

# Creatine and Caffeine

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## SUMMARY KEYWORDS

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Hey there. Welcome back to the flex diet podcast. I'm your host, Dr. Mike T. Nelson. Thank you so much for listening to the podcast. We're here we talk about all things to enhance performance and body composition in a flexible manner, all without destroying your health in the process. We've got a whole bunch of really cool guests coming up this month, so stay tuned for that they will be released probably later this month, October and then into November. I'm recording a bunch of them this month. So I'm excited to do that. Today, we are brought to you by me, my website, which is Mike T. Nelson calm. I recently released a new product, which is over 140 video micro lectures that I've done. So in the past, I've used this online software that allows me to do a virtual whiteboard session for you. It does look more like a drunk chicken with a pen and it's hand ran across a piece of paper and yammering about all sorts of science related to metabolic flexibility, mobility, heart rate variability, performance lifting, biomechanics, grip stuff, mtorr versus amtk, all sorts of things. So I have over 140 of these small lectures, they're anywhere from a couple minutes on up to 20 minutes, I think was the longest one that I've done. Some of these in the past I used for teaching at the college level, the college I was teaching at years ago doesn't exist anymore, so I have the rights to use them. And I didn't use any of their material at all. So I've put them all together for you. And you can literally get them for whatever the heck you want to pay me so it's literally a pay what you want. So go to Mike t Nelson comm forward slash micro lectures all one word, Mike t Nelson comm forward slash micro lectures, and there'll be a link, whatever your podcast viewer is around here. And as I said, it is literally pay whatever you want, one time, you'll get access to all of them. And I'm also adding more lectures each month. I'm not sure how long they'll keep doing that. But as of now, today, I just added two lectures on caffeine and two on creatine. And in the podcast today, we'll go over some of those. And for the creatine and caffeine have recorded a myths that you can get on the micro lectures. So go to Mike t Nelson comm forward slash micro lectures. As I mentioned today on the podcast, little solo cast, it'll be a shorter one. But I wanted to give you the two most important things for the use of the top sports supplements to enhance your performance. And as you already figured out the two are going to be caffeine. And the second one is creatine. Now you're probably thinking, oh boy, this is boring. I've heard about caffeine. I've heard about creatine already. nothing really new here. And if that's true, then you can skip this one. And come back. Listen to the next episode. But I still see a lot of people kind of hosing these up. I was just at a commercial gym the other day and saw someone mixing up their pre workout as they were heading into their session. And it wasn't like they had a long warm up. They just didn't do any warm up actually. And by the time I got to the gym floor, they were already well into their working sets. So there are a couple things to consider with these. The nice part about both caffeine and creatine is they are very cheap, and they are pretty darn safe. safety profile of both of them is quite good. Millions of doses of both have been used for decades. You could argue caffeine is probably the most widely used drug. It's been in use for literally 1000s of years. creatine monohydrate as a supplement, most commonly used since about the mid 90s is when it kind of became popular but in the form of food especially in red meat. It's been used For many, many, many, you know, hundreds, probably 1000s of years. So the first one we're gonna talk about is creatine. So as you know, creatine is useful, because it enables you to do more reps, and allows your body at a cellular level to replenish his ATP stores faster. So ATP is your cellular currency that your body needs to run muscle contractions. And we look

in the literature, if you're doing a very heavy lift or something that is a high percentage of your one rep max. creatine allows you to do maybe a couple more reps at that high end performance. Now to some people listening that may not be massive. But if you can do a little bit more work, each time you go to the gym, that's going to be a benefit. The nice part about creatine is the cost or what you need to do to obtain the benefits. Same with caffeine is super easy you to consume it as a supplement. So Dr. Jose Antonio has talked about this a fair amount, that the nice part about supplements, especially the ones that work is the cost to using them is pretty simple. Hey, I added five grams of creatine to my protein shake in the morning, or I drink coffee or I consume the caffeine, the thing you need to do to get the performance enhancement benefit is very simple. So it's a very low cost of action. And that is, I think the biggest appeal of supplements, right? So if I want to train and get a bigger benchpress, I need to benchpress right. And that's going to take time, it's going to take a fair amount of work in order to see those benefits. The appeal of supplements is you can take a capsule pill, powder, portion, potion, whatever, and still see benefits. Now the downside is there's all sorts of supplements that have very little to no data on them. And unfortunately, many of them are not useful. But there are some that have a ton of data, caffeine and creatine being those to a good safety profile. And if you came to me and asked what are the top two ergogenic Sports supplements? Again, we're not talking about the basics. You're already doing macronutrients food, sleep, micronutrients, etc. I would say caffeine and creatine, right? So ergogenic supplements, ergo means performance enhancement, can we increase our performance with the consumption of these two supplements? And the answer is yes.



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So the two main questions are, what form and what dose? So for creatine, the form is pretty easy to answer, what's going to be creatine monohydrate. That is the original form of creatine that was studied as a sports supplement. Shout out to Dr. Roger Harris for all his original work on that. He's also kind of the godfather of beta alanine as a sport supplement to and it's still the original form of creatine monohydrate. There's lots of other forms now from creatine HCl to creatine f Lester to creating this creatine that, and so far, I haven't seen any decent study that has shown that other forms are more beneficial than creatine monohydrate. Now, there are some studies you can find showing that some of the salt forms are possibly equivalent. But I haven't seen any data showing that any of these new forms are superior. Some of them along the way, like creatine ethyl Ester, which does dissolve in water a little bit better. That was its early claim to fame of, Hey, we put it in the glass and you swirl it around, and you can see that the water isn't cloudy, it's dissolved and gone into fluid better, therefore, it must be superior. And what you find out from the studies is that it is not. And in a conversation I had with Dr. Harris at ISSN many years ago, his thoughts were that if your body ended up cleaving the molecules at a different point that that particular form of creatine may have been very toxic. Turns out it doesn't appear to have a high level of toxicity. But a lot of the original studies didn't really investigate that all that much. So and it was shown to not be as effective so luckily it's kind of disappeared from the scene or a little like anything I'm sure it'll probably pop up again at some point in the future. So creatine monohydrate, doesn't really seem to have many issues that are associated with creatine. by other, let's say marketers. Some people say that the bio absorbability, or bioavailability, is not very good, that's false.



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That creatine doesn't dissolve very well. It's kind of sort of true, it doesn't like to stay in suspension and water real well, but as long as you consume it, it does get uptake and does get stored into the muscle. So you can get around that by you know, kind of grinding the creatine into a smaller particle size, which a lot of manufacturers do now, that may help get a little bit more creatine out of the glass into your body. But that's probably the main benefit there. And of course, if you're consuming it, you want to try to get the dose all the way in, you don't want half of it left in your shaker cup, but not really much of an issue. The number one form to use for creatine is the old school form creatine monohydrate. And it's easy to find, it's very cheap, and you don't need to get fancy with it at all. Pretty boring, but that's a works. In terms of dosage. The two main marketed dosages of creatine are going to be the five grams per day, or a loading dose of 20 grams per day. Now, if we look in the literature, they typically compare five grams per

day. And then the loading dose of 20 grams per day is done over the course of five to seven days. And it is true that if we look at the end of only seven days, the loading dose will be a little bit higher. So remember that creatine is stored in the muscle tissue itself. So at the end of seven days, 20 grams per day, is a little bit better in terms of the amount of creatine in the muscle. However, if we look at the end of 30 days, five grams per day, or a one week loading dose of 20 grams per day, and then go down to five grams per day, at the end of those amounts, or even just the single week at a high dose. After 30 days of continually using five grams per day, you're about at the same. So the big takeaway is, if you're in a massive Hurry, and you want to get levels of creatine as high as possible, within seven days, you could argue that the loading dose 20 grams per day, that's usually separated and four separate doses may be beneficial. But for most people, I don't think that's going to matter. Just general advice, I would say, five grams per day, at the end of around 30 days of doing that, your muscles are going to be pretty well saturated with creatine. So that's why we do see differences in performance. Because remember that creatine is something called an ergogenic, meaning it does increase performance. But the mechanism is different than say caffeine. Caffeine has much more of an acute effect where you consume a dose of caffeine within that particular next session within 30 to 60 minutes, you can see an increase in performance. With creatine, it's going to be a little bit more delayed, you need to reach the saturation level in the muscle tissue itself. And to do that, you need a dosage every day over the course of many days. So again, the most common dosage shown in the research is five grams of creatine monohydrate per day, at the end of around 30 ish days, you're going to be fully saturated. Now it is true that other groups of athletes may see more beneficial effects. There is something called creatine kind of non responders. What exactly is that related to? Still a little bit up for debate, but my bias is that these non responders may have already had their levels of creatine saturated. So maybe this is an issue with uptake. Maybe some people can uptake more creatine from their diet. If you're consuming a ton of meat in your diet, you're going to have more creatine, possibly some people can reassemble and create creatine from amino acids endogenously at a faster rate than others, but we do see a difference in populations that don't consume a lot of meat such as vegans, compared to populations that do consume, consume meat. If you are a vegan, and you do opt to use creatine, again, that's up to you. You can debate later if that is considered an animal source or not. Virtually all the creatine now is made via chemical reactions. So I would argue that while it is found in meat, the methods made right now are, in my opinion vegan friendly, but again, you have to see how that lies with your own particular ethics. But if you are a vegan and you do use creatine as a supplement, you're probably going to see a bigger effect. So the first time I use creatine was back in the mid 90s, I was doing my Master's in mechanical engineering up at Michigan Tech. And for a good portion of my time there, I didn't really consume a lot of meat at the time I didn't consume any red meat I do. Now, I did consume fish. And for the first year or two, I didn't really consume much chicken either. So I did not have looking back enough protein in my diet. And when I did use creatine, I did notice a pretty big effect. And that's probably because my dietary basis, my creatine levels in the muscle were relatively low. So adding that as a supplement, I did see a bigger benefit from it. Fast forward many years later, I do consume red meat. Now I do consume chicken, fish, etc. I've gone through periods of time of loading creatine and not loading it. I've gone for like two or three months just as an experiment without using creatine as a supplement to see if I notice any big drop in performance. And I noticed a little bit of a drop, but it's not super huge. I definitely don't notice as big a benefit compared to when I was consuming much lower levels of meat and especially no red meat in my diet. I still generally use it though, because I think there's a lot of other benefits to it. I talk a little bit about that in the micro lectures that I did. There's some very interesting brain effects. There's some interesting health effects. And the safety profile is really good, and it's dirt cheap. So I don't know any reason not to really consume creatine for generally healthy people based on the research. They want to do take about five grams per day. Most days in reality that's probably about five days per week because Yeah, sometimes I forget on weekends. So creatine, best form monohydrate dosage, about five grams per day. So for caffeine, we're switching topics here. This is the other top ergogenic it is extremely cheap, it is effective, and safety profile, pretty darn good.



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Caffeine itself again, I'll refer you to the positions Nan, just look up International Society of sports nutrition position stand, caffeine and exercise performance. 2021. Shameless plug I was one of the I was the third author on that. We

do find the caffeine can enhance many different aspects of exercise performance. We show a moderate benefit of caffeine use in endurance events, movement, velocity, muscular strength, sprinting, jumping, throwing, as well as a wide variety of strength and power in a Robic sports. And the most common question then is what is the form of caffeine which I'll come back to, but first I want to talk about what is the dosage of caffeine.



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Difficult dosage of caffeine in the literature that is reported as an ergogenic benefit. So performance enhancing This is acutely three to six milligrams per kg of body mass. So if you are a 220 pound land mammal, that is about 100 kilograms, so three to six milligrams per kg. We have on the low end, three times 100 is 300 milligrams of caffeine on the high end is six times 100 is 600 milligrams of caffeine. Now that's probably a higher dose than what most people use. But again, there's exceptions there. There is some data that as low as two Meg's per kg. So if you're 100 kg athlete again, that'd be 200 milligrams may be beneficial. What I've noticed with the lower end dosage is it's much more widely variable. Some people will still see a performance increase there, some people won't. Now this does get a little bit confusing because we're talking about acute exercise performance here. For cognitive benefits, you may get by with an even lower dose on the high end. Once you get above around nine milligrams per kg. You start having side effects and an ergo lytic effect. So ergo lytic meaning starting to impair a cued performance to get nine MCs per kg. That is a 900 milligram dose of caffeine, that is a massive dose of caffeine. So for some reference, the typical nodos tablets that you see are typically in the US around 200 milligrams per tab. So if you're at 600 milligrams, that would be three of those. And that's a pretty darn healthy dose. Now, again, individual variation with this is very, very high. This can be from genetic reasons, some people are fast versus slow metabolizers when you consumed it, what type of exercise you're doing. So there's a lot of variables. In general, I tell people to start with as low as 100 milligrams, and then go up by 100 milligrams with each testing. So in a perfect world, you'll be doing this many, many, many weeks out from your competition, you would pick whatever exercise you want to standardize, I like using something that gives me easy data, this could be a set weight for reps, this could be a one rep max performance. I like using the rower a lot, because for power, I'm going to get watts. And I'm going to get time when I get all my performance metrics from it. So I would start low, just that 100 milligrams, do whatever exercise that you're looking to perform and to increase. And then also rate your RP, so rating of perceived exertion, How hard did that feel? Have you rest days, because if you're doing this back to back, you're gonna have some fatigue, which you want to reduce or eliminate. And the next time use 200 milligrams, a few more rest days. And again, maybe the next week, and depending on how much time you have, go up to 300 milligrams, and you're going to keep going up until you see a drop off in performance. So for myself, 400 milligrams for me, right now I weigh as of this morning 230. That's right around my sweet spot. Sometimes I can go a little bit over that. So 450, but I start getting to 500 600 milligrams, I definitely see a drop in performance. So we're looking for the point where you see the greatest performance increase, and where drops off, then you're going to have a pretty good idea of what that amount of caffeine is. Now again, this is not something I recommend use for every single training session. At minimum, I'll do something called a priority training, or I'll pick what is for myself, for my clients, the number one thing, and we may consider using caffeine that I say may because this can increase overall stress. And that's something to keep an eye on. If I have clients who are already consuming some caffeine, and tend to be higher on the stress spectrum looking at heart rate variability for their day to day training. And in their training sessions, I'm probably not really going to have them use a lot of caffeine, before a big event will take some time and we'll figure out what is going to be best for them. Again, there's a lot of variations. Because if you have events like say, obstacle course racing, that are spread out over a time period, or you're doing multiple daily events



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may or may not be as beneficial as compared to a powerlifting event where you know when you're going to perform and you're going to do three lifts. Even with powerlifting, I tend to have athletes only use caffeine for a high dose before what they consider their weaker lift. If you are doing three lifts, and let's say it's a big meat, it's spread out

over five hours, probably don't want to be hitting high amounts of caffeine before every lift, right, we're going to pick the lift that is going to be most beneficial for you. We then use little smaller amounts around other lifts, but we're going to try to have the biggest impact on that one particular lift. So again, it's you know, coaching is also an art in addition to a science. But most people if you're looking for an all out ergogenic performance aid tend to underdose caffeine. Most people I also see tend to use lower amounts probably a little bit too much for most of their training sessions. Again, I think it can be beneficial, but not something I'd recommend people to use all the time. A little phrase I like is that you know caffeine is the credit card asleep. So a lot of athletes I see are substituting caffeine for sleep. So you want to make sure you have all your other basics of course in line beforehand, so that covers dosage. Most common timing is going to be 30 to 60 minutes before exercise form. It appears to me that a lot of endurance athletes like to use coffee for it and I love coffee, I think it is one of life's simple pleasures. However, it is extremely variable in caffeine content. And that's what makes using coffee for a big event and ergogenic benefit quite difficult. The reason that I will then use anhydrous forms of caffeine is because it is much more stable. So by anhydrous caffeine I mean just caffeine as a supplement such as a capsule, or a tablet in hydrous just means no water. So it's literally just the caffeine powder itself. Now in some places online, you can find caffeine in just a straight up powder us kind of made that not really possible so much anymore, because people are idiotic, and we'll take too much caffeine and a powdered form and run into issues. Of course, if you're taking a very high amount of caffeine, you can run into acute issues and if you take too much of it, you can potentially die if you cross something called LD 50. However, that's generally pretty high. But there have been complications with people taking in several grams milligrams several grams of caffeine at once in the form of a straight up powder again, that is highly not recommended. But for that there has been some crackdown on the selling of bulk anhydrous caffeine. In general right now you can still get it in the form of tablets or capsules, they generally around 200 milligrams per dose. So caffeine in the form of coffee has been used. There's tons of benefits to that, especially health benefits associated with coffee. The downside is the caffeine amount in coffee varies widely. So the best study I've seen on this is you can find this in the journal analytical toxicology, volume 27 October 2003, caffeine content of specialty coffees and the main researcher there is McAllister MC see USK are. And what they did is they sent a grad student most likely to Starbucks to buy coffee at the same time, the same size, the same brew for six days in a row. And the reason they picked Starbucks My guess is because bigger coffee chains try to be as standardized as humanly possible. Obviously, Starbucks being the biggest coffee chain, most likely in the world. I think now they do everything they can to make sure that it's a consistent



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presidents or I should say product, no matter where you're at. Now you may or may not like Starbucks coffee, and I think it tastes a little bit burnt is not really my favorite. But when I travel I do drink it. So Starbucks is trying to make everything as consistent as possible. If we look at the literature just in coffee in general, tons of different things affect the caffeine amount in coffee, brew time, the type of bean, so your robusta beans tend to be much higher in caffeine than your Arabica beans. robusta beans in general don't taste as good, although there's different versions now that are actually pretty good. Some high caffeine coffees such as deathwish use a mix of different types of beans and actually tastes pretty good. So the bean type makes a difference where it is grown different amounts of sunlight soil. The roasting method, dark coffees in general tend to be lower in caffeine, some of the caffeine gets decomposed due to heat. Like I said, brew method, brew times water temperature ground Is it fine versus coarse terms of different things affect the caffeine amount. So back to our study here. They went to Starbucks six days in a row. They tried to get the same thing every day in terms of coffee, which they did. And what they found was when they analyzed it by using HPLC, a very wide range of caffeine. So they said quote, notable finding is a wide range of caffeine concentration which varied from 259 to 600. I'm sorry, from 259 to 564 milligrams per dose, right so it's in the same cup of coffee beverage obtained from the same outlet on six consecutive days.



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So in English, what this means is that if you're on the low end, you could be at let's say round up 216 milligrams of caffeine. You could literally show up the next day or the next cup and have almost twice that amount. 565 milligrams if we round up. So that is a huge variation. And if you are trying to use coffee and determine your performance outcome from that the amount of caffeine you're getting is varying widely. So that is why I generally don't recommend coffee for use when you're trying to really dial in your performance. Now again, if you just like using coffee before an average training session, cool, I think that's fine. I do that myself on occasion. But again, if you are a high level athlete, you have everything dialed in, and you're using caffeine as an ergogenic. Specifically, trying to even change by 100 milligram dose using coffee is going to be almost impossible. So that's why I like using the form that isn't in hydrous as a supplement, just caffeine all by itself and taken at the same time beforehand. So there we go. There are our top two ergogenic supplements, both start with the letter C. They're very cheap, inexpensive, effective, have a ton of research on them great safety profile, we've covered the form. So with creatine monohydrate dosing five grams per day. For caffeine, the form is going to be as a supplement by itself or an anhydrous form, tablet or capsule. I prefer tablets because it makes it easier to get 100 milligram hot change in dose. And dosing is gonna be between three to six milligrams per kg. So if you're 100 kilogram athlete, that's going to be 300 to 600 milligrams. If you're a athlete that's half that size, obviously it's going to be half so it is bodyweight dependent. If you want to learn more about some of the myths that are associated with both creatine and caffeine, you can go to my website and get the micro lectures. When I talk about common I have the seven myths with caffeine or three with caffeine and three with creatine and then Anyway, I've got some myths there about caffeine and creatine. Go to Mike T. Nelson comm forward slash micro lectures. Mike t Nelson comm M i c ROLECTUR r e s, and you can literally pay whatever you want, and you'll get over 140 videos. It's just me writing on a whiteboard. So if you want expert penmanship, do not buy these videos. The penmanship is frankly, pretty darn horrible. But I talked about reach mine, so hopefully you can understand what I'm saying. And we've got over 140 videos ranging from everything from effects of testosterone, exercise performance, heart rate variability, daily training, bioenergetics, supplements, behavioural change models, such as the transtheoretical model, videos range in length from as short as a couple minutes to sometimes up to 20 minutes. And you can literally pay whatever you want. So go to Mike t Nelson comm forward slash micro lectures. Thank you so much for listening to the podcast, as always, really, really appreciate it. And we'll be back coming up soon with a few more solo casts and then I've got a whole bunch of interviews once again with other experts. So stay tuned. Thank you so much. Have a great day.