water
Lipid
Protein
Other

## ASSESSMENT - COMPARISON

<table>
<thead>
<tr>
<th></th>
<th>ADP</th>
<th>SKINFOLDS</th>
<th>BIA</th>
<th>DXA</th>
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</thead>
<tbody>
<tr>
<td><strong>LEVEL</strong></td>
<td>II-INDIRECT</td>
<td>III-DOUBLY INDIRECT</td>
<td>III-DOUBLY INDIRECT</td>
<td>II-INDIRECT</td>
</tr>
<tr>
<td><strong>ACCURACY RELIABILITY</strong></td>
<td>****</td>
<td>***</td>
<td>****</td>
<td>****</td>
</tr>
<tr>
<td><strong>EASY TO USE</strong></td>
<td>****</td>
<td>***</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td><strong>SPEED</strong></td>
<td>****</td>
<td>***</td>
<td>****</td>
<td>***</td>
</tr>
<tr>
<td><strong>REPRODUCIBILITY</strong></td>
<td>****</td>
<td>***</td>
<td>****</td>
<td></td>
</tr>
<tr>
<td><strong>SAFETY</strong></td>
<td>*****</td>
<td>*****</td>
<td>****</td>
<td>**</td>
</tr>
<tr>
<td><strong>FIELD TEST</strong></td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td><strong>COST</strong></td>
<td>-</td>
<td>*****</td>
<td>****</td>
<td></td>
</tr>
</tbody>
</table>

**ADP** air displacement plethysmography  
**BIA** bioelectrical impedance analysis  
**DXA** dual energy xray absorptiometry
BODY IMPEDANCE ANALYSIS BIA

- The diagram biavector (biva) shows us immediately the condition of subjects
SKINFOLDS MEASUREMENT AND PREDICTING EQUATIONS

• Simple technique
• Reliable
• Elevated risk of bias due to variability intra operator and between operators

• Is essential to respect standard references (lohman 1988, partially integrated by isak 2001)
• Is essential to duplicate measurements
BODY COMPOSITION FEMALES - ADP IMSS CONI 2017-2018

- BMI (kg/m^2)
- Fat mass % (ADP BODPOD)
- Statura (cm)
- Peso (kg)

Short track: 11
Sci alpino: 14
Pallavolo: 11
Pallanuoto: 10
Pattinaggio ghiaccio: 6

BMI: 19.9, 20.6, 19.6, 24.5, 16.1
Fat mass %: 168, 168, 184, 171, 163
Statura: 185, 175, 165, 155, 145, 135, 125, 115, 105, 95, 85, 75, 65, 55, 45, 35, 25, 15, 5
Peso: 15, 25, 35, 45, 55, 65, 75, 85, 95, 105, 115, 125, 135, 145, 155, 165, 175, 185
BODY COMPOSITION MALES - ADP IMSS CONI 2017-2018

bmi (kg/m^2)

Fat mass  % (ADP BODPOD)

statura (cm)

peso (kg)

short track 10  sci alpino 14  pallavolo 16  pallanuoto 9  pattinaggio figura 5  salto sci 5
EATING HABITS AND DIETARY ASSESSMENT

“TRAINING AND COMPETITION HISTORY”
- Periodised training calendar of the athlete
- Type of training
- Calendar of competition

Lifestyle habits
Food preferences
And the knowledge the athlete has on food (ingredients, cooking methods, nutrition etc.)
DIETARY ASSESSMENT

- Goals

Reliable quantitative and qualitative dietary intake assessment in order to guarantee a tailored dietetic prescription

Training

Competition

Quantity
Quality
Timing
NUTRIENT INTAKE

- CHO %
- FAT (%)
- PRO (%)
- PRO g/kg BW
- Iron (mg/die)
During training

Daily energy requirements (kcal/d)

In our experience the daily energy intake derived by the dietary intake assessment, is a good approximation of the average daily energy requirements of the athlete

During competition

BODY COMPOSITION ASSESSMENT RESULTS
MEDITERRANEAN DIET

» RESPECTS INTERNATIONAL GUIDELINES FOR SPORT NUTRITION

(International Olympic Committee - IOC, American College of Sports Medicine - ACSM, International Society for Sport Nutrition - ISSN)

ADVANTAGES:

wide variety of foods and recipes in order to profit of many functional effects of eating habits on *HEALTH AND PERFORMANCE*
CARBOHYDRATES 52-65%
10 - 15 % soluble
40 - 55 % starch CHO

According to glycemic Index and timing

HIGH
LOW

SPORT NUTRITION
MEDITERRANEAN DIET
SPORT NUTRITION

MEDITERRANEAN DIET

- Increased protein synthesis
- Repairing muscle damage
- Preventing injuries
- Grant proper synthesis of other proteins
- The contribution to energy metabolism is low
- (leucine oxidation in endurance sports)

1.2 - 1.8 gr / Kg BW / die
max 2 gr / kg BW / die
ANIMAL: VEG 2:1
## Protein Quality

<table>
<thead>
<tr>
<th>Protein Source</th>
<th>Rating Methods</th>
<th>B.V.</th>
<th>P.D.C.A.A.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whey protein</td>
<td></td>
<td>104</td>
<td>1.0</td>
</tr>
<tr>
<td>Whole egg</td>
<td></td>
<td>100</td>
<td>1.0</td>
</tr>
<tr>
<td>Beef</td>
<td></td>
<td>80</td>
<td>0.92</td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>Casein (milk)</td>
<td></td>
<td>77</td>
<td>1.0</td>
</tr>
<tr>
<td>Soy</td>
<td></td>
<td>74</td>
<td>0.99</td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td>59</td>
<td>0.25</td>
</tr>
<tr>
<td>Beans</td>
<td></td>
<td>49</td>
<td>0.68</td>
</tr>
</tbody>
</table>

B.V. biological value  
P.D.C.A.A.S. protein digestibility aminoacid correct score
## LEGUMINOUS CROPS NUTRITIONAL VALUES

### Italian varieties

<table>
<thead>
<tr>
<th>LEGUMES DRY</th>
<th>ENERGY kcal</th>
<th>PRO</th>
<th>FATS</th>
<th>CARBOHYDRATES</th>
<th>VITAMINS</th>
<th>MINERALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chickpeas</td>
<td>316</td>
<td>21</td>
<td>6.3</td>
<td>47</td>
<td>B1 e PP</td>
<td>Iron, Ca, Mg, K</td>
</tr>
<tr>
<td>Beans</td>
<td>293</td>
<td>22</td>
<td>1-2</td>
<td>47-51</td>
<td>B1 e PP</td>
<td>Iron, Ca</td>
</tr>
<tr>
<td>Broad beans</td>
<td>310</td>
<td>21</td>
<td>3</td>
<td>53</td>
<td>B1 e PP</td>
<td>Iron, Ca</td>
</tr>
<tr>
<td>Lentils</td>
<td>291</td>
<td>23</td>
<td>1</td>
<td>51</td>
<td>B1 e PP</td>
<td>Iron, Ca, P, Mg</td>
</tr>
<tr>
<td>Peas</td>
<td>286</td>
<td>22</td>
<td>2</td>
<td>48.2</td>
<td>B1, B9 e PP</td>
<td>Iron, Ca, P</td>
</tr>
<tr>
<td>Soy</td>
<td>407</td>
<td>37</td>
<td>19</td>
<td>23</td>
<td>B1 e PP</td>
<td>Iron, Ca</td>
</tr>
<tr>
<td>Lupini beans</td>
<td>371</td>
<td>36</td>
<td>2,4</td>
<td>40.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SPORT NUTRITION

**MEDITERRANEAN DIET**
<table>
<thead>
<tr>
<th>Alimento</th>
<th>Weight per portion (g)</th>
<th>Water (g)</th>
<th>PRO (g)</th>
<th>CHO (g)</th>
<th>LIP (g)</th>
<th>Calcio (mg)</th>
<th>Energia (Kcal)</th>
<th>Leucina (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Yogurt</td>
<td>250</td>
<td>217</td>
<td>9,5</td>
<td>11</td>
<td>9,7</td>
<td>312</td>
<td>165</td>
<td>750</td>
</tr>
<tr>
<td>Yogurt Greek style</td>
<td>150</td>
<td>117</td>
<td>9,6</td>
<td>3</td>
<td>13,7</td>
<td>225</td>
<td>172,5</td>
<td>Non disponibile</td>
</tr>
<tr>
<td>Whole milk</td>
<td>250</td>
<td>217,5</td>
<td>8,2</td>
<td>12,2</td>
<td>9</td>
<td>297</td>
<td>160</td>
<td>862</td>
</tr>
<tr>
<td>Ricotta cheese</td>
<td>100</td>
<td>75,7</td>
<td>8,8</td>
<td>3,5</td>
<td>10,9</td>
<td>295</td>
<td>146</td>
<td>997</td>
</tr>
<tr>
<td>Parmesan cheese 30 months</td>
<td>30</td>
<td>9,0</td>
<td>10,0</td>
<td>-</td>
<td>8,4</td>
<td>347</td>
<td>116</td>
<td>864</td>
</tr>
<tr>
<td>Soy drink</td>
<td>250</td>
<td>224,2</td>
<td>7,25</td>
<td>2</td>
<td>4,75</td>
<td>32,5</td>
<td>80</td>
<td>Non disponibile</td>
</tr>
</tbody>
</table>

Tabelle composizione alimenti CREA
• Energy source
• Vehicule lipophilic vitamins (a retinol, d cholecalciferol, e tocopherol)
• Omega 3 omega 6
• Privilege fish (omega 3)
• Vegetable sources: nuts, oils
• Extravirgin olive oil
• Mono- polyunsaturated fats
• Tocopherol (vit e)
IRON DEFICIENCY AND PERFORMANCE

IRON DEFICIENCY ANEMIA  (Hb) <12 mg/dl FEMALES <13 mg/dl MALES; Hct <36%

- IMPAIRED PERFORMANCE
- LOW Hb is more responsible than LOW cytochrome or myoglobin (Beard 2000)

IRON DEPLETION  FERRITIN* <12 mcg/l (alcuni AA: <10 mcg/l; <20mcg/l)

TRANSFERRIN (Tf) > 360 mg/dl;

IMPAIRED PERFORMANCE

HYDRATION AND PERFORMANCE

SWEATING:

endurance in normal climatic conditions: 0,5 liters/hour

HIGH TEMPERATURE AND HUMIDITY UP TO 2-4 liters/hour

% dehydration

0 1 2 3 4

reduction % maximum exercise capacity
REHYDRATION

- Before exercise: (400 - 600 ml during the 2 previous hours)

- During: (150-300 ml every 15-20’)

- For activities lasting more than 90 minutes 6-8 % CHO, 10 mEq/L NaCl

- After: Cover fluid loss with beverages and food, if necessary 1,5 l of fluids each kg of weight loss
HYDRATION - WHAT to drink

- Give fast availability of fluids to tissues
- provide an adequate source of CHO as ready energy substrate for the muscles in activity if necessary
- contain small amounts of electrolytes
- Do not cause gastrointestinal distress
- present an excellent palatability to encourage the voluntary intake of liquids

Normally water is sufficient, especially in speed sports
# TIMING: PRE DURING - POST WORKOUT

<table>
<thead>
<tr>
<th>GUIDELINES: IOC 2010, ACSM 2009, ISSN 2010</th>
<th>Athlete 50 Kg</th>
<th>Athlete 100 Kg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre workout meal (2-3 hours)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2 g CHO/kg PC</td>
<td>50-100 g</td>
<td>100-200 g</td>
</tr>
<tr>
<td>0.15-0.25 g PRO/kg PC</td>
<td>7,5-12,5 g</td>
<td>15-25 g</td>
</tr>
<tr>
<td><strong>During &gt; 60 minutes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0,7 g CHO/kg/h</td>
<td>35 g CHO/h</td>
<td>70 g CHO/h</td>
</tr>
<tr>
<td>30-60 CHO/h</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Recovery meal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within 30 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHO : PRO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-4 : 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0,6-1.0 g CHO/kg BW</td>
<td>30-50 g</td>
<td>60-100 g</td>
</tr>
<tr>
<td>0.15-0.25 g PRO/kg BW</td>
<td>7,5-12,5 g</td>
<td>15-25 g</td>
</tr>
<tr>
<td>Repeat every two hours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SPORT NUTRITION**
TAKE HOME MESSAGE

- Assess with care lifestyle, eating preferences, knowledge about food of athletes
- Quantity, quality and timing varies according to training programme
- (Cho, proteins, water, salts)
- Consider and use foods as “supplements”

BODY COMPOSITION

- Respect standard references to guarantee
- Accurate and reliable results
THANKS!