>> Hi, okay so this is chapter 10 on sports nutrition. If this chapter interests you, I do teach a NF110 class that is all sports nutrition. It's taught in the fall, every fall in the Palmdale campus. So a couple things here. This chapter's going to deal with some basic things and then a couple little detailed diet suggestions if you're exercising. You don't have to be on a sports team, but you'll see. I think it'll interest you. And of course I'll go through what you need to know for the quiz. But basically there's two important parts of being good at any sport. Basically it would be your training and then of course also your genetics. You know if you have the genetics to be a quick runner, the way your muscle fibers are, you have an edge. And then of course your training is important. But, what a lot of athletes don't realize is that your diet can harm your performance if you don't eat well. But it can also enhance your performance if you do eat well. And there's a lot also about timing of when you should eat before a performance or before you exercise. So we're going to go through that in this chapter. First a couple of just general health benefits I wanted to mention of regular exercise. You know whether you jog or go to the gym, regularly work out with weights or ride a bike, when you do it regularly, it has been shown to enhance your heart functioning, protect against heart disease, improves your sleep because it tends to honestly wear you out a little bit. Improves your body composition meaning that you would have more muscle and less fat tissue which is just better for general health. It reduces your stress levels. It does help secrete hormones and neurotransmitters that help calm you. It's been shown to decrease blood pressure and cholesterol which is a big concern for Americans. It improves your glucose regulation therefore decreasing your risk of diabetes. And also helping to reverse it if you do have it. Improves your immune system function, aids in obviously keeping your weight at a good set point. Raises your BMR, your basal metabolic rate, which we talked about in chapter seven. And it lowers your risk of all chronic diseases. That's a lot of stuff just from regularly exercising. But how much exercise do you need to get all those benefits? And by the way, your book goes through what I just mentioned there, all the different health benefits. But how much do you need to get all those benefits? You only need 30 minutes a day of what they call moderate intensity activity. So if you wanted to reduce your risk of chronic diseases, heart disease, cancer, diabetes, and so forth, 30 minutes a day of moderate intensity– that means getting your heart rate up a little bit and we'll talk about that. Some people might need an hour a day if you need to lose weight or to prevent weight gain depending on your calorie intake. And then some people need an hour and a half. Everyone is different. So only know how much would be good for you. But the minimum, 30 minutes a day. And then your book goes through– if you have your book, this is a great chart, whether you're doing aerobic type exercise or muscle strengthening or stretching, and they go through some general recommendations [inaudible] you read. Now, what is an aerobic workout? What does that mean? Like if you're in aerobics class or– aerobic workout is important for lowering your risk of chronic disease. Again, it is recommended that you get 30 minutes a day of activity. They're really talking about aerobic type activity. And this is where you are– aerobic basically, as opposed to not aerobic or anaerobic– is nonstop activity for

at least 30 minutes. Meaning you're jogging or cycling, rowing, stair stepping for 30 minutes without stopping. Okay? As opposed to your playing tennis or golf or you're weight training. That's stop and go. So the 30 minutes a day of aerobic is what's recommended and at a moderate level. And this is just FYI, I'm not going to test you on this part, but to determine if you're exercising at a high enough level of intensity to get this benefit, really what you do is you use what's called your age predictive maximum heart rate. So you want to see are you exercising, you know, are you just strolling in the park? I mean some movement is better than none but it's not going to really do much to lower your risk for chronic disease. So to determine your maximum heart rate, you take 220 minus your age and that's called your maximum heart rate. That's the absolute maximum that your heart can beat per minute, okay? And then you multiply that by some percentage. Usually they do anywhere between 60 and 90%. And let me show you on the next slide what that looks like. So in other words, you don't want to exercise at your absolute maximum heart rate, 220 minus your age. So here's an example of a 20 year old to make it simple. You– 220 minus 20 is 200 beats per minute. You wouldn't exercise where, at your maximum where you check your pulse and you're at 200 beats per minute. That's way too hard on your heart. And you won't last long for that matter. But if you exercise at let's say 60% which is a good starting point, 60% of 200 is 120 beats per minute. 90% would be 180 and you can exercise anywhere within that range. Usually people do 60 to 70 or even 80 just for health bene- general health benefits. You can– how do you check your heart rate? They do sell heart rate monitors that you can strap along your chest or on your wrist, but you can also just pause for a minute, count your pulse on your wrist for about 10 seconds, multiply that by six to get you a minute, and see where you're at, you know? If you're at a, too low, let's say you're at 100 beats per minute, that would be meaning that you're not exercising at a high enough intensity. If you're above 180 or 170, wherever you want to be, you might need to slow it down. And, a lot of gyms have charts up so you don't have to do the math, but let's say this chart, your age, let's say you're 30 years old here and you want to see, you want to exercise let's say for heart, for weight management at 60 to 70% of your maximum heart rate. So the math for that would be, you're 120 to 140 beats per minute. And then again you would maybe exercise for 10 minutes, pause for a minute and check and see where you're at. Okay and you could always Google heart rate charts and see if you don't want to do the math. So for overall health you really want exercises that target three areas: your cardiovascular endurance– that would be your heart and lungs; your muscle strength– so weight training; and flexibility, stretching. Some people only do one aspect. They only do the running. They only do the weight training. They only stretch. But it's really good to do all three. And we're going to go through this in this chapter, what type of fuel do the muscles use when you're exercising? There are a lot of factors involved in that, the type of activity. How intensely you're working out is the main one. And then how long are you working out? And we'll go through these. So muscle cells need energy in order to work, in order to contract so you can exercise. Where do they get this energy? We've

talked about ATP in prior chapters and basically it all, muscles must get energy from your food, first of all. It breaks down, it digests, it absorbs. It gets into the, each cell in your body. In this case, muscle cells, into the mitochondria where it converts it into ATP. Okay so let's talk about this a little bit more. Again, our carbs, fats, and proteins broken down to make the ATP. The thing is your muscle at rest, let's say you're sitting down, only has a small amount of ATP at any one time. You never have like just an hour's worth of ATP. There's just a small amount. And as you start to exercise, your body needs to make more. So this is what ATP looks like. You have an adenosine molecule, adenosine triphosphate– tri means three so three– phosphate molecules. And these are high energy bonds. When this splits it produces a lot of energy for your muscle cells. So the amount of ATP that your muscles normally have is enough to have your muscle work for about two to four seconds. That's it. If you're going to do anything more than that, you're going to need to make more ATP. But there is also something called phosphocreatine that is also in the muscle and that can be broken down pretty quickly to make more ATP. And your muscle cells will use phosophocreatine until your body starts making more ATP from carbs and fats which we'll get into in a minute. Phosphocreatine might sound familiar because some body builders buy creatine powder. And the creatine powder combines with the phosphate in your body to make phosphocreatine. It just gives you more energy while you're working out. This is mostly for like weight training or sprinting type work. So the phosphocreatine is used to make ATP. It splits in your body into phosphate and creatine but again what's most important to remember– I think there was a test question on this– is that phosphocreatine provides energy for your muscle but only for activities lasting about a minute. So that would be like a sprint or, whether it's a running sprint or swimming, or you're at the gym and you're doing a set of barbells. You know a set of bicep curls or triceps or pecks. One set usually lasts under a minute and this is when it would be used. And then while you're resting, it allows your body to make more ATP and more phosphocreatine. So again, please remember for the quiz phosphocreatine is used for an energy source for activities lasting less than a minute. And like I said, weight lifting, sprinting, throwing a baseball, jumping. Things like that. Okay, let's talk about carbohydrates as a fuel. We've talked that carbs are your main source of fuel for your body, for your muscles and your brain. Where does it get the carbs from? The glucose is basically your liver glycogen. When you're exercising, your liver glycogen will break down and provide glucose to your blood. And the glycogen in the muscles will break down to glucose for your muscles. So you've got the blood glucose and you've got your muscle glucose. And depending on whether or not oxygen is available to the working muscles depends on how that glucose is broken down to ATP. There's two main forms. We've got anaerobic and aerobic glucose breakdown. Like I mentioned earlier, aerobic means you're involved in a nonstop activity. You're jogging. You're running. You're cycling. Anaerobic is stop and go like weight training. Now, what does this mean, oxygen is available? Well, if you're in anaerobic activity like weight training, you're working so hard and the activity only lasts maybe a half a minute to a minute. Like I said, a set of bicep curls or

something. You're working at such a high intensity and for such a short duration there's no time for oxygen to be utilized to break down that glucose to ATP. Whereas aerobic activity you're cycling or bike– or jogging for half an hour, it's at a lower intensity and your muscles have time to utilize oxygen. So that makes a big difference as we'll see now in a minute. So the anaerobic glucose breakdown, you're working hard for a short period of time, your glucose breaks down to ATP. You only get two molecules of ATP. But that's not very much and that's why, let's say you're lifting weights or you're sprinting, you're going as hard as you can at high intensity but you're going to run out of energy– you got two ATPs, you're going to run out of energy real quickly. And when you're done, you're done. You can't move. If you've ever watched like an Olympic sprinter, you've seen they cross that finish line and they drop to the ground. You're weight lifting and you're lifting that weight and you get to eight or nine or ten reps and you [sound effect] you know a lot of people just drop the weight. You're done. Because you've run out of ATP, okay? You also produce lactic acid because there's no oxygen around. So you've got, what you want to know for the quiz, anaerobic glucose breakdown is a way that your muscles break down sugar or glucose to ATP when you're doing a stop and go activity. It lasts anywhere from 30 seconds to two minutes. That's what you want to remember, okay? 30 seconds to two minutes. The lactic acid builds up and that can cause also fatigue and soreness. So that's another downside of the anaerobic versus the aerobic. Now you can see here this guy's really muscular. He's a sprinter. That's not a long distance runner that'll be real thin. And I don't know what this is. I don't even know if this is possible but, okay, let me stop this part. We'll pick up with part two.