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Dr. Krissy Kendall: Is Creatine Safe for Teens?

Nick Collias: Everyone, welcome to *The Bodybuilding.com Podcast*. I'm Nick Collias, an editor for Bodybuilding.com, and Krissy Kendall, Ph.D., is here. She's the science editor for Bodybuilding.com. Normally we have a third guest, third microphone. Water bottle's the third guest today ...

Dr. Krissy Kendall: Ha ha, go.

Nick: But today, we're going to be enough, reason being Krissy (Ph.D., if I didn't already mention it), our in-house academic has had alarm bells going off like crazy recently when the immensely popular sports supplement Creatine Monohydrate was in the news the other day. Krissy's not just another swole gym rat, she is a university researcher who has been involved in studies looking at the effects of, among other things, creatine. Correct?

Krissy: Creatine itself, yeah. That's actually what got me started, my very first study that I was a participant in, was creatine. It started the whole thing.

Nick: Okay, and this one, the one that was in the headlines, that was on NPR and different news outlets, came from The Journal of Pediatrics. In it, someone posing as a … I think it was a 19-year-old posing as a 15-year-old, called up a bunch of supplement retailers and said, "Hey, I'm looking to get some mass. I want to get big, what should I take?" And the vast majority of them, like 70 something percent, I could be getting that wrong, said, "Take creatine of course." Implicit in all of these stories is a question: Is it safe or advisable for teenage athletes to take creatine? And the answer in most of these stories is they say, "No, of course not." Doctors say teens should definitely not take it, it's a scary supplement. I wanted you … I'm assuming you looked at the study, what stuck out to you when you looked at this?

Krissy: A couple things. One, beyond just how they conducted the research, whether or not if you agree, I mean it's the form of research they used or how they collected the data is a form of deception. It's okay to use, but obviously there are some moral issues with that, right, you are lying.

You're saying you're someone who you're not. But, they did make it clear that even when the retail individuals did not specifically say creatine, if that's what they were looking for, they brought it up themselves. But, they're still using that as a-

Nick: Leading the witness.

Krissy: Yeah, exactly, so that kind of irked me. But, if someone came to me and said, "Hey, I'm looking to increase strength, I'm looking to increase mass." They go through everything and they say, "Can I take creatine or would you recommend it?" Then, absolutely I would. If I went through the checklist and you know if that's what they wanted to say. Now, if I had a 15-year-old that said, "Hey, I'm looking to get in shape." Is the first thing I'm going to say creatine? No, probably not. But, if what they led with is, "I'm looking to take a supplement. I'm looking to take creatine, that's what I want to take. Would you recommend it if these are my goals?" Then, yes, because to me that's someone who probably did the research. If they're an athlete, I'm going to assume that they're eating right, they're on a training program. Sure, you should check with them and make sure, but there's no reason why you can't recommend that to an individual. So, to say that you just had all these people, the first thing, someone picks up the phone and says, "Hi, I'd like to take a supplement." "Take creatine." That's not what happened, you know.

Nick: It was set up for creatine from the start.

Krissy: Yeah, exactly. The other thing that really stuck out to me is they paired creatine with testosterone boosters, or at least that's how it came across reading the article.

Nick: Impure supplement, right.

Krissy: Well, and they put that together. It was when I asked if I should take creatine and/or a testosterone booster. Those are two totally separate things. But, a lot of times, and this is where creatine gets such a negative connotation to it or an idea around it, is that people put a testosterone, synthetic testosterone, a steroid, and creatine, which is a naturally occurring substance, one that our body creates, just not enough, that we want to supplement with it. So, something that's naturally produced with something that is not naturally, or that you're taking exogenously or putting into your body, which could be dangerous, and you're putting those into the same sentence, into the same breath? That's unfair. Why don't we do that with, why isn't someone saying, "Well, vitamin D and testosterone?" Why not, you know? For whatever reason, everyone bullies on creatine, like that's somehow this just horrible one and people relate it to, oh it's a steroid, or it's only for bodybuilders, and I could go on and on about all the potential benefits for it. That was the other thing that really jumped out at me, when they were interviewing other physicians, there was an ER physician that they interviewed. The article did say, anecdotally so, hopefully people understand that that means that's not scientifically shown, there's no actual research data. If it's anecdotally that's just someone's personal experience with it or story to it, or what they've seen. But, an ER physician had a patient come in and complain of symptoms, and of course they pinpoint it on creatine. I'm sure they didn't do a full dietary analysis. I'm sure they didn't go through every single possible thing. Any other supplement, any other prescription, because there's a lot of things that can. When studies have isolated creatine by itself, they have shown time and time again, that it's safe over long-term, that it does not lead to compartment syndrome or swelling. It does not lead to heat intolerance or heat cramps, heat exhaustion, or increase the risk of that. It doesn't lead to dehydration. It doesn't lead to any of these things that people always point to it. They just group it with creatine, and all these other things. Well, all these other things tend to be those things that can possibly cause all these side

effects.

Nick: Including, yeah, pre-workouts, testosterone boosters, all types of herbal supplements. Fat-loss supplements. Who knows? Who knows what somebody's taking.

Krissy: Who knows what's in there? Yeah, but they just pull out creatine. That's the one that they're going to pull out, every time.

Nick: Creatine is not a banned substance, but implied in some of the coverages, this is a bodybuilding supplement, it's not something that normal people take. Is that accurate?

Krissy: Yeah, and that's unfortunate too. We typically just see it with athletic individuals. I wouldn't even say bodybuilding because a lot of what it is it's just a strength … so, I would say anyone athletic. But, I mean its purposes go way beyond that, and they've done these great studies looking at older individuals and showing how it maintains muscle mass, muscle strength, bone density. When you look at past year's … okay so now I can bench 225, 250, whatever, but now my 80-year-old grandmother can put her groceries away, can get in and out of bed without problem, reduces the risk of falls and fractures and all sorts of things. So, its applications go way beyond. For whatever reason it does tend to go more towards athletics, because it's performance benefits on strength, high intensity performance, on muscle mass. I mean, those … blown out of the water and time and time again it is the most effective supplement for that, but we are showing other things that it can be used for as well.

Nick: Let's talk specifically about teenagers though, because there was some implication in some of the coverage that I saw that, "Well, that's all well and good for you when you're 21, or you're even 19, but when you're 17, your body is not ready for exogenous creatine."

Krissy: Yeah, and that to me- okay so, and I go back to when it grouped it with testosterone, and I agree. You should not be- well, that's someone's personal decision if whether you want to take testosterone or not. But, especially when you're dealing with a teenager, a boy, a male teenager, who is potentially going through puberty either right before, right after. Hormones are changing, testosterone levels are fluctuating. By potentially manipulating what your body is producing on its own, it could have long-term effects. If you're taking something that could affect how your body naturally cycles testosterone, or its natural production of testosterone, that could have long-term effects and I would definitely not do anything that deals with that. Especially during maturation or puberty, during those times.

Nick: Crucial hormonal period, right.

Krissy: Exactly. Creatine has no effect on that. No effect whatsoever. No more than what a bout of resistance training would do, or anything else that could possibly, or eating saturated fat could influence testosterone levels. Anything else that might influence testosterone, like there's nothing that's going to directly increase or decrease testosterone levels. What I will say is, if you're dealing with a 15-year-old who is just, maybe they for the previous 14 and a half years not active at all, but now they want to go out and start being part of a group sport or something like that. Yeah, they probably don't need to from day one take creatine, and I would tell the same thing to a 30 year-old, or 40 year-old, who they have been sedentary their entire life. Do they need to take supplements on day one? Probably not.

Nick: Activity is your supplement.

Krissy: Exactly, they are going to see so much with just altering their diet, manipulating their diet and their training, and their physical activity level, that yeah probably for the first few months they're going to have great changes and positive benefits with just manipulating those two. But, if I have a 15-year-old who has been in competitive sports since third grade, or whenever you can start putting kids into sports, or who is-

Nick: Or, who is regularly lifting.

Krissy: Regularly lifting, then there is no reason why- I would rather give my child five grams of creatine, then say I need you to eat two to three pounds of raw meat in order to get five grams of creatine. It seems a lot safer to give them a teaspoon of creatine.

Nick: Mm-hmm, sure. Now, are there any studies specifically investigating the effects of creatine on teenagers?

Krissy: Teenagers, I would have, I'm not as clear on teenagers, but younger kids I do know. Most of those are case studies. The reason for that being for any research study to get approved it has to go through the Institutional Review Board. It's just a standard procedure and it's difficult, and I can appreciate that process. It's very protective of women, it's very protective of pregnant women, of children, of elderly, and it's very rigorous trying to get a study approved. That's why we don't see very many studies in women, for that main reason. It's very difficult to get those through the IRB. Menstrual cycle and things like that can affect results, and they just want to protect and not potentially put a woman at risk for anything where it could- and then ultimately, the data's messed up because oh, she was on her, a week before her menstrual cycle, the hormones are messed up now and you can't use any of her data. And, we just put her through all of this.

Nick: Similarly, protective of teens as well who are developing.

Krissy: Exactly, but with that being said, there have been studies where they've given creatine to babies, 1-year-olds, as a neuro-protective benefit. And pregnant women, as well. Because, there are studies … and it first started, most studies any time with dietary interventions, or supplements specifically, usually starts in animals, rats. We found that creatine has a neuro-protective benefit, especially with traumatic brain injuries. Huge for contact sports. Kids play contact sports. They start with Pop Warner, Pee Wee football, and that is, you've got young kids who are playing. Soccer, too. Contact sports, and their increased risk of concussions. That's a big push for me, too, is when people are saying, "Don't take creatine." We are starting to show that it has a neuro-protective benefit, and that's been shown in as young as 1-year-olds. No, we did not inflict brain injury on these. What we did, it started in animal models, but then what we've been able to show is when young children have been brought into the hospital with traumatic brain injuries, or with a head injury, and they were giving them creatine, they noticed that those who had creatine their number of days in the hospital were reduced. Because of, the swelling in the brain went down and the recovery in the brain, in the neurological function, because creatine can be considered in the class of nootropics, so it has some cognitive, some memory benefits as well. It reduced the number of days stayed in the hospital following a traumatic brain injury or head injury, concussion. So yeah, again, I think of all the kids that are playing sports these days, all the kids that are having concussions. My cousin, second cousin, just had one, and immediately I told my cousin, "Oh, he needs to be taking creatine." Just, beyond any potential strength benefits, he's a football player it might benefit him as

well, but it's just yeah protecting his brain as well.

Nick: So what about the person who says, "Well, we don't know the long term implications." You've got a kid started taking this, who takes it for five years, maybe there's not, are there studies that are addressing the long-term implications of usage?

Krissy: Yeah, so I know [Dr. Richard] Kreider, he's at Texas A&M right now, but when he was in Memphis- the longest I believe right now is two years. And again, it's hard, because you know trying to tell someone to do something every single day for an extended period of time is very difficult. But, when he was at Memphis University, in Memphis, him and his colleagues had the football team taking creatine every single day. The longest study is right around two years, that we have again no detrimental effects, no blood markers, no negative changes to blood markers. Liver changes. Renal or kidney changes. You know, my biggest thing with this is, if you don't want to give your kids creatine don't give your kids creatine, that's fine. But, don't give it this bad rap, or bad name, or say that is has- I can tell you if you gave someone ibuprofen for two years straight. Do we have clinical data that says if I gave my child ibuprofen every day for two years, or if I gave my child a, this every single day for two years, or for three years, do I know it's safe? I don't know that we have data even on things that are regulated by the FDA, every single day. That's very difficult to do.

Nick: There was one interesting thing that I might recall seeing from one of the stories was the suggestion that, well the creatine itself might not be the problem, it's that it's probably tampered and it has steroids in it. If the creatine was pure it would be okay, but it's probably not because it's a supplement, it's a nasty supplement. How do you interpret that comment? It seems a little contradictory, you look at it and you say, "Oh, creatine's the problem." And, then they say, "Well, creatine maybe isn't the problem, it's the stuff that's in the creatine."

Krissy: Yeah, and again, it's just this whole idea that the whole supplement industry is corrupt. That we will do whatever to make a dollar and put something on the shelf. First of all you know, and we've had this discussion before, yes, you can put something on the shelf, but at that point FDA has every single right and they will investigate a product that's on the shelf.

Nick: That happens ...

Krissy: A lot.

Nick: Daily, right.

Krissy: Daily, yeah, so if something is mentioned on the label, or if you have your ingredient, you know a claim that's on the label, or the ingredient list itself. If the FDA tests that product and either finds that the ingredients do match what's on the label, or the claims are not substantiated by what's in the product, they'll pull, or send a letter to the company to pull the product, or there's legal ramifications to that. Yes, you know, anything runs the risk of being contaminated, but within the supplement industry there's certifications, there's testing that you can do. Be a smart consumer, look for labels that say good manufacturing practices, GMP, you know where those products are being manufactured. That the machines are being sterile. That in between, if a manufacturing plant is in charge of processing and manufacturing multiple different products or supplements, if its following GMP or good manufacturing practices they should be cleaning, and keeping everything from cross-contaminated. You can also, if you're an athlete, and most are interested in taking creatine, you don't want to take something that's banned because then you could get in trouble. So, you look for NSF,

or a … WADA certifications, World Anti-Doping Agency certifications. The supplement industry does have regulations, it has certifications, and you can look for that. You don't have to be sketchy about it and find some random Internet sales place. Anything can be contaminated. I remember you know, when we said that, my first thing is, well spinach has been contaminated. FDA regulates-

Nick: Chicken, ice cream sandwiches. Right.

Krissy: Peanut butter, contaminated. Anything can get contaminated. Yeah, so absolutely, and again it's not the spinach that makes people sick, or that could possibly kill someone, or the peanut butter. It's the bacteria in it. Just like, it's whatever happens to get into a product that ...

Nick: So, with creatine, does the, you know all of these safeguards that you're talking about, do they just make it so that it's all of a sudden an incredibly expensive supplement that's way out of the reach of a 16-year-old?

Krissy: Yeah no, creatine is the cheapest!

Nick: That's what it seems like.

Krissy: Yeah, that's what I tell people.

Nick: That's one concern. On sites, you can buy a huge bottle, $10, with those safeguards in place, it seems like.

Krissy: Yeah, and that's the thing too, we're not- you look at some of these other products and some of them will be 50, 60, 70 dollars for a one month supply. I just bought a thing of creatine, which, you know, 10 bucks for, gosh I think it's like a three or four-month supply, I don't know it's crazy. It's the cheapest supplement out there. Has the most data to not only support its effectiveness, but its safety. That is, again, all age ranges at this point. I will challenge anyone to find a clinical paper, where it directly pinpoints creatine as a cause for renal failure, disease, kidney or liver, muscle cramps, compartment syndrome. Because, I have a list, and I have more, and I will say, and I can show you all of these meta-analyses, review papers. Actual double-blind, placebo-controlled papers, that have shown that it is not dangerous. It's not unsafe to use.

Nick: What about things like panic attacks, and psychosis, that you hear about as well?

Krissy: Yeah, well you know, I always get comments on articles. We just published one about *Why Women Should Take Creatine* and someone's like, "Well, I get acne every time." I don't know why you get acne. You know, there's always that one or two. Everyone can react a little different. I don't know how to explain that.

Nick: But the research doesn't speak any of it?

Krissy: Yeah, I think some people probably could take something else and have some weird, and it might be in their head or not. I don't want to come to any judgements, but it's ...

Nick: Right. So, what would have made this study better?

Krissy: For one, I think if they would have included someone who has done research with creatine,

would have been nice. No one- so, they had the pediatrics, the, like you mentioned the- or, it was published in The Journal of Pediatrics. The lead researchers have never published or done anything with dietary intervention, supplement interventions, working with athletic populations, have never done anything with creatine. Like I said, the ER physicians, again, nothing to do research with creatine. All of the other outlets that publish or talked about this, again, did nothing to bring in another viewpoint in. To say that a study- I'm not downplaying any of their findings. There are studies all the time that they might find something that's different than what other studies find. That's why we do research, to come up with new things. But, that doesn't mean you ignore, or you brush aside what 30, 40, 50 other papers have shown. Which is that it can be safer, you know. To just completely ignore that, or just not present any side to that, would've been- it would've been nice to see that. Or, to explain, or even just to separate the creatine and the testosterone boosters, that really irked me. That's a big one that we see a lot, and it wasn't that long ago that there was another paper that came out that grouped creatine with a group of other dietary supplements that included testosterone boosters, and then all these other things that I can't even pronounce because I don't even what, you know how to say them. If we're going to always bully this one, let's isolate it and look at it individually. Because, we don't do the same. No one ever says anything like that about beta-alanine. Or, branched-chain amino acids.

Nick: Aside from, "Hey, that thing doesn't work." Or whatever, yeah.

Krissy: Yeah, and everything that they presented as far as, "Oh, this one patient had this or that." None of it was research-backed. There was no data on it.

Nick: That seems like a big problem. It's based on what, just on legend and rumor?

Krissy: Yeah.

Nick: Anecdotes.

Krissy: That's the thing. If you were super against something, let's say that I was totally against the keto diet. I just hated it. Someone came in, and I was an ER physician, and someone came in and said that they were feeling horrible and da, da, da. In my initial thing I paid no attention to what their training, what their diet, what their supplements were, but they told me that they were following a high-fat, low-carb diet, and then I just jumped and said, "It's the keto diet. It's killing you." That might be a little dramatic, but that's what they're doing. Without looking at anything else and just assuming that it's 100% that, based on you know, because keto diet's getting a lot of attention. To assume, to just harp on one thing and to not really investigate anything else. It can be somewhat dangerous because like I said, going back to creatine and compartment syndrome.

Nick: Which is?

Krissy: Compartment syndrome, around your muscles and certain areas you basically have a sheath, or like a connective sheath, and the muscle underneath can swell or get inflamed in, to the point where your blood vessels, and you have fluid accumulation, and causing the area underneath that sheath to swell. Can be very painful, can be very dangerous. It typically happens in extremities, so you think the lower leg, or the arm. There have been isolated cases where people have said, "Creatine." But, what's interesting is that when you look at those, and there have been a few times where people have really dug in to figure out is this really creatine, what they've found is that those individuals, I know there was one case study where initially they said creatine, they did a heinous

workout. An absolutely heinous, heinous workout. Like, rhabdo to the extreme. And, they blamed it on creatine. Without looking at blood markers and all these other things.

Nick: Just pure choice, the choices this person made.

Krissy: Yes, so we have this mindset, it could be somewhat dangerous, because we're not looking at all these other factors. If we're just going to say its creatine, and then they keep doing this type of workout or whatever- you know, that's again one example but, if we ignore all these other factors and we have our blinders on to it, we might not be picking up on some of these other issues. That's what happened. The same thing, like you know it's been shown to cause issues with thermo regulation. It's quite the opposite, and it's been shown to be beneficial if you are training in hot, humid weather, because it helps with water retention, especially if you're doing a higher dose. It pulls water into the cell, so it actually has a beneficial effect for thermo regulation.

Nick: Okay, so it doesn't cause dehydration, it actually can prevent dehydration, or help work against it.

Krissy: Exactly, and so when now people are saying like, "Creatine causes dehydration." It's like no, something else is, and you should probably look into seeing what that is. Whether that's you're not drinking enough water, do you need to modify your training, when you're training, the time, the location. Are there other things. Let's say you just take out creatine and do everything else the same, you may not be fixing that, and you may be at another risk for dehydration or another heat illness.

Nick: I've seen statistics, and I forget where this is from so I could be getting it wrong, saying that somewhere around 75% of competitive collegiate athletes in different disciplines actually take creatine. So, speaking to a parent perhaps of a student athlete who thinks, "Well, I don't know if my son or daughter is taking it, but they could be. Do I have something to worry about if that's just part of the athletic culture?" Do they have something to worry about from creatine most likely?

Krissy: Yeah no, I don't, no, I would say no. I don't think it's a gateway drug to anything else, you know what I mean. I don't think it's like oh, you start with creatine, where are you going to end up next? I think some people think that way, too.

Nick: God, the supplement world, the dark underbelly.

Krissy: Start with the easy stuff, and then go somewhere. I would just, as a parent, I would just want to make sure, I'd be like, "Well, what are you taking?" And, that's a lot you know, I'd want to make sure that they're taking creatine monohydrate, that's what I take and that's what I'd prefer my child to take.

Nick: As opposed to Johnny's mystery blend.

Krissy: Creatine HDL, creatine nitrate. The reason for that is just because the research has been in creatine monohydrate. I'm not saying creatine nitrate or creatine HDL does not work, is not great, whatever it may be, but we don't know the correct dosing yet because there's not been enough research on it. Is one or two grams of HDL equal to three to five grams of monohydrate? I'm not sure. That's the reason for my monohydrate, so again, just making sure that, and because student athletes are, depending if they're at collegiate level or higher, they could get urine tests or blood tests. I would just want to make sure that they're taking ones that are certified WADA, NSF.

Nick: There are a lot of products out there that are sort of the muscle blend, that's got a bunch of stuff and creatine in it as well. You're saying go for the creatine instead, especially if you're a drug-tested athlete.

Krissy: Yeah, and a lot of them under-dosed too. The reason for that, some of them, because you'll take a pre- and a post workout, and the pre will have some and the post will have some. You take them together and you get your five grams and that's great. But, if you're only taking one or the other, then you're typically not getting enough. If you're a college student you don't have all the money in the world to take all these supplements, but yeah, then you're also taking potentially a list of other things that you're not quite sure. Some of them could very well be safe, there are some great pre- and post workouts out there. If you've got beta-alanine in it, and some of them are formulated great. Then, you have all of them in one. If you are not sure on the dosing what all of them are, just get a tub of creatine and mix with anything that you want. You can take it any time during the day. You can take it pre workout, post workout, in the morning, before bed, in the afternoon. It doesn't matter. That's the other nice thing about having it on its own, you can just take it whenever you want. You don't have to take it with 200 milligrams of caffeine in your pre workout. So, it's like I forgot to take it, now I'm going to take it before I go to bed.

Nick: Before bed, right exactly. Okay, well you heard it, Krissy's challenge, come up with the science. Prove her wrong.

Krissy: Yes. There you go, I'm willing to take on anyone.

Nick Collias: She's got a list of references, I'm looking at it over here, this is a piece of paper, just nothing but creatine references. So, she's ready and waiting everybody. Thank you for listening, and I hope we were able to provide some clarity.

Krissy Kendall, Ph.D.: Yes. Awesome, thanks guys.

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