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Eating to Play

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A letter was sent to the editors requesting information about eating around game times. With the new season nearly upon us, it is probably a good time to review some topics associated with nutrition and sports performance.

This has been one of the most intensely researched topics in the sports performance literature and there have been many advances from the "Saturday morning steaks" that dads might remember from their high school football days.

Research can be grouped into four categories regarding the timing of eating: training days prior to competition, day of competition, during competition and after competition. In brief, carbohydrates are the best choice so choose foods that give the most carbohydrate per serving.

Days Prior To Competition
This was the first real focus of study that lead to the "glycogen loading" concept. Without going into a lot of scientific history, the typical routine now is to gradually reduce training volume and intensity while increasing the fraction of the total diet that is carbohydrates. This will help the muscles load up extra glycogen (the main fuel for muscles) for the game.

In soccer, this is not a common practice unfortunately. Most research shows that the muscle glycogen

levels of (male) soccer players are no better than the spectators in the stands - not good.

Studies on soccer players have shown that those with the most pre-game muscle glycogen run the farthest at the fastest speeds during a game. As such, it is surprising to see that glycogen loading schemes have not been as universally adopted in soccer as they have in traditional endurance sports like running, cycling, cross-country skiing and triathalons.

Five to six grams of carbohydrate per kilogram of body weight over a 24 hours period is the typical suggestion so read those labels on food packaging. Remember, 1 pound of body weight/2.2 = kilograms of body weight.

Day of Competition
There is probably no more area full of misleading information than eating the day of competition - the proverbial pre-game meal. Most pre-game meals are eaten in the 3-4 hours prior to competition. But realize that the food eaten will have little to do with the energy expended in the game. That comes from what was eaten in the 2-3 days prior to the game.

Most players eat what they like so they won?t still feel full come game time. Remember that the more calories (i.e. fat and protein) in a meal, the slower the food leaves the stomach. Carbohydrates are always the best choice as fruits, cereals, juices, pancakes/waffles etc. over sausage, eggs, steak, or many choices on the breakfast menu at a fast food restaurant.

Food in general, and carbohydrates in particular, should be avoided in the last hour before play. Carbohydrates stimulate an insulin response which lowers blood sugar and also stimulates the production of serotonin, a chemical in the brain that reduces arousal (makes you listless and sleepy).

Both are obviously counterproductive to competition. If something must be eaten, choose low glycemic index foods as they cause less of an insulin response.

Immediately prior to competition (in the minutes before kickoff), carbohydrates can be taken in. The excitement of the game will counteract the insulin response and the fresh carbohydrates give the muscles an extra source of fuel. The type of carbohydrates is important. Foods should be of a moderate or high glycemic index (see table).

Carbohydrate supplement drinks work great. "Clear" candies (jelly beans, "Gummy" candy, Skittles etc. you get the idea) are another choice. .

Eating During Competition
During the game, carbohydrate supplement drinks given before the game and at halftime have been shown to increase running volume and intensity in the second half in soccer players. This is important to consider because goals become more frequent later in the game as players get tired.

If you have more energy than your opponents, you are more likely to have an advantage over the opposition and hopefully, score more later in the game. As you can see from the table below, the ubiquitous orange slices at halftime are pretty low on the priority as a carbohydrate source.

Eating After The Game
The game uses muscle glycogen (carbohydrate) so it must be replaced. Research has shown that muscle is the most receptive for carbohydrate replacement in the first two hours after exhaustive exercise. Therefore, it is important to eat some moderate to high glycemic index foods in the first two hours after a game.

From the table, you see there are quite a variety of options for food, most of which require a little planning and typically do not come in a bag or a tray from a fast food restaurant. With games at 12 noon and 4 pm, it is necessary to get some carbohydrates back into the muscles quickly.

Remember, fast foods are high in fat and protein and can remain in the stomach at the start of the next game (depending on when it was eaten and how much was eaten) and doesn?t return much in the way of carbohydrates to the muscles, therefore should be avoided.

A nutritionist gave me a good suggestion: make up bags of Chex Mix with some pretzel sticks added (forget the oil and baking requirement) and let the players eat this after the game. Clear candy is also good as are raisins, cakes, pies, bagels.

Ideally, eat 50-75 grams of carbohydrate every two hours until you reach the total based on your weight (5-6 grams/kg body weight).

But don?t get the idea that all the carbohydrate can be replenished in a couple of hours. Under the best of conditions, it can take 20 hours to fully replenish muscle glycogen from muscles that have been completely depleted.

Eating for sports performance requires a bit of planning and clock watching, but can lead to improvements in performance. When done properly, the players will notice they have more energy late in games as well as when they have multiple games with minimal recovery between games.

For more information, try:
http://www.olympic-usa.org/inside/ - USOC website for nutrition information including some sample menus.
http://www.mendosa.com/gi.htm - a complete discussion of the glycemic index.
http://www.mendosa.com/gilists.htm - for a long list of foods with their glycemic index. These last two sites are written for diabetics, but contain much useful information.

Glycemic Index Table
High Glycemic Foods
Syrups (e.g. maple, corn, cane); Honey; Bagel, white bread, jams, jellies; Potato; Most cereals; Raisins, banana, watermelon, pineapple; Carrots, cooked; White rice; Maltodextrin; Jelly beans, Skittles, pretzels, most candy bars

Moderate Glycemic Foods
Whole grain bread; Spaghetti; Corn; Oatmeal; Oranges, grapes

Low Glycemic Foods
Yogurt; Peanuts; Beans, peas; Apple, peach, pear; Milk and milk products.

This sports science article comes from the Sports Medicine Section at the Duke University Medical Center and UNC Hospitals. The authors are members of the US Soccer Sports Medicine Committee including from UNC Dr. William E. Garrett, Jr (US National Teams Physician and Committee Chairman), and John Lohnes. From Duke are Dr. Don Kirkendall (exercise physiologist) and Patty Marchak (athletic trainer for 1996 US Women's Olympic Team).

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