>> Okay. So let's move along here. And we were just talking about anaerobic glucose breakdown for stop and go type activity. Now, let's move on to aerobic glucose breakdown. This is –Aerobic, again, is nonstop activity. You're cycling. You're jogging, but you're going for a longer period of time exercising. And to be able to do that, you're exercising at a lower intensity. This one produces 28 to 30 molecules of ATP. So, obviously, you have more ATP. You have more fuel. It'll last you longer. You'll have more energy to exercise. The key here is you're exercising at a lower intensity than you were with the anaerobic. This 30 ATP's will last you anywhere from two minutes to three or more hours. Again, that's the part you want to know about for the test. Aerobic glucose breakdown is for activity lasting two minutes to three hours or more. Like I said, jogging or long-distance running, swimming, rowing, things like that. So just to summarize this, we've got the anaerobic, which is a high intensity, short duration exercise. You're going to produce ATP very quickly but only a few molecules of ATP, and so you're not going to be able to sustain that activity for very long. Aerobic glucose breakdown, you're exercising at a low to moderate intensity versus a high intensity, and you produce more ATP, which is going to last longer for fuel, okay. So let's say you go to the gym and you want to be on the stair stepper for half an hour. If you go like gangbusters and you just go as hard as you can, you're only going to last a few minutes because you're going too intensely, and you're going to burn up your fuel. You have to find that happy medium where you're at a high enough activity intensity to produce an effect but not too high intensity that you're going to run out of fuel. Your book goes through, just summarizes what I just went over, when do you use phosphocreatine versus carbs for anaerobic versus aerobic, oops, versus fat and protein, which we're going to get into in a little bit. Here is what it looks like in your muscle. This is your muscle cell. If you're doing like weight training and aerobic, you do produce the lactic acid, and you're only going to produce about two molecules of ATP. If you're exercising at a lower intensity, like jogging, you'll produce 28 to 30 molecules of ATP. Don't worry about that. It's your book going through some more pictures here. Now do you need to eat while you're exercising and especially carbs? And this is what we're going to get into. And please know this for the quiz. If you're exercising for less than an hour, your muscles have enough glycogen stores for fuel that you don't need to eat, okay. So exercising for less than an hour, you should have enough glycogen stores. But if you're exercising for more than an hour, yes. Let's say you're out hiking for three hours, you're on a long-distance bike ride for many hours, then you have to refuel. Just like if you go on a long car ride, you have to stop periodically and get more fuel, more gas. So for your body, that's usually about an hour. You'd have to refuel. Let's say you're out for a hike, like I said, the amount of carbs that you want is usually between 30 to 60 grams of carbs per hour. And everyone's different. You know, a female's going to need a lot less than a male. And it depends also on how intensely you're exercising. But about that much will help keep your blood sugar levels even, so you don't run out of energy. And you can read the food labels on a sports drink or a sports bar and see how many grams of carbs does it provide. And, of course, you want

the carbs because that's going to break down to sugar, which is what you need to make the ATP. And remember, carbs digest easy, way quicker than fat or protein. So you would bring a sports drink or a sports bar, like a PowerBar. This is for sports. You know, a Kellogg's nutrition morning bar, that's not a sports bar, okay. So read the labels. Now fat for fuel, we do break down some fat stores for fuel. The thing here is we only use fats for fuel when you're exercising aerobically. That's that nonstop activity at a low to moderate intensity, okay. But look at how much ATP you produce, about 108 molecules of ATP. That is a lot more than what you get from carbs. Again, the key is you got to be at a low to moderate intensity. And your body doesn't start breaking down fat for fuel until you've been exercising for about 20 minutes because it does take time for your body to start utilizing fat. So hiking, a long-distance bike ride, again, that's low to moderate intensity. Let's say you go for a bike ride. The first 20 minutes, you're only using carbs for fuel. And then after 20 minutes, 25, 30, 40, 50 minutes, an hour, now you're using both carbs and fat for fuel, okay. But again, you have to stay at that low to moderate intensity. Once you go real high intensity, you're only going to be breaking down carbs. And that's because fat can only break down in the presence of oxygen. So that is aerobic. So just to summarize, anaerobic activity, carbohydrates is the only fuel. If you're going on aerobic activity, jogging, something like that, you're going to use fat plus some carbs. Now do we use protein for fuel? Remember from chapter six, really, why we need protein, why we want to eat it, why our body needs it is to make structures for your body, your hair, your nail, your skin, your bones, to repair tissues and organs, to build muscle. You don't want to be using your amino acids for fuel when you should be using it for those things I just mentioned because something's going to take a backseat. The only athletes that really use some protein is a very long-distance runner, let's say on a marathon or a triathlon. They might at the end start dipping into their protein and start burning up protein for fuel. But in general, we don't break down protein for fuel; however, if you go to the gym let's say in the morning, 7:00 AM, 8:00 AM, and you haven't eaten since the night before, your blood sugar might be pretty low. Your glycogen might be used up or pretty much gone. And if you exercise quite a bit, you might start breaking down muscle tissue for that protein because the amino acids can then convert to sugar, which then breaks down to ATP. So it's always a good idea to eat a little something before you work out. So I know a lot of students do a lot of weightlifting. Just to summarize, the two fuels you'll be using are carbs and the phosphocreatine that I mentioned. The only time you'll be burning fat for fuel while you're weightlifting is in between sets. When you're sitting recuperating is when you burn fat for fuel, just like you burn fat for fuel when you're sitting around watching TV or studying. Any time you do activity, now you start burning carbs. At rest or light activity, you burn fats and a little carbs. Now what should you eat after you work out? And we're going to get more into this. But generally speaking, you want to eat a lot of carbs, a high carb, moderate protein meal. And I do believe there was a test question on that. A high carb, moderate protein meal after exercising, when you combine the carbs with the protein, the insulin actually helps bring

the protein into the blood, amino acids to help build more muscle tissue, okay. So high carb, moderate protein, that might mean a turkey sandwich or a tuna salad sandwich. Mostly carbs and a little bit of protein. This chart, I really like. It shows – If you see down here, the red is protein, orange is carbs, yellow is fat or beige. Weightlifting, you can see here. Mostly, you know, you lift a short set and that's your carbs. And then in between sets, you're burning fat, very low protein. Hurdles, this is an anaerobic. You're going high intensity, short duration. You can see is mostly carbs. That's anaerobic is always mostly carbs. And then basketball, you know, it's a lot of anaerobic stop and go, but there's some aerobic activity in there as well. So you can see it's maybe 60% of carbs and 40% fat, something like that. Again, all this is very low protein. Maybe a little bit more protein, like I mentioned, in a marathoner. At the end, they might break down some protein, but it's about 50-50 carbs and fat that they're burning for fuel. Okay. Again, your book goes through and summarizes when you use which fuel. So I'll let you take a look at that. Great chart to really sink this in. And then, again, there's another chart that shows you the protein in red. We really, even as intensity increases, you don't really use much protein. As intensity of exercise increases, you're using more and more carbs, that's the orange, and less fat. At lower intensities, you use more fat, pretty much less carbs or about equal. Now if you're exercising, you start going to the gym or whatever you're doing, you do need to consume extra calories because that's going to give you the energy you need to exercise. That doesn't mean bad calories. It just means you need food. Now and this is the key here. I believe this was also a test question. If you're exercising for more than an hour day on a regular basis, you're going to need to take in more carbs than the average person because you're going to need to refuel your glycogen tanks. That would be in your muscle and liver. Remember, we store glycogen in our muscle and liver. And if you're exercising every day, depleting those glycogen stores, you're going to have to eat more carbs than the average person. That is why, remember, there's a range for carbs: 45 to 65% of your day's calories. Why such a range? Well, now, this hopefully will make more sense. If you're a couch potato, you don't exercise at all, you should really stay on the low-end, about 45%. But if you're exercising every day, the more you exercise, you know, if you exercise an hour a day, maybe you need 55%. If you're at two hours a day, 60%; three hours a day, 65%. You have to kind of experiment. This is what I go into in the sports nutrition class in the NF110. Okay. So just know that in general. This, you don't need to know for the quiz. And we go into this in NF110. Really, we use more of your body weight to figure out how many grams of carbs you need. So again, you don't need to know this. But keep it healthy carbs, not junk, not cookies and crackers and cakes, but, you know, whole grains, vegetables, fruit, things like that. Your book goes through some examples of different – You can see here, a third of a cup of cooked rice gives you about 15 grams of carbs. And, you know, if you're an athlete, I've had many students over the years that are marathoners or they play on a sport, and, you know, it looks like a lot of work, but you figure it out once or twice what kind of meals will give you how many grams of carbs that you need. So, like I mentioned earlier,

if you're an athlete, you need more carbs. If you're not getting as much carbs as you need, you're not going to have the energy that you should. So if you're running every day or you're lifting weights and you're getting tired, you feel weak, maybe you're not getting enough fuel in the way of carbs. Your fat intake does not need to increase when you're exercising because we all have enough fat. So again, 30 to 35% of your total calories. The main thing about fat, you don't want to decrease it. It's all in the matter of what kind of fat are you eating because we need fat, remember, for your brain and your nerves and to prevent dementia. We need a good amount of healthy fats, the monounsaturated fats and the Omega threes from fish and nuts, the monounsaturated fats from olive oil and nuts. And remember also, the nuts and seeds and coconut oil, real, real healthy. Limit your trans-fats and possibly saturated fats. There's still research on that one. Protein, remember, 0.8 grams per kilogram body weight is what's recommended for the average person, 0.8 grams. But if you are working out, particularly trying to build muscle, then you need more: 1 gram, 1.2, 1.4, 1.6. It just depends on how much you're lifting weights or if you're a football player. Again, you go by body weight or the percent of calories, 10 to 35%. If you don't exercise at all, 10% is fine. If you're exercising, maybe you need 15, 20, 30, 35%. And again, everyone's different. So to get optimal benefits, this is when you want to start looking at how much exactly do you need of protein and carbs, okay. So if you work out, you do need more. Protein supplements, like whey protein powder. Most of us can get the protein we need from food. But if you're having a problem with that, you can definitely buy some of these supplements.