OUTDATED CLASSIFICATIONS

Traditionally, CHOs were categorized as either "simple" or "complex" according to their chemical structure. Simple CHO foods were deemed to be unhealthy and generally not nutrient rich, whereas complex CHO foods were considered to be healthier and more nutritious. These groupings are misleading, however, because many complex CHO foods (*e.g.,* French fries) are often quite high in fat, whereas many simple CHO foods (*e.g.,* fruit and yogurt) are low in fat and are good sources of protein and other vitamins. To avoid confusion and providing misinformation, many professional associations have begun to recommend CHO ingestion according to GI classifications.

PRE-EXERCISE CHO INGESTION

Preparation for exercise performance is multifaceted and incorporates factors such as training schedule, hydration strategy, and timing and amount of CHO ingestion. The *type* of CHO ingested is also an integral part of preexercise preparation strategies, and this issue has been widely researched in recent times. Despite some mixed results, a general consensus has emerged that indicates that certain benefits may be gained from the preexercise ingestion of low-GI (LGI) food (18,20). This is largely caused by the resultant decrease in postprandial hyperglycemia and hyperinsulinemia. This causes an increase in free fatty acid oxidation and possibly better maintenance of plasma glucose concentrations, leading to a more sustained CHO availability during exercise (18).

Some recent studies have provided a clearer picture of the different effects that preexercise LGI and high-GI (HGI) CHO ingestion has on metabolism and performance (14,18,20). For many recreational athletes and fitness clients, fat loss and weight maintenance are top priorities when engaging in exercise programs. Although it has been shown that fat oxidation is maximized when exercise takes place in a fasted state (19), many GI studies have highlighted that there is a distinctive increase in fat oxidation during both the postprandial period as well as during subsequent exercise bouts when LGI CHO is ingested 2 to 3 hours preexercise as opposed to HGI CHO. Initial findings resulted from studies carried out on single foods, but subsequent studies have indicated that a similar metabolic response was still elicited from LGI mixed meals, which indicates that the GI approach can now be applied to more lifelike athletic situations. In some cases, LGI ingestion also can result in improvements in endurance capacity because increased fat oxidation can lead to a sparing of muscle glycogen, which allows for more sustained CHO availability during the course of the exercise (20).

MALE VERSUS FEMALE RESPONSES

Until recently, sports coaches and fitness professionals questioned whether sex differences existed in the metabolic responses to LGI and HGI CHO ingestion. However, it has been suggested that similar to males, a higher fat oxidation rate also is observed in females after an LGI meal ingested 3 hours preexercise (15). Research findings also indicate that for both males and females, preexercise medium-GI CHO ingestion produces similar metabolic responses to those observed after a meal of entirely HGI foods (1).

DURING-EXERCISE CHO INGESTION

As recommended by many exercise and health professionals, athletes of all levels ingest CHO during exercise, mostly in the form of sports drinks or snack bars (Table 1). However, once a standard amount of CHO is ingested during exercise, that is, as used in many research studies, either 2 g CHO/kg body mass (3) or approximately 6% CHO solution, the typical responses seen with LGI pre-exercise ingestion are overridden, and little, if any, benefit exists in relation to substrate utilization and performance (17). It also has been highlighted more recently that fat oxidation during exercise with CHO intake was not different when compared with exercise in the fasted state (7). Performance enhancements that do occur are generally as a result of exogenous CHO rather than from any GI-related benefit (17). Further research is needed in this area to determine the optimum balance of preexercise and during-exercise CHO ingestion that will positively influence glycemic response and enhance exercise performance.

Post-exercise Ingestion

Just as rehydration is vital after exercise to restore fluid balance, food ingestion plays a crucial role in replenishing muscle glycogen stores during recovery. It is important to rebuild glycogen stores as soon as possible after exercise, particularly if