

## **Dr. Mike T Nelson**

Hey there, welcome back to the Flex Diet Podcast. I'm your host, Dr. Mike T. Nelson, we're going to talk all about things to increase lean body mass, better performance, and do it all without destroying your health and improving body composition.

Today, I've got just the solo cast with myself some Q&A. And I'll talk a little bit about the Flex Diet Cert, carbs versus fat for fuel and performance, metabolic flexibility, does your brain prefer ketones over glucose and a few other things want to let you know that the Flex Diet Cert will open up again for enrollment coming up this Monday, which by the time you listen to this, this is going to be June 6 2022. The Flex Diet Cert will open again for only one week -- June 6, through June 13, 2022.

For all the info go to [flexdiet.com](https://flexdiet.com). And it's specifically designed with eight different interventions to maximize nutrition and recovery. We cover all the particular research then involved in each intervention, which range from protein, carbohydrates, fats, and neat. So non exercise Activity Thermogenesis, such as walking, moving around twitching, exercise, sleep, micro nutrition, and fasting.

We cover all of those, we give you the research breakdown for each one, we give you the big picture of the overall concept, which is going to be metabolic flexibility and flexible dieting. And then we also have 40 specific action items. When you go through, you'll know which particular action item to do via the system we have set up. It's a semi flexible program that you can coach a lot of clients through at the same time. And we tell you what are the action items to do.

That's one thing I noticed with certifications in the past, some of the more research-based ones were great synopsis of the research, but you kind of missed the big picture, and you weren't really entirely sure what to do with that information. Some of the other ones that were very practical i.e., they told you what to do tended to disregard the overall context. And what they had to do might not necessarily be the best thing. So if you take a course on a ketogenic diet, they're probably going to tell you just to have everyone do a ketogenic diet. And it can be beneficial for some people, but for other people, probably not the best place to start.

We're doing this in a very flexible approach. You'll learn exactly what to do with each client or yourself if you want to get more advanced knowledge in this area. So go to [flexdiet.com](https://flexdiet.com). And you'll see all the enrollment information there. If you go there, once it's open. If you go there outside of the time, June 6 through the 13th, you'll be able to get on the waitlist for the very next time that it opens. Again, there'll be a contact information there.

If you have any questions on it, you can let me know. And I will get back to you as soon as I can. So enjoy this solo cast here with five Q&A questions. Thank you so much.

I had a few questions here and just wanted to address number one, the why behind carbohydrates being more oxygen efficient than fats. And the second part, which is tied in here, anything related with the Krebs cycle, especially with metabolism of fat. So in the flex diet cert, we do go over the main concept here, in addition to related to metabolic flexibility, is the crossover effect. So metabolic

flexibility, how well can your body use carbohydrates on one end? How well can you use fat on the other end? And how well can you switch back and forth between the two?

We look at something called the crossover effect, which is from Brooks and Mercier about 1992 if I remember right, that says that during higher intensity exercise, we want the ability to use carbohydrates because that is going to provide the most speed and power and performance. However, during the low and moderate intensity exercise or rest, fat is going to be a much better fuel and where these two fuels crossover. If the exercise intensity at which you're burning, 50%, fat and 50% carbohydrates, there's something called the crossover point.

When I was doing research, for my PhD in the lab, we measured a whole bunch of people using fancy metabolic carts, we put them on either a bike or a treadmill. And we could measure exactly where they were using carbohydrates and where they were using fat. This is done by something called the RER, or the respiratory exchange ratio. That's simply just looking at the amount of oxygen and CO<sub>2</sub>.

Because we know that by looking at those metabolic heart uses something called indirect calorimetry, we can determine acutely, are you using more fat? Or are you using more carbohydrates? So back to the question about the why behind carbohydrates being more oxygen efficient than fat. So a couple of things with that, in terms of efficiency, fat is going to be more purely efficient for the amount of ATP or energy that is created for the same amount of fat versus carbohydrates.

Real simply, if you have the exact amount, the same amount of fat, and the same amount of carbohydrates, you will be able to create a lot more ATP by a huge factor with using fat. So some of the people in the low carb keto area will bring up this fact nonstop. And that is correct. Now the caveat with that is that that is only for low to moderate intensity exercise. So if you're doing that type of exercise, then yes, I 100% agree, fat is going to be more efficient. Or fat is almost primarily entirely something called aerobically derived, meaning that it has to use oxygen.

Now where it gets a little bit confusing, we talked about the crossover effect. As you get up to higher intensity exercises. The problem with fat is that it is much slower to create ATP. And if you think about all out high intensity exercise, everything is happening really, really fast. So you need the ability to create energy much faster.

Even though carbohydrates produce the less ATP, for the same starting material, they are able to do it much, much faster. And briefly, they can even do it under what's called anaerobic conditions, or conditions of oxygen debt. Now that gets into a whole bunch of other mechanics etc. But carbohydrates are the best fuel for high intensity, speed and power. And if you want to start really splitting hairs in this area, you can classically it is called use carbohydrates both aerobically and anaerobically.

Now, I've argued before that is a really any true anaerobic exercise, when at the end of the day, everything in my biased opinion is aerobically based. But you can create ATP. Without direct oxygen for short periods of time, I guess you could consider that to be anaerobic. Now, when you look at that fat can only be used aerobically, you absolutely have to have oxygen there. Again, it's a very slow phenomenon to create that ATP.

Carbohydrates, you can do it, quote, aerobic ly and anaerobically. And you are probably going to be a little bit more efficient, classically using carbohydrates aerobic ly than fat. So that might be the question that you're asking there. So where we see data for this is if you look at high performing elite athletes for say, a marathon, they've done some studies, I think it was a half marathon where they blocked the ability to use fat and they did not see a drop in performance.

Now keep in mind, these are high level. I think it was pretty elite marathon runners. So if you are running really really fast, yes, using carbohydrates is going to be your advantage. Now again, if you're just trying to complete a marathon You can probably get by by using mostly fat. To do that, if you want to win a marathon, I don't really know of anyone who's done that at using 100% fat. So in theory, if you start getting out into ultra-marathons, you know, 100 plus miles, the longer the distance, the more fat is going to be probably going to be used in favor. But at the end of the day, even for 100-mile race, the person who crosses the finish line first is still the winner. Speed is still going to be a factor.

Fat is a good energy source does produce a lot of ATP. But it does it slower. Carbohydrates do not produce as much ATP, but they do produce it much, much faster. And the flex diet cert I talk about a condition called McArdle is disease. So McArdle disease is a genetic disease where they are missing one of the cold phosphorylase enzymes, which in English means they have a hard time breaking down stored carbohydrates, they can't use stored glycogen.

And when you put these people on a treadmill, and you increase the amount of work that they have to do, they just get gassed out really, really fast. So again, that's an extreme example, where they can't really use any stored carbohydrates for fuel. But it is some data in humans to show that for higher levels of performance, you want to be able to use carbohydrates. So another reason why I like the concept of metabolic flexibility is it's saying that both fat and carbohydrates are great energy sources. It just depends upon what you're doing at that time.

If we're just hanging out having this conversation, by all means you want to be using fat primarily as fuel. If you're doing some sub Max exercise, I do believe using fat is going to be a better choice for that. Now granted, your body's still could use carbohydrates, but it does not need to. And if you're always skewed towards using carbohydrates or in low intensity, I do believe that has some health implications involved with it. So anything about the Krebs cycle related to fat metabolism, it's probably a little bit beyond the course, the takeaway there is all roads lead to something called acetyl. Co A, and how you get that and how things run through the Krebs cycle is important.

But when you are low on oxygen, or you need to produce ATP very fast, some of those get a little bit short circuited, and the body is going to prioritize speed over the sheer amount of ATP that is produced.

Question number three, what is Dr Mike's perspective on where the aerobic zones reside? So here, the classically we're talking about aerobic zones are zones of which you're primarily using oxygen. Now again, this gets really confusing, because oxygen is going to be the base fuel for pretty much all muscle contraction. So if you don't believe this, like I was classically told that there's a robic and then there's also anaerobic. And that if we put you on a rower, and you're doing, let's say a Wingate protocol, so

you're gonna do 30 seconds, just all out as hard as you possibly can. I was always told that this is an anaerobic event, meaning that for that period of time during exercise, your body is not using oxygen. And what I found out is that you can accumulate some oxygen debt, but your muscle is using oxygen immediately.

First time I saw this, I think was from shout out to Aaron Davis probably six years ago when he got a Moxie sensor. So I saw Roger presented the design and medical devices conference. So the Moxie sensor uses something called nears technology.

And if you've looked at Pulse ox, right, so those little sensors, you stick on the end of your finger. Those are designed to look at the arterial side. And by reflecting a little beam of light off of the red blood cells, we can look and determine how much oxygen they are carrying. Because it is true, they do have a little bit of color change when the amount of oxygen they're carrying is less. So this is the exact same idea. But they put the sensor over the muscle level.

So again, we're trying to look at the flow so to speak of oxygen, or something called smo to say saturation of the muscle and percentage of oxygen, we know that as the muscle does more work, it's going to pull oxygen out as a source of creating ATP. Well, the Moxie sensor does is you can stick it over like one of the quad muscles, like the vastus lateralis, a lot of times the outside quadricep muscle, and you can start a row like a 32nd row. So I've done this here again in my garage since I have a Moxie, and I have a metabolic cart.

And what you see right away is that a nice warmed up muscle in my case, as typically around 85%, meaning that there is a lot of oxygen that could still be used, right, my percentage of oxygen is quite high. And as I started to exercise that immediately started to drop. And by the end of those 30 seconds, you know, I was already down to around 20%, meaning that the muscle is extracting a lot of oxygen right away. So I would argue that even that is kind of more of an aerobic type exercise.

Right? So the argument I made is that most exercises aerobic is just on a certain percentage that we're looking at it. So if we sidestep that, and we go back to what are kind of considered the classic aerobics zones. If we go back and we talk about the crossover effect, right, we know that as you increase exercise intensity, at some point, we are going to see a shift to use more carbohydrates.

We can monitor this on the metabolic cart by looking at that RTR number I talked about, the RTR will be displayed between points seven, which means you're using 100% fat all the way up to 1.0. So 1.0 means that you're using 100% carbohydrates. Now where it gets a little confusing is that you can see our ers over one. Now this is primarily sort of a little bit of an artifact.

Because at that point, your breathing rate is normally very fast. And you are getting rid of a ton of carbon dioxide. And that does whew, the number a little bit more over one. But it doesn't mean that you're using even more carbohydrates, you've already kind of maxed out that system. So other words that get thrown around here all the time are something called a lactate threshold. So lactate, or it's called lactic acid as a byproduct of running carbohydrates really hard through the system. So high intensity exercise.

So lactic acid gets immediately broken up into lactate, which is actually a really good fuel, and those pesky hydrogen ions, it's the hydrogen ions that cause the sort of muscle in this sort of burning sensation, you're literally dropping acid into the muscle. And I go into pretty good depth of this in physiologic flexibility cert in the pH section.

And there are ways you can try to buffer this both intra muscle, so in the muscle and extra in the blood, right. So we see pH changes with that. So in exercise performance, if we want to run a long duration, let's say marathon, we want to stay just below those thresholds. A lot of times this is classically called ventilatory threshold, lactate threshold, VT one, VT two, right? They all kind of talking about the same point, right?

When we look at performance, what is kind of the highest level performance or speed we can maintain without sort of crossing that threshold. Right. And once we crossed this sort of threshold, we see a build up of lactate and hydrogen ion starts becoming exponentially faster. breathing rate goes up, the amount of carbon dioxide you're producing goes up. And these are not a linear response. It's a curvilinear exponential response. So we want to stay just below that inflection point.

A lot of times classically, this is called your aerobic zone. And I do think there is some benefit to training more in your aerobic zone. Right? Phil Maffetone has talked a lot about this, he'll use something called 180 minus your age as sort of the top end for kind of the end of where your aerobic zone would end. If you don't have any fancy equipment. I found that that's an okay approximation. If anything and higher level athletes, it's probably a little bit conservative.

Some of them you know, can go a little bit higher. In practice again, if you don't have a Moxie or metabolic card or anything fancy. I like using nasal breathing as a pretty darn good threshold. So if I can breathe in and out of my nose, and again, this is something you can train. So at first, if you've never done this, your outputs are going to be pretty low.

But after training to more for 468 weeks, you'll kind of reach this maximum just by looking at heart rate, where it becomes really hard to cross any higher in terms of intensity, with just nasal breathing. So one way you can train aerobically I like people to do is cap their performance by the highest intensity they can do by only breathing in and out of their nose.

There is some data on what's called the Old School Talk test, if you want to look at kind of your classic, what they call zone two training, right, so the zones are just different levels of intensity, most of the time that you can get these online that are based off of heart rate. But if you don't know what your true max heart rate is, I found that they can be off by quite a bit.

So do some high intensity stuff and monitor what the all out maximum heart rate is you can get, I would much rather use that number than what's called the carbonium formula, which is just 220 minus your age, the 220 minus your age has a massive standard deviation, meaning you could be plus or minus easy 15 beats away from it. And that will completely change your zones of training. So in practice, I

don't really use that a whole lot. I'll monitor someone and see what is the maximum heart rate they can go, and then we'll kind of do it from there.

In a perfect world, they would use a metabolic heart because we want to look at the actual air that's being exchanged in and out. But if you don't have any of those, I like using nasal breathing. So what's the highest intensity you can read in and out of your nose at so for me, if I'm on a rower right now, it's about 155, I can hold 155 beats per minute by nasal breathing runnings actually a little higher, just because I'm not as efficient at running like around 160. When I first started doing it, like 110 is where I capped out at. So that is something that is trainable.

But you will run into a plateau with that. So I do like just more aerobic based training to build up a good base, especially if your aerobic performance is very low. I'll typically have athletes do an aerobic block for for eight, sometimes 12 or 16 weeks. And then we'll work in a little bit more higher intensity stuff after that. So again, I think it all depends upon what is your goal, what are you trying to do.

And I will also baseline that off of their vo two max test. So if you don't have fancy equipment, you can do a 12 minute Cooper run test. What is the farthest distance you can run in exactly 12 minutes, and there'll be some equations online you can plug that into. Also look at a 2000 meter test on a concept two rower, you can plug that in.

Also, to go on the concept to rower warm up, set the distance for exactly 2000 meters. And then from that, you're gonna go as hard as you can to get the best time over 2000 meters, you know, you're gonna be off a little bit, it's going to take a little bit of pacing, you know, if you feel like you did horrible, maybe do it again one other time, that's gonna get you in the ballpark. And then on the concept to side, you'll be able to plug those numbers in.

And they'll tell you what your VO two max is the volume of oxygen that's maximal, you can run through your system. And I'll also give you normative data there. If you're very low, like in the bottom, 20% or even 50% or below, I will then do more just an old school aerobic block training a lot of nasal breathing, sub max intensity. However, if your VO two Max is pretty good, let's say you're in like the 78th percent of the population.

I don't really I'm not convinced right now you would need to do a ton of old school aerobic zone training. I've had some athletes do that. And when we've tested their vo two Max, it's actually gotten worse. So I think it depends upon where he is the capacity of your current system. Right? So if your max benchpress is 300 pounds, yeah, using 135 all the time is probably not going to be enough of a training stimulus to get stronger. Right. So same idea here.

Question number four. Does the brain really prefer ketones over glucose?

Yes and no. So to me that depends on the biggest question about ketones is are you talking about normal healthy metabolism for a healthy person? Or are you talking about pathologies, diseases or other states? And to me that makes a huge difference and it's something most people online don't talk enough about. They conflate the two all the time.



This is why I created I'll paste it somewhere in here. A flowchart of you know, should I do keto? Which is probably like the second most question I get all the time. And the first question on there is, do you have a pathology or not? Do you have some disease under the care of a physician you are trying to treat? If you do, talk to your doc, because I think there is some evidence that a ketogenic diet may be extremely beneficial.

I did a whole course for the Carrick Institute of clinical neuroscience on the use of ketones for a concussion and traumatic brain injury. So TBI, so if you want info on that course, go to that link there. And argument I made is I think ketones can serve as a really good fuel after you get whacked in the head. So if you get whacked in the head, what happens is a couple of things.

One, potentially, your blood brain barrier can open up. And now you've got all these things flowing into your brain that shouldn't be there, which further exacerbate the inflammation going on. And then to your brain is suffering a massive energy crisis. Glucose Metabolism just gets really screwed up after a hard hit in the head. And ketones can actually serve to help with both of those.

So ketones appear to still be used as a great fuel by the brain, even when glucose metabolism is not working. So well say after a TBI concussive hit. What's also interesting is that some of the ketones do serve as reducing neuro inflammation. This is potentially to four, beta hydroxy, butyrate, and some of the other ones. So it appears that they may have direct anti inflammatory effects on the brain, they do appear to cross the blood brain barrier. And now with the use of both ketone salts and different type of esters, you can get pretty darn high levels of blood levels of ketones very, very fast.

So when I talked the Carrick human performance program, we had people do a 2000 meter row, three different days, that portion of the course was over three days. So we'd haven't come in and do it fasted. The next time, we would give them a ketone esters, we use the original ones from HV mn, and then they would do the RO. And with that we saw, you know, some smaller mammals in the class humans at, you know, levels of four millimolar. So pretty darn high after just consumption of one vial.

Some of the larger people in there, not quite as much, but most people were well over two, which is a pretty high state of ketosis, especially when you consider it occurred only within 20 minutes. So they would do their max two kg row. And then the last day, we did it under a high carbohydrate condition. We did this in the US and then I also taught it over in Sweden.

And while the results are not published, they're definitely anecdotal. When we did see is that, you know, some people did hit a max just fasted, and that was not the norm, but a couple of people did. I don't think we had anyone hit their all up Max after the ketone supplementation. But we did see some of the cognitive tests that were done immediately after were a little bit better in the ketone ester condition. And then most people hit their max after high levels of carbohydrates the day before.

Again, anecdotal, but that data does match most of the other public published data that we've seen. So I do think ketones might be useful under high cognitive load and exercise. Dr. Brad and Egan, Dr. Dom D'Agostino, and other people have published on that. I think the jury's still out a little bit. So for normal exercise performance, for people who are not trying to treat a pathology, again, these are all healthy

recreationally trained subjects. I'm not convinced that ketones are going to be the best for all out performance. In terms of a healthy population, are ketones more preferred than glucose? I haven't seen any data that says that is true. Now, there are a lot of anecdotal reports of people who take exogenous ketones or do a ketogenic diet, and do report that their brain function is a lot better.

I don't really know on that, to be honest, my baseline thought is maybe their glucose metabolism, their brain is a little bit more off than what we think. So if I have a client who reports feeling amazing, after ketones, then I'm going to dig quite a bit deeper and look at how is their own overall glucose metabolism? Is there fasting glucose good? Is there a one C off, we can look at other measures too. If you look at blood stuff, you could look at glyco mark, you could even have them do an oral glucose tolerance test.

Consume around 80 grams of glucose, measure blood glucose about every 20 or 30 minutes over the next a couple hours or two. Again, in research studies, sometimes they'll pull insulin at the same time. And then yeah, so I'm gonna dig quite a bit deeper. And then also, if you're doing blood work, you can get a faster than insulin level, but insulin is quite variable.

I like using C peptide a little bit more. C peptide is kind of a rough approximation of insulin output over 24 hours. So I would dig a little bit deeper, obviously work with your physician if you need to, to see what's going on with that. So I'm not convinced the people who are healthy, the brain prefers ketones over glucose. But I do think in the case of some pathologies, that that is definitely true. So those would be my four answers to that.

Last question, do you talk much about gamma amino butyric acid or GABA?

Nope, I don't really talk too much about it. There is some supplements that do use different forms of GABA that may help with sleep. fondant, Fenty beauty was one of them, which last day heard is being pulled off of the market. There's, I know, companies are switching over to different other forms now. But I don't have a whole lot of information on that. So just wanted to address those questions there.

Thank you so much. Thank you so much for listening to the flex diet podcast, really appreciate it. If you enjoyed this episode, please share it with some friends or family, you can leave us a nice review on the old iTunes or whatever podcast platform you use.

And also to let you know the Flex Diet Cert opens June 6 Through June 13 2022. Go to [flexdiet.com](https://flexdiet.com). For all the information, if it's during the enrollment period, you'll be able to enroll and get all the information there. If it's outside of that time, if you're listening to this podcast later, you can still go there and you'll be able to get on the waitlist for the next time that it opens.

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next week. I've got something really cool that I'm excited to share with you. Anything else I can do drop me a note and check out [flexdiet.com](https://flexdiet.com) Talk to you later.