

Nutrition and Athletic Performance

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Scope of Presentation

- Nutrition recommendations for active adults and competitive athletes
- Sports Food



Nutrition Recommendations – Guiding Principles

- Nutrition goals and requirements are not static – athletes undertake a periodized programme and integrate different types of workouts in the various cycles of the training calendar
- Nutrition plans need to be personalized and should be specific for uniqueness of the event, performance goals, practical challenges
- Competition nutrition strategies should focus on providing adequate substrate stores to meet the fuel demands of the event and support cognitive function
- Energy availability sets an important foundation for health and success of sports nutrition strategies
- The timing of nutrient intake and nutritional support over the day is important in relation to sports rather than general daily targets

Energy Requirement

Energy requirement determined by

- Athlete's sport
- Performance goals
- Periodized training & competition cycle
- Body composition goals

Population specific regression equations may be used to determine energy requirement

Increased energy needs

- Exposure to cold or heat
- Fear
- Stress
- High altitude exposure
- Physical injuries
- Specific drug or medication
- Increase in fat free mass

Decreased energy needs

- Reduction in training
- Aging
- Decrease in fat free mass

Carbohydrate: Pre-event Fuelling



- Carbohydrate Loading

- Aims to maximize glycogen stores prior to endurance exercise lasting > 90 minutes
- Benefits – delayed onset of fatigue and improvement in performance

- Current recommendations

- For sustained or intermittent exercise > 90 minutes: 10-12 g/kg BM/day in 36-48 hour prior to exercise
- For exercise < 90 minutes: 7-12 g/kg BM should be consumed during 24 hrs prior to event
- For exercise between 60-90 minutes: 1-4 g/kg BM in the 1-4 hours prior to the event

Carbohydrate: During Event

- **Carbohydrate ingestion** improves performance in longer events by preventing hypoglycaemia and maintaining high levels of oxidation
- **Carbohydrate mouth rinse** has a positive influence on performance – receptors in oral cavity send signals to the CNS which has positive impact on perception of fatigue and concentration
- Recommendations
 - 90 g/h for events > 2.5 hour duration
 - 60 g/h for events 2-3 hour duration



Carbohydrate: Post Event

- Glycogen restoration is one of the goals of post exercise recovery
- Consuming carbohydrate immediately post exercise relevant when next exercise session is within 8 hours
 - 1-1.2 g/kg BW/hour for the first 4-6 hours followed by resumption of daily carbohydrate requirement
- Consumption of foods with moderate to high glycemic index recommended post exercise



Protein



- Exercise induced protein synthesis is elevated for 24-48 hours following resistance exercise & for 24-28 hours following high intensity aerobic exercise
- Protein consumption after exercise enhances muscle protein synthesis (MPS)
- Multiple feedings over the day post exercise may help to maximize muscle growth
- Consumption of adequate energy from carbohydrates to match energy expenditure is important to spare amino acids for protein synthesis

Protein Needs

- Dietary protein intake necessary to support metabolic adaptation, repair, remodelling, and for protein turnover range is 1.2-2.0 g/kg BW/day
- Muscle adaptation to training can be maximized by ingesting 0.3 g/kg BW protein after key exercise sessions & every 3-5 hours after exercise throughout the day
- Higher intake maybe indicated for short periods during intensified training or when reducing energy intake
- In case of sudden energy restriction or inactivity as a result of injury, elevated protein intake of 2.0 g/kg BW/day or higher may help prevent loss of fat free mass (FFM)

Protein Quality

- Leucine has been shown to be an important regulatory activator of skeletal muscle protein synthesis (MPS)
- Whey protein was found to be superior to soy protein and casein in stimulating MPS in both rested and contracted muscle
 - Leucine content in whey higher than in casein and soy
 - Casein is digested more slowly than whey
- Current evidence suggests that a high leucine-containing protein that is rapidly digested, leading to rapid leucinemia and hyperaminoacidemia should be consumed post-exercise to achieve peak rates of MPS

Micronutrients

- Requirements for some micronutrients maybe increased
- Key micronutrients of concern are *iron, calcium, vitamin D & some antioxidants*
- Vitamin and mineral supplements do not improve performance unless recovering from a pre existing deficiency
- Athletes at risk are
 - Those who frequently restrict energy intake
 - Rely on extreme weight loss practices
 - Eliminate one or more food groups from their diet

Fluid & Electrolytes

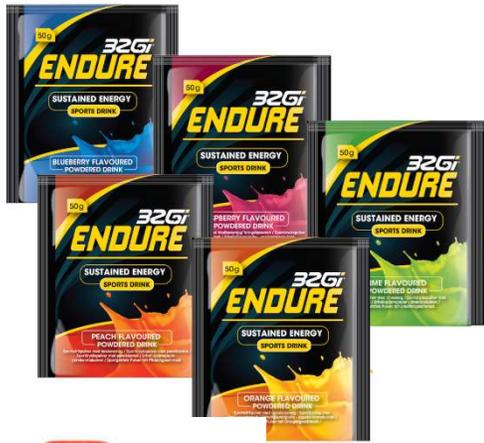
- Important for an athlete to be well hydrated prior to commencing exercise
- Goal of fluid consumption during exercise is primarily to maintain hydration & thermoregulation
- Hydration requirements are linked to sweat loss, which is highly variable and dependent on
 - type & duration of exercise
 - ambient temperature
 - relative humidity
 - athlete's individual response
- Fluid & electrolyte replacement after exercise can be achieved through resuming normal hydration practices.
- General recommendation – 1.25-1.5 L fluid for every 1 kg BW lost by the athlete during exercise

Dietary Supplements & Ergogenic Aids

- Athletes should be counselled regarding the appropriate use of sports foods and nutritional ergogenic aids
- Such products should only be used after careful evaluation for safety, efficacy, potency, and compliance with relevant antidoping codes & legal requirements

Sports Food





Sports Drinks & Supplements
Isotonic
Carbohydrate 6-8%



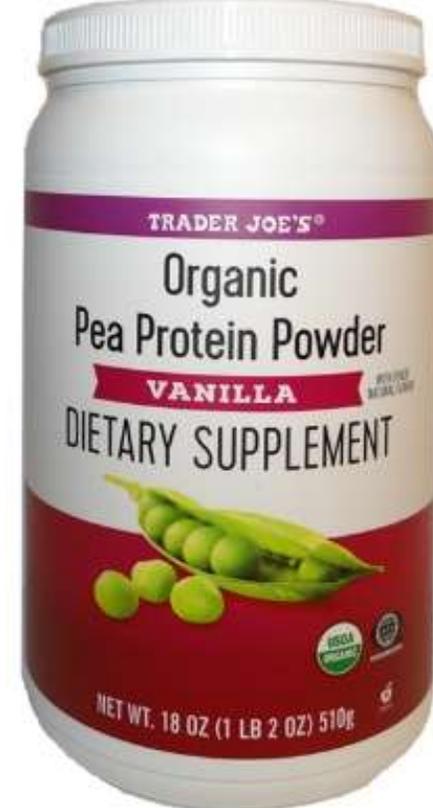
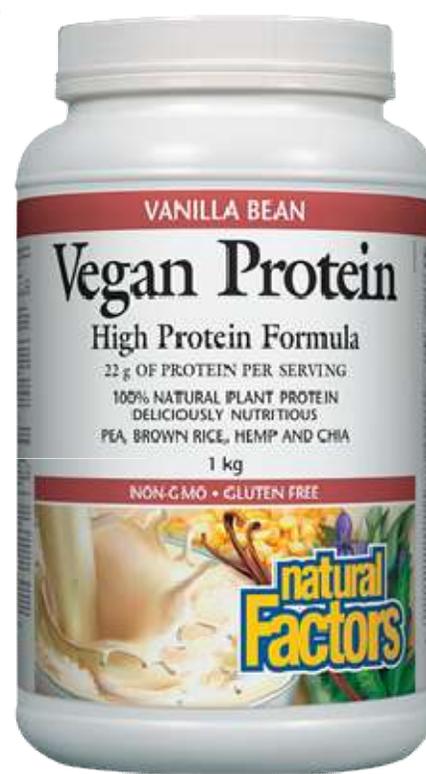
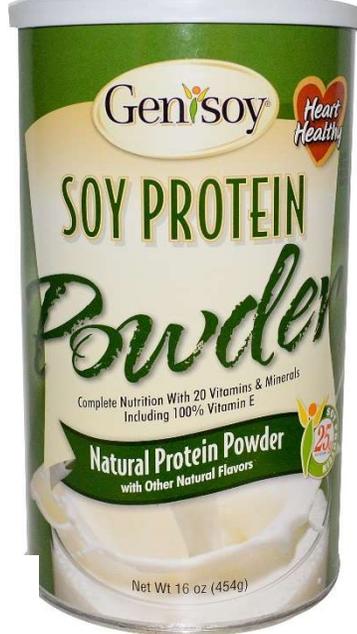
Sports Gels

Endurance & ultra-endurance exercise

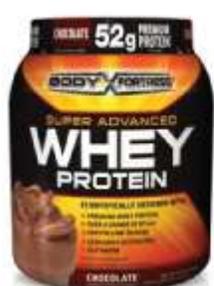
Highly concentrated source of carbohydrate

Easily consumed form

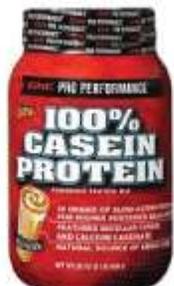
Quickly digested



PROTEIN SUPPLEMENTS DEFINED



WHEY



CASEIN



EGG



SOY



PEA



RICE

liquid derived from production of cheese.

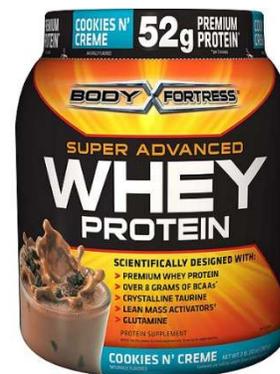
a slower digestive process, derived from milk.

good for the lactose intolerant, egg protein is an animal based protein.

a good vegetarian & vegan option, source is from soybeans.

plant derived protein, great for vegetarians and vegans.

friendly gluten-free alternative derived from rice.



References

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3. Phillips S M et al (2016). Protein “requirements” beyond the RDA: implications for optimizing health. *Appl. Physiol. Nutr. Metab.* 41:565-572
4. Phillips S M (2014). A brief review of critical processes in exercise-induced muscular hypertrophy. *Sports Med.* 44 (suppl 1): S71-S77
5. Phillips S M & Van Loon L J C (2011). Dietary protein for athletes: from requirements to optimum adaptation. *J of Sports Sciences.* 29 (S1): S29-S38
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Thank You
