Sports And Performance Nutrition

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Week-04

Lecture-19: Introduction to nutrient periodization

A warm hello and I hope you are enjoying these lectures. In today's topic, we are going to learn about nutrient periodization. So what is nutrient periodization? Having the timing of a certain nutrient specifically to suit the exercise or even thereafter can actually influence training adaptations. So either consuming carbohydrate before exercise or not consuming carbohydrate after exercise can actually change the exercise outcomes. Let us learn more. By now you would have understood that athletes have varied training needs across different cycles for somebody who is a recreational athlete or even for a professional or an elite athlete.

The requirement of a nutrient off season will be very different from what will be during a high intensity workout or in the peak competition season. If you are looking to cut weight or increase muscle glycogen for a tournament, the amount and the type of food that you will consume will change. So similarly on a match day, the exact contrast of what you would do on a rest day prevails. A macro cycle of the entire training period is the longest and of course the goal remains that you want to optimize body composition and health and well-being.

The miso cycle can last up to a few weeks and that could be even the pre-competition season. So in the few weeks prior to the run up to a competition, in the pre-competition season, an athlete can focus on improving the sport specific skill and also training the gut to increase the carbohydrate intake. And in the micro cycle, the athletes focus is on day to day nutrient requirement. From fuelling right to enhancing recovery for the lost glycogen after intense training to optimize the second training session can be the objective here. So how can we manipulate the amount or the type of food taken before, during and after workout to change the training goals? So let's learn more about how an individual or a sports person can manipulate the food be the amount or the timing before, during and after workout.

We have learnt the basic foundational guidelines of how an athlete needs to ensure adequate carbohydrate intake post workout to ensure the recovery of glycogen to making up for the lost fluids, ensuring the consumption of a combination of adequate carbohydrate and protein post exercise can ensure not only optimizing the lost liver glycogen or support the availability of protein for the repair or rebuilding of the muscles. So is it always necessary for an athlete to consume high carbohydrate meals before, during and after and can that guideline change? We know that carbohydrates are the fuel to exercise and ensuring a continued supply can not only lower the rate of perceived exertion, delay fatigue and optimize exercise capacity and in certain situations but not consuming carbohydrates we can lead an athlete into different training adaptations and we will learn about it in just the coming slides. High carbohydrate meals support high intensity exercise. So to ensure that an athlete can handle a higher amount of carbohydrate requires sustained practice to consume high carbohydrate amounts. If you

recollect in the chapter carbohydrates we have emphatically discussed what are the types of carbohydrate, the fast digesting carbohydrates which have high glycaemic index which absorb very fast.

A larger carbohydrate meal can be consumed 3 to 4 hours prior to exercise. If it is a snack, a very light meal even as little as 1 gram per kg body weight which is roughly about even 60 grams of carbohydrate for a 60 kg man which can mean that it can be 1 fruit, a cutlery of curd, 2 slices of bread which is roughly about 60 grams of carbohydrate. One important thing to note here is athletes get very excited about consuming either sugar or a high carbohydrate meal particularly high GI very close to the training time or especially on a match day with the assumption that it gives them extra energy or calories but is that advisable. It is ideal to avoid eating high GI or a high carbohydrate meal very close to training time particularly on a match day. Sugary foods and fluids consumed too close can lead to the release of an hormone called insulin and that can lead to lowered blood sugars which is hypoglycaemia and that will work against you.

So I hope this has been a new learning for you particularly if you are not aware that is best to withhold consuming carbohydrate rich foods especially high in sugar content too close to the training time or tournament. If your goal is to increase exercise capacity not only ensuring consumption of a carbohydrate meal before the workout ensuring for longer duration of exercise refueling the lost blood sugar by consuming adequate carbohydrate either as food or an electrolyte or a energy drink during workout can be also very useful to sustain the exercise capacity. For those of you who find it uncomfortable to take foods such as banana, dates or any high GI food be it even a puffed rice laddu if you are having gastrointestinal discomfort or especially in sports as marathon running where there is a gut discomfort or the urge to use the washroom then it is best to stick to liquid food options be it a sports drink or a protein shake will lighter on the stomach and if you recollect the carbohydrate chapter based on the exercise time we can distribute 30 grams of carbohydrate all the way up to 120 grams by the hour progressing by the each hour. So to remind you again simple sugars as glucose or maltodextrin are fast absorbing carbohydrates and can be very useful particularly during the workout you can ensure about 30 grams of carbohydrate intake between 15 to 20 minutes and keep sipping on these solutions which can be easily absorbed. So maltodextrin is a product got by breaking down starches during intense workout this is one of the quickest way to add energy maltodextrin does not lead to any gastric discomfort and it can be used as an isotonic fluid and we discussed how 6 to 8% solutions can be comfortably absorbed by our gut.

One of the principles for ensuring recovery after exercise is to eat as soon as you can after an exercise session if you recollect the stored amount of glycogen in the liver can last only about one and a half hours of exercise duration. So for anyone who aims to not only recover better after exercise and keep their weight maintained the best time to consume larger meals with heavier carbohydrate content is after an intense session of exercise and here's why. When the body has exhausted the store of glycogen there is an enzyme glycogen synthase which is very high or elevated. So a high carbohydrate meal synced with this enzyme can take all the carbohydrates which is your rice, roti, aloo consumed in the meal and push it back into the liver for storage as glycogen. So all the carbohydrates are siphoned off to be stored as the carbohydrate storage form which is glycogen.

So that can spare excess carbohydrates so to reiterate the prime time to eat high carbohydrate meal or periodize high carbohydrate meals after the training is ideally within that one to two hour of window period when the body can utilize this carb meal back to the storage form in the liver. Similarly along with the carbohydrate consuming a high protein meal which contains at least 25 to 30 grams of protein in that recovery meal can optimize the muscle protein synthesis. A high protein meal can also prevent the breakdown of muscle proteins. So if you are prioritizing a high carbohydrate meal to boost exercise performance or to ensure the recovery after intense exercise. Why would we avoid intake of carbohydrates and who is this suitable for? For those individuals who are looking to cut their weight or lower their fat or for those individuals who are looking to lower their fat mass not eating carbohydrate before during or after workout can be beneficial to meet this objective.

When the carbohydrate intake is low the body switches to a different battery which is fat burning. So low carbohydrate meals increase fat oxidation in endurance exercise. Do note that this is possible only in the low intensity exercise where you are able to comfortably exercise and talk simultaneously where the oxygen supply is constant because fats burn only when there is adequate oxygen supply. Oxygen synthase is an enzyme that optimizes uptake of carbohydrates to make glycogen. So timing a meal immediately after exercise can optimize the absorption of carbohydrates who can benefit by lowering the carbohydrate intake either before during or after exercise.

For those athletes who are trying to lower their body weight or fat mass this can be a good strategy. On a rest day or during off season athletes can approach carbohydrate through a different strategy of manipulation by deliberately avoiding consuming the carbohydrates before workout. You've been hearing of how carbohydrates are the fuel for exercise and you'll be surprised when I say that by not eating carbohydrates to an athlete can benefit by certain influences that it brings out in the training adaptation. Also if you heard of fasted workouts let me explain what it means. Some athletes will not eat anything particularly after an overnight fast and they will do fasted workouts especially in the early morning sessions.

So when an athlete exercises over 45 minutes to 1 hour when the liver glycogen is dipping and through the overnight fasting this pushes the carbohydrate battery to the fat burning battery. So by not consuming a pre-workout carbohydrate snack or a meal an individual can go into the fat burning zone and you may relate to the chapter of energy metabolism where we have studied about the fatty oxidation to how the glycolysis which gives the energy to the athlete. So for an athlete who would consume a lion's share of the food intake as carbohydrates there's a shift to deliberately consuming lower carbohydrate but there's a catch. Fasted workouts or trained low strategies work best when you are off season but for those elite athletes or the professional athletes who compete they need to ensure there is high carbohydrate intake in the peak season or on a tournament day to support optimal performance that's called the train low and the compete high strategy. So that will bring us to the carbohydrate cycling concept.

Consuming high amount of carbohydrates for higher intensity training or even days with multiple training sessions versus consuming lower carbohydrate on perhaps rest days or a single training session perhaps even on certain days through the week in off season to bring about body composition or physique transformation and this carb cycling needs to be personalized to the individual or the athlete what are their body composition goals and which sport do they play and how many days do you keep your low carb intake or cut your calories

and of course when you keep your carbohydrate intake low you also have to ensure that the meals are wholesome with higher protein, good fats, more fiber to give you satiety or a feeling of fullness. If you recollect the protein chapter where I had discussed of how an athlete must ensure even higher amount of protein particularly if he is lowering the carbohydrates so that way the thermic effect or the amount of time taken for the protein digestion can be longer and that can delay hunger and prevent the snacking craving in athletes who lower the carbohydrate intake. Just as we can plan pre-workout meals, intra-workout meals and post-workout meals with high carbohydrates in peak season similarly you can also plan for low carbohydrate intake before, during and after workout to improve the body composition by ensuring days with high carbohydrate intake mixed with days of low carbohydrate intake we can ensure the athlete is fueling well for days of intense training at the same time making the best of low calorie or carb intake for days of low training. So this way making sure there is enough food intake for days of multiple training sessions and ensuring the energy availability we can support exercise and ensure recovery. So by adjusting the type and the timing of carbohydrate we can bring about changes in body weight by not consuming carbohydrates before, during and after exercise athletes can look at physique transformations by lowering the fat percentage and body weight and this can be very useful for several sports in weight category but not consuming carbohydrates can also cause fatigue and lower exercise performance.

Therefore by carb cycling consuming adequate carbohydrates for peak season or for higher intensity workout athletes can improve exercise performance. I hope this lecture was helpful for you to understand how carbohydrates can be varied for different days of training sessions and thank you for listening.