Eat to Win! Maximizing health and performance in aquatic athletes through nutritional intervention

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Does your aquatic athlete go to training with a full tank of fuel to enhance the adaptation to training? Does your athlete refuel and rehydrate following training to maximize training value and decrease risk of injury and illness before going to school or work? These questions are of critical importance to athlete health and performance, yet the nutritional plan is often left to the athletes and their families who may be lacking in the scientific knowledge of the latest information. Coaches, using widely varying sources and with the best intentions may provide the athlete with nutritional advice that is inaccurate and potentially detrimental.

Improving athlete health and performance is an important goal of the FINA Sports Medicine Committee. One critical aspect in accomplishing this goal is the provision of adequate and effective nutrition. The nutritional plan for most aquatic athletes is often given little to no attention by athletes, coaches and the athlete sport science support teams.

FINA, with the support of Yakult sponsored the FINA YAKULT Nutrition Consensus Meeting in Aquatic Sports in December 2013 in London, England. World leading scientists, nutritionists, and medical practitioners from around the world were invited to address the topic of nutritional intervention in the aquatic disciplines. The sports nutrition scientific evidence for all of the aquatic disciplines was reviewed and discussed. The focus was on identifying best nutritional practices for aquatic athletes based on the scientific evidence.

Topics included in the FINA-Yakult Consensus meeting included:

- Energy demands of swimming
- Training adaptation
- Recovery
- Nutritional supplements
- Disordered eating and eating disorders
- Illness and injury prevention through nutritional intervention in the aquatic sports
- Nutritional strategies for special environments
- Nutritional advice for the travelling aquatic athlete
- Discipline specific nutritional advice for all FINA disciplines of swimming, open water swimming, water polo, diving and synchronized swimming

There are many outcomes from the FINA-Yakult Nutrition Consensus meeting for the Aquatic Sports. A scientific review paper on each of the topics listed above is published in a special
dedicated edition of the International Journal of Sports Nutrition and Exercise Medicine, due to be released in June 2014. In addition, the FINA Sports Medicine Committee in association with Yakult will develop a coach and athlete educational nutritional guide in brochure, CD, and web based format over the next year. These educational tools will be promoted at FINA events, conferences, on the FINA website and in the FINA Magazine.

The FINA-Yakult Consensus Statement on Nutrition for the Aquatic Sports presented below summarizes the highlights of the 2.5 days of discussion and debate and provides many answers and practical advice for the aquatic athlete while identifying areas where further research is required.

**FINA Consensus Statement on Nutrition for the Aquatic Sports**

An effective nutrition plan is critical to success in all aquatic sport disciplines for athletes at every stage of their development. A well-designed, periodised training program remains the fundamental cornerstone of peak performance outcomes, but this will mean little if nutrition needs are ignored. Specialised sports nutrition experts should apply evidence-based science to the intake of key macro- and micro-nutrients essential to the health, physique and performance of all athletes. Coaches, parents and health professionals in the athlete support team should recognise that these needs are specific to the individual and are different for each of the aquatic disciplines. The needs of athletes also vary through maturation and during periods of high energy expenditure, the taper, competition and post-competition recovery.

Strategic intake of foods and fluids can enhance performance in training and competition and help athletes to realise their potential. Specific nutrition strategies should match the phase and type of training, including concurrent endurance and resistance training, altitude, overload and taper. When the training load changes during high volume phases, injury, taper, or in the off-season and after retirement, athletes should adjust their energy intake according to the altered energy expenditure. Recovery after training or competition should address the nutritional aspects of restoration of homeostasis, adaptation to the exercise stimulus and preparation for optimal performance in the next session. These challenges are specific to the session and the athlete's goals and may require a planned intake of key nutrients such as protein, carbohydrate, fluid and electrolytes, particularly in the period immediately after training. Training adaptations can be promoted by the ingestion of about 0.3 g/kg body mass of high quality protein at intervals throughout the day and around training sessions, up to a total of about 1.5 to 1.8 g/kg body mass per day. Carbohydrate intake, both over the day and in relation to training sessions, should be manipulated according to the fuel costs of training and racing, and the varying importance of undertaking these sessions with high carbohydrate availability.
Informed management of body mass and composition is key to ensuring that athletes achieve peak performance, including the meeting of aesthetic expectations. Low energy availability (EA) and disordered eating are concerns for athletes in disciplines that emphasise leanness, such as synchronised swimming, diving and swimming. Athletes in all aquatic sports should practice healthy eating behaviours to prevent low EA and reduce the risk of suppression of the endocrine, metabolic and immune systems that can lead to impaired bone health and injury. Even when a well-constructed and justified program to reduce body fat is undertaken, adequate EA should be ensured. The athlete’s support team should be educated to recognise early signs and symptoms of low EA and disordered eating behaviours.

Aquatic athletes are encouraged to consume a well-chosen diet with sufficient energy, macronutrients (particularly carbohydrate and protein), and micronutrients, to maintain immune function and health. Vitamin D status may be compromised in athletes who are predominantly based indoors. Bone health requires adequate energy availability and micronutrient intake: bone-loading activities, which may be limited in an aquatic sport training program, are also required. Strategies to manage alcohol intake should be developed in the context of the team culture to minimise the negative consequences on recovery and athlete welfare.

The use of supplements does not compensate for poor food choices. Supplements containing essential nutrients may be useful only when a diagnosed deficiency cannot be corrected easily and promptly by changes to the diet. Athletes contemplating the use of supplements and sports foods should consider their legality, efficacy, cost, practicality, and safety, including the risk to health and performance. Contaminated supplements may cause a positive doping test. A few evidence-based supplements may provide a performance benefit for some athletes with no risk to health, but the scientific evidence specific to aquatic sports is often limited or absent. Ingesting carbohydrate via sports drinks, gels or sports foods during intensive and/or prolonged training sessions should be beneficial for performance.

Elite aquatic athletes are required to undertake arduous training and competition schedules in challenging conditions including varying water temperatures, air and water pollution, altitude and jetlag/travel fatigue. Nutrition interventions that might mitigate the negative environmental effects include: adequate hydration, carbohydrate, protein and iron intake while at altitude; manipulation of fluid and carbohydrate intake during races according to the varying water and ambient temperatures; and careful food and fluid hygiene practices when travelling.

Nutrition support in elite sport should be provided by qualified professionals and nutrition assessments should be a key element of the periodic health examination. Proactive nutrition screening can allow early detection and resolution of developing nutrition-related issues. Research into nutrition and aquatic sports is underdeveloped: much remains unknown, but some sound principles have been established. Education of the athlete support team, including coaches, health care providers, parents, and athletes themselves is a crucial step to improving nutrition practices.
Athletes should also be aware of the need for long-term dietary planning to ensure lifelong health and wellbeing and should recognise the pleasures of good food choices.

**Discipline Specific Recommendations**

**Swimming:** Pool swimmers should follow a well-planned training diet with a focus on periodising energy and nutrient intakes to optimise training and competition. Intakes should match requirements for energy and nutrients and be timed to maximise the adaption to each training session. Swimmers should recognise the individual nutrition needs of taper, complex competition schedules and the off-season break.

**Open water swimming:** Open water swimmers are exposed to variable competition and training environments that present unique nutrition challenges. Swimmers should begin races with optimised glycogen stores and in a well-hydrated state. Events may last many hours, so swimmers are encouraged to begin feeding early and to consume carbohydrate (up to 90g per hour according to the duration of the race from a range of carbohydrate sources) and fluid to maintain high swimming speeds.

**Water Polo:** Water polo requires a combination of endurance, strength, power, swimming speed, agility, tactical awareness, and specific technical skills. A planned nutrition approach incorporating strategies to facilitate recovery should be implemented following training sessions and matches, particularly when short recovery times are scheduled. Players should commence intensified training sessions and competition well-fuelled and adequately hydrated.

**Diving:** Divers require a combination of explosive power, flexibility, strength, artistry and courage to achieve success. Divers must ensure adequate energy availability to satisfy the needs of daily training loads by dynamically matching nutrient intakes with the demands of the sport. Nutrition practices should support the achievement of sport-related physique goals, an optimal strength-to-weight ratio, and peak competition performance while assuring good health and well-being. It is important to make suitable foods and fluids available during prolonged practices and competitions to enable appropriate energy and nutrient intakes to be achieved.

**Synchronised swimming:** Synchronised swimming is unique amongst the aquatic disciplines as it requires technical precision combined with a high level of fitness involving speed, power, endurance and flexibility. Athletes must achieve artistic mastery while spending a great amount of time breath-holding while upside down underwater. The aesthetic nature of the sport emphasises leaness, so restricted eating behaviour is common. Furthermore, athletes are faced with limited eating opportunities which hinder adequate macronutrient consumption and contribute to micronutrient deficiencies. Therefore, appropriately timed food and fluid intake which provides adequate energy intake and macronutrient consumption should be encouraged.
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