Preparing a national team for success at major sporting competitions such as the Olympic Games has become a systematic and multi-faceted activity. Sports nutrition contributes to this success via strategic nutritional interventions that optimize the outcomes from both the training process and the competitive event. National Nutrition Programs involved with the 2012 London Olympic Games preparation from the Australian, British and American sports systems involved the following elements:

- development of a nutrition network involving appropriately qualified sports dietitians/nutritionists within a multidisciplinary team,
- recognition of continual updates in sports nutrition knowledge,
- a systematic approach to service delivery, education and research within the athlete’s daily training environment.

Nutrition knowledge and practice advanced over the 2009–2012 Olympiad in various areas and with different levels of evidence base. Examples include strategies which were new (e.g. nitrate supplementation), refinements of previously held ideas (e.g. guidelines for carbohydrate intake during competitive events) or simply a best response to an issue that had become more topical (e.g. treatment and prevention of illness and injury). A systematic sports nutrition program should be underpinned by a strategic plan that clearly identifies core issues, and in particular targets those areas in which a worthwhile performance advantage may be gained. These areas may be determined by special challenges associated with the Olympic environment (e.g. heat, humidity, pollution), background expertise and resources, identification of existing nutrition problems or failure to engage in evidence-based practices, specific issues associated with events in which talented athletes are undertaking, and
<table>
<thead>
<tr>
<th>Phase</th>
<th>Positives</th>
<th>Challenges</th>
</tr>
</thead>
</table>
| Research              | • Collecting information on elite, or at least highly trained, athletes adds crucial information on the general and event-specific evidence base underpinning use of a nutrition strategy in sport  
• Athletes and coaches who participate in research studies gain direct evidence of their event-specific and individual response to a nutrition strategy  
• Other benefits to athletes and coaches arise from involvement in research: enhanced relationship with sports scientist, appreciation of the research process and the development of an evidence base, enhanced training, identification of other suboptimal practices or issues that can be enhanced | • Research is resource and time intensive and may not be included in standard sports budgets and timetables  
• It is difficult to gain adequate access to the highest caliber athletes to undertake optimally designed research projects  
• There are limited opportunities to alter existing training/nutrition programs or collect invasively derived data  
• By definition, elite athletes are few in number; studies may be underpowered  
• Many athletes and coaches do not appreciate the research process; even when they are engaged in a project, they may insist on changes that dilute the research design (e.g. poor standardization of diet or background training, allocation of treatment to the best athletes rather than random allocation; preference for observational research without placebo group or treatment)  
• Athletes may develop career ending injuries and drop out of research or protocols  
• It is unlikely that research will be able to definitively identify ergogenic strategies for every specific event or individual athlete; some practices will need to be determined by intuition rather than direct evidence base  
• It can be difficult to arrange supplies of new supplements or food products in the Olympic environment due to issues with international delivery (customs requirements), Village delivery (security requirements) issues or clashes with official sponsors |
| Implementation of new knowledge | • Athletes benefit from an evidence-based nutrition strategy which directly enhances performance or allows them to achieve better training outcomes  
• Addresses different athlete learning styles which dictate willingness to engage in new knowledge  
• Athletes can receive a placebo effect, which also enhances performance due to the extra confidence associated with having new or special strategies to implement |
an assessment of the likely benefits afforded by new or improved dietary strategies. Programs developed by each country are likely to share some common elements but may also differ in other target areas. Common areas of focus include sound use of supplements and sports foods by athletes [1] and enhancement of recovery after injury [2].

Issues of clinical nutrition support must often be integrated into the performance nutrition matrix. Food service also plays an important role in the achievement of nutrition goals during the Olympic Games, both through the efforts of the Athlete Dining Hall and catering activities of the host Olympic Games Organizing Committees [3] as well as adjunct facilities often provided by National Olympic Committees for their own athletes. A special issue that arose in London Olympics was the coincidence of the competition calendar (July 27 to August 12 2012) with the Islamic holy month of Ramadan (July 20 to August 18 2012). Muslim athletes who chose to fast during the London Olympic period, involving the withholding of all fluid and food from sunrise to sundown, would have incurred both lengthy periods without nutrient intake as well as the inability to eat and drink around exercise sessions conducted during the day according to sports nutrition guidelines. This situation required special catering issues to be considered as well as the development of education resources to guide Muslim athletes to making well-informed decisions about fasting and sports performance [4].

The period after each Olympic Games is spent undertaking a review of the programs and services provided during the 4-year Olympiad and at the Games and the successes and failures of these activities. A summary of the advantages and challenges specifically involved in gaining and interpreting the data from nutrition research activities is provided in table 1. It is anticipated that the next Olympiad through to the 2016 Rio de Janeiro will provide both some clarification of current issues as well as introduce some totally novel ideas and practices.

References