Nutrition is more often than not a completely overlooked part of a young athlete's life. These days, we are bombarded with so much information that it becomes hard to decipher the "helpful" from the "unhelpful". I hesitate to describe information as good or bad because the more I dive into the nutrition research the more I realize that there is not one right answer for every person, young athletes are no exception. I have, however, complied some information that I believe is based on current, reliable research which pertains to our young athletes.

How much to eat?

If you haven't noticed yet, swimming makes your young athlete hungry! This is natural, since they are not only expending a lot of energy, but also growing. Generally, the older the athlete and the higher level of group they are in, the more calories they will need. Without a sufficient amount of overall calories, your athlete will feel sluggish and crabby at practice, school and at home. While there is no magic answer to the question of how much, the University of Minnesota School of Public Health gives the following general recommendation based on age and gender:

	Age 9-13	**Age 14-18**
Female	1600-2000 cals/day	2000 cals/day
Male	1800-2000 cals/day	2400-2800 cals/day

(Source: http://www.sph.umn.edu/pdf/epi/research/HelpingKidsEatBetter.pdf)

In general, the older the athlete the more food he or she needs, boys need more food than girls and the more intense the activity the more food he or she needs (the older the athlete, the more intense the training). In my experience, most adults don't even know how to total their daily caloric intake, which makes it very difficult for a young athlete to know how much 1600 calories is as opposed to 2000 calories, therefore, I don't see much practical value in giving total caloric advice to young athletes. However, if you are worried about your athletes total caloric intake (for example, you see signs of weight loss or gain), have him or her write down everything they ate in a day. Then, together, find a reliable website that can calculate your child's caloric intake for you. There are a number of great websites out there and some of my favorites include http://www.myfitnesspal.com and http://www.livestrong.com/myplate/. Honestly, you should only be worried about total intake if you notice large changes in your athlete's body composition or if they are consistently tired and sluggish at school or practice.

What to eat?

Our food is broken down at a chemical level into carbohydrates, proteins and fats and there is plenty of information that suggests the "optimal" percentages of these three macronutrients for optimal performance in athletics. However, when we sit down to eat a meal, rarely do we ponder, "Well this chicken is 3 parts protein, 1 part fat." Our normal, everyday lives are lived in *foods* not in micronutrients. More important than the macronutrient combination is the type of food your athlete consumes.

I'm a firm believer (based on much extensive reading and research on nutrition) that it is important to eat as *clean* as possible; meaning, eat foods as close to its original source as possible. More specifically,

eat foods that are minimally processed. I understand that this can be hard for young children and for busy lives (as processed foods are often time the "tastiest" and most convenient sources of food) but most processed, pre-packaged foods have far too much sugar and salt to be able to provide sustainable fuel for a young athlete *and* adult. The sooner kids are exposed to clean eating, not only will they be able to fuel their day and their activities, but also, the healthier and easier their nutrition choices will be moving into adulthood.

Regardless, pre-packaged foods are inevitably the most convenient source of quick calories. The best advice I've heard on packaged foods is to check the label and look at the list of ingredients. The ingredients are listed from most to least by volume. If the first or second ingredient is sugar, corn syrup, sweetener or anything suggesting sugar in any form: avoid! These snacks and foods taste good because they are mostly simple sugars and are not long-term, sustainable energy sources. In addition, find foods with minimal ingredients and with ingredients that you can pronounce.

The nutritionists at Core Performance have three simple suggestions for what kinds of macronutrients to eat:

- Carbohydrates: Minimally processed, at least 3 grams of fiber per serving included
- Proteins: Include a lean protein source with every meal
- Fats: incorporate healthy fats (avocados, nuts, olive oil)

Source: http://www.coreperformance.com/daily/nutrition/the-core-performance-nutrition-philosophy.html

In addition, Core Performance also suggests having three colors on your plate at every meal. Yes, that means that fruits and veggies are your *best* source here. Swimmers, branch out and find some veggies that you enjoy because they are the best source of sustained fuel and energy, and they provide you with the added vitamins and minerals that you need for healthy growth and development. Processed snacks and foods will keep you going for the short term, but won't provide the long-term, sustained energy needed for exercise.

When to eat?

In my opinion, this may be the *most* important piece of the nutrition equation. I studied under one of the nation's top researchers in sports nutrition and human metabolism at the University of Texas, Dr. John Ivy. Dr. Ivy has published numerous research studies on the immense benefit of fueling *immediately* after exercise. There is a **30 min window** directly after exercise where your muscles are *most* sensitive to a hormone called insulin. Insulin is the gate keeper to our cells and allows glucose to enter the cells that it attaches to. There is also a very important compound inside our muscle cells (and liver) called *glycogen* which is basically our storage system of glucose. Glucose (a simple carbohydrate) is the major source of fuel during exercise and if your muscle cells can top out their stores of glycogen, your body has plenty of energy ready for the next bout of exercise. Think about it? If your fastest source of energy is already inside the muscle cells, those cells can use that energy *quicker* and use that energy to fuel exercise. If our stores are not at maximum, we must pull fuel from the bloodstream and other

tissue stores which takes time. If I want to make a last push on the last 50 of my 200 to beat the person next to me, I don't have time to wait for that energy to enter my cells. I want it right away!

What does all this mean? It means if we take advantage of this important 30 min window directly after exercise and fuel the body with the proper nutrients, we can *recover* quicker and be ready to maximize the benefits of the next practice! If our young athletes have the maximum amount of energy for the next practice, they have the *best* chance to get stronger and faster each and every day. Sounds awesome, right? Well, what most people forget is that this 30 min window has a time limit! After 30 min, the food you eat may not be maximally going to the muscles and may be going elsewhere. This means, the glycogen stores may not have the opportunity to pack in as much glucose as possible. The best part is that if you take advantage of this window, your body extends the muscle cell sensitivity to insulin for a few hours. As long as you eat a full meal at least **2 hours** after that 30 min window, most of those nutrients are going straight to the cells that need it the most: the muscles.

Now, what is the best food to eat right after exercise? The good thing is that you only need a snack to gain benefits from this 30 min window. Studies show that a snack with **both** *carbohydrates (carbs)* and *protein* in the ratio of **4:1 (carbs:protein)** will induce maximal recovery response. The carbohydrates are important to maximize glycogen stores and the protein is important to rebuild muscles. Again, we don't eat foods in parts of carbohydrates and proteins so here is a list of great food options for post-workout snacks and the approximate carb:protein ratio:

** the following totals may vary by brand and type of food, but are to be used as rough estimates**

	Carbs	Protein	Ratio (C:P)
Non-fat chocolate milk (8oz)	26	8	3.25:1
Greek yogurt + ¼ cup granola+ ¼ cup blueberries	45	19	2.4:1
1 string cheese, 5 wheat crackers, 10 grapes	26	8.5	3:1
1 cup cheerios, ½ c milk	27	7	3.9:1
¼ cup hummus, ½ cup carrots	15	5	3:1
1 slice whole grain bread, 1 oz. turkey w/ mustard, 1 cup apple juice	35	9	2.8:1
Peanut butter on whole grain bread	17	6.5	2.6:1
1 Banana, 1 tsp Almond butter	22.3	4.3	5:1
Hardboiled egg + 11 wheat crackers	22.6	8.3	2.7:1
Instant oatmeal (original) + ¼ cup blueberries	24.3	4.5	5.8:1

As you can see, all these food combinations don't add up exactly to a 4:1 ratio, but they are all in an optimal range to take great advantage of that small window of muscle cell sensitivity and contain the nutrients necessary to refuel and recover. All contain a combo of carbohydrates AND proteins which are required to replace important energy sources used up or lost in exercise and promote muscle resynthesis. My absolute favorite is chocolate milk as it naturally contains a great ratio of carbs:protein AND contains both whey (fast acting) and casein (slow acting) proteins. In addition, low-fat is better for recover than full-fat, probably because the added fat slows digestion (Source: http://www.nsca.com/education/articles/whey-protein-vs-casein-protein-and-optimal-recovery/). To me, chocolate milk is the easiest way to refuel in that 30 min window, as long as your body can digest lactose. For more information on the power of refueling for recovery, this is a great article about Dr. Ivy and his work: Timing is Everything.

In terms of timing of other meals: full meals 3 hours and snacks 1-2 hrs prior to meets or practice is the general recommendation to allow for full digestion and regulation of blood sugar (Source: http://www.cps.ca/documents/position/sport-nutrition-for-young-athletes). Everyone is different though, so find a window that helps *you* feel your best. Again, food as close to its original source is key here. Fruits, veggies, nuts, deli meats, cheeses, wheat bread … be creative!

Conclusion

Nutrition is a tricky subject because each and every person is different. Without knowing your individual genetic makeup and how you respond to foods, we are left to just experiment and follow general recommendations. While I am not a Registered Dietician (and for more specific advice and for actual individual meal planning and prescriptions, a licensed RD is your best and most reliable source), I done extensive research regarding sports nutrition in my Master's program and I try to continue to learn and grow with the current literature. If you take away two things and two things only from this article let me suggest they be the following:

- Fueling with a snack (preferably with carbs and protein in a 4:1 ratio) immediately after practice (within 30 min) is *crucial* to optimal recovery from practice followed by a full meal within 2 hours of the end of practice.
- Eat as *clean* as possible- if you have the choice between packaged and whole foods, always choose *whole*.