

Written Transcript On The Line Episode 1.2 “Rhabdo”

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Charlie Palmer: Welcome to On The Line a podcast for today's wildland firefighter brought to you in part by the black. I am, Charlie Palmer joining me again today, our doctors Brent Ruby and Chuck Dumke and our engineer, Mike Matthews. We're going to tackle rhabdomyolysis today. Rhabdomyolysis. You say potato. I say potato. Is there a proper way to pronounce this thing? People just say Rhabdo.

Chuck Dumke: I guess I, uh, I always say rhabdomyolysis (Rhab-dough-my-ALL-is-sis), but it's not like you don't know what you're talking about. If you say it slightly differently, it is a potato potato thing, but the word itself is kind of interesting. It describes a muscle cell breakdown, which is what it is. So rhabdo is kind of the cylindrical definition of what a muscle cell is. It's a long cylinder of contractal proteins. Mio is Latin for muscle and lysis is breaking down. So that breaking down of muscle can happen in a lot of different ways and you'll often hear of exertional rhabdomyolysis and that essentially refers to ,while exerting or exercising, you create muscle damage. Now one thing I think that is kind of misconstrued, there's a lot of information out there on this and most wildland firefighters have heard of Rhabdo and we'll probably just use that abbreviation for the rest of the podcast, but you get sore and a lot of people get sore and you know, is that Rhabdo and when does soreness become rhabdo? And you kind of have to think of it as a continuum. Muscle soreness is what we research in the lab and both Dr. Ruby and I have done research studies on muscle soreness and what creates it, what improves it, how do you recover from it, all these different things, but you can't really study rhabdo. Rhabdo is a clinical condition that essentially means you're probably going to go to the ICU and you can't do research and cause Rhabdo in the lab.

Charlie Palmer: Darn it.

Chuck Dumke: Yeah. So you know, we end up referring to case studies and sort of associations that might have caused this might predispose somebody might be related, but they're usually correlative. So going back to the continuum, windows soreness become rhabdomyolysis? So when you do unaccustomed novel exercise, you can actually break up your muscle, right and essentially disrupt the muscle membrane and the result of that is it actually releases its contents and the things inside of a muscle cells spill out into your extra cellular fluid and even into your bloodstream. And in fact the sort of conclusive evidence in the doctor's office is they're going to measure an enzyme that's actually found inside of a muscle cell in your blood. It's called creatine kinase, and that's usually in your cell, but when you break it open, right, it goes out into your bloodstream. Interestingly, it's the same way that a doctor tells if you've had a heart attack,

you know you've heard about these vague symptoms of, yeah, my left arm went numb. You're right. Well, and that ended up being a heart attack. How did the doctor know? He measured a heart specific version of that creatine kinase enzyme in your, in your bloodstream. And indeed everybody walking around has a little bit of creatine kinase in their bloodstream because you're constantly turning over muscle, right? But you know when you get sore and you release some of these contents out into the bloodstream, that can be simply soreness and sometimes we call this delayed onset muscle soreness because that results in inflammation and you start to get sore and you know the your body is trying to fix it. So there's, you know your immune system is going in there and the progression towards Rhabdo is when you've had so much muscle soreness and you've had so much of the muscle contents released out into the bloodstream that it actually causes a problem with your kidneys filtering all those proteins. And one of the big ones is myoglobin. Myoglobin is the oxygen carrying protein in your muscle that gives it its red color. So you've got hemoglobin in your blood giving your blood red color. You've got myoglobin in your muscle, given your muscle red color, but your kidneys when challenged to get rid of that Myoglobin can actually become clogged, stopped working. And, and that's when the clinical situation of Rhabdo is initiated.

Charlie Palmer: So we've got 26 cases since 2008, seven cases in 2016 from tracking things so far this year, several cases in 2017, several more suspected cases. So Brent, why is the wild land firefighter at risk for Rhabdo?

Brent Ruby: And that's a million dollar question...

Charlie Palmer: I've only got 10 bucks. So give me...

Brent Ruby: \$5 question. Um, so you can ask more. But it is fascinating to think that, I mean, it's scary and fascinating at the same time, like why seemingly all of a sudden do we have these cases cropping up? And why it's not necessarily just unique to wild land fire because the military is experiencing the same thing and in a lot of ways the recreational fitness scene is also experiencing and an increasing number of these cases.

Charlie Palmer: Crossfit, for example, crossfit. Not to pick on a particular usual training.

Brent Ruby: Uh, yeah. And so you start to have to look in another direction in the world of fire. It's not like, Whoa, all of a sudden firefighting just got harder. We know that's not the case, but what firefighting and fitness training and training to play football and to be a marine, those haven't all of a sudden gotten harder. It's almost the opposite. The human has perhaps gotten little softer. You look at today's society and the activity choices that people make. We either want nothing. We want to be sedentary and left alone or we want it all at one moment, and so that sort of spectrum creates the opportunity for, well, I need to get fit. Okay, best way to get fit is high intensity. So instead of progressively overloading the muscles, you jump full force, you're the coyote chasing the road runner and you go 100 percent aggressive from out of the gate. And that's

where we start to have these problems. So it's, it's crazy for me to think that in the old day of wild land fire in the old day, not that long ago, I guess, of the military war fighter, these things didn't come up that often. So what's unique about today's situation that's paving the way for these? I mean, certainly there's an increased recognition of some of these clinical situations, but if these were clinical situations 20 years ago, 10 years ago, 50 years ago, people would have had kidney failure and people were not having kidney failure. With Rhabdo. It was originally described in the early 19 forties during the London blitz when the Germans were bombing London and the buildings were collapsing and falling on people and causing physical damage to the skeletal muscle. A crushing syndrome. So they're taken to the hospital. They're cared for. They're crush injuries, broken bones were taken care of, but these people were dying days later from kidney failure and it's because the architectural characteristics of the muscle were so severely damaged. Like Chuck said, that the contents spill out into the extra cellular fluid into the blood. The kidneys are responsible for trying to filter all these massive molecules and it can't do it, and so it gets clogged and shuts down and then they done. So. It's amazing that that kind of response can actually be created through a self-selected exercise regime. That is amazing that that is actually happening and the people are pushing themselves to that point.

Chuck Dumke:

So I, I do think there's a little bit of what Brent talked about with people on different spectrums. You know, they're doing nothing but I think there's also a culture nowadays of. If I'm going to exercise, I either gotta go to a crossfit gym in or do high intensity interval training and that, you know, leap quantum leap in intensity predisposes somebody. But there's also this sort of correlative thing, of group exercise. So recently in our local area here around Missoula, there was a high school student who got Rhabdo as a result of participating in a crossfit workout. And this idea that you've got a workout of the day. It's prescribed workout. I got to do it. I'm a 17 year old boy. I'm not going to back down and you know, stop. Even though I'm doing much more than I had done previously. And other cases we talked about military, we talked about wildland firefighters. You know, there are situations where people end up putting themselves in a group fitness situation that they probably is going to be an unusual novel bout of exercise and fitness is a protector, but only if this muscle action is similar. So for example, people going downhill skiing the first time of the year, they can be super fit, but they go downhill skiing and that sort of Eccentric contraction or sort of muscle lengthening can put that person then at risk and you get sore right after your first day of skiing. It's not probably going to cause Rhabdo, but that soreness is an indication that you've disrupted some muscle cells. So there's some things. Going back to your question about why wildland firefighters, right. That's one thing and in those cases, those 26 cases, they're typically in May in June, early in the season and a six out of the seven and 2016 were in PT training within the first or second day. And that's consistent with what we understand about that initial attack, so to speak, on the system of doing something that's unusual in novel. We have gone out to western states 100, if you don't know what that is. It's 100 mile running race from essentially truckee down in towards Auburn and it's largely downhill so that downhill running, that Eccentric contraction predisposes people for muscle damage and

soreness. I worked with a medical director for years and they would actually offer free creatine kinase values at the end of the race. Part of the reason was because some of the athletes were going into the hospital days after this ultra distance running race and having to get on kidney dialysis to rescue themselves from rhabdomyolysis, and we were able to kind of categorize people who were at risk from their ck values. Now, one of the things that I'm not trying to suggest that this has application to the wildland firefighters.

Chuck Dumke: We can't measure creatine kinase out into the field except that one of the reasons wild land firefighters are a little bit predisposed is because they aren't just finishing the race and then going home and going back to their job in front of a computer right? They're, having to go out the next day and then the next day and then the next day and it can be this cumulative effect, so there is that component of one there in the heat. Now heat doesn't necessarily cause Rhabdo, but again it's perhaps correlative. They're working in the mountains, right? They're going downhill they're hiking. That predisposes that essenturic contraction and in this idea that they can't take breaks. They were essentially out there and they're going at it. They're going at it hard...

Charlie Palmer: And we're emphasizing that maybe they could reevaluate how often they take a break.

Brent Ruby: Yeah, but like Chuck said, rarely do these cases crop up during a 14 day assignment. They're happening in the early moments of the season.

Charlie Palmer: Three of the seven were from the first day the person reported to work...

Brent Ruby: and that's less like welcome to wild land firefighting training. One hundred one get ready. Hopefully you showed up with your guns loaded because we're gonna to out of the gate. We're going to do more than you've ever done in the early part of your. You haven't done that, this kind of training in the off season, so I like to think of it as, okay, the job, the fitness demands of the job might require a B+ and unfortunately in the off season your physical activity patterns get you more like a C-, but when you show up for the first day of the crew, when the crew first assembles, now everybody's automatically training like they want an A+ and they have no business doing that kind of training, especially with musculature of the upper body that has probably been undertrained over the course of the off season. It's easy to train the leg muscles to deal with eccentric contractions because you've probably done some skiing. You've probably done some hiking, uphill, downhill. The leg muscles are already accustomed to that, but you're not used to doing as many pushups as you can in five minutes, as many pull ups as you can in five minutes and then repeat, Rinse, repeat, rinse, repeat, and so on, and that's the unaccustomed exercise and rushing into that with the idea that, oh, well, it's a. it's a microwave fitness class. I'm going to do, I'm going to get the most benefit for my buck in seven minutes, eight minutes. So that's a formula for disaster.

Chuck Dumke: And in the, uh, Brent's point about lower body versus upper body is a really good one. You know, in one of the research studies we did, we looked at Ecentric leg extensions and that's kind of like one of the classic sort of interventions you use in the literature and we saw creatine kinase levels go up about twofold, but if some other studies that do things like ecentric bicep curls, right? You think about biceps, right? Relatively small muscle compared to your legs and they would go up as much as tenfold. So it speaks to the fact that your upper body and doing these, let's get the crew together and let's do a hot seat. How many pull ups we can do amongst the 20 of us in, you know, a cycle of 20 minutes is a dangerous situation if somebody is not ready for that. And again, there's something in exercise physiology called the repeated bout effect and it's not that complicated. It's the fact that once you do something, you become more to it, right? So on your second day of downhill skiing, right, you're going to get less sore as long as that second day isn't the second day, right? You don't do two days in a row because then it will just add to your soreness, but the point is the next time you do a bout of exercise, it's no longer novel. You're going to get less sore, you're less at risk for breaking up muscle and release in this contents out into the blood. So that repeated bout effect, right? Needs to be specific to the movement pattern. Okay, so you can be a really good ultra distance runner, but if you show up to camp and they start doing a bunch of pull ups, you're not going to be. That. Fitness isn't going to translate to keep you from getting a muscle damage. And I'm not going to say necessarily rhabdomyolysis, but you're going to be sore.

Charlie Palmer: I think there might be the perception from some that it's a hot shot community issue. So three of the seven cases in 2016 were from IHC's, so what's your take on it?

Brent Ruby: Well, the case that I looked into was a case that happened in May in Utah, and that was this year where the person shows up and then within a day or so as a result of the initial physical demands of that early season training was in the hospital with Rhabdo and some of that can, when you look at some of the training habits, they're just exceedingly aggressive for that first week and they also don't necessarily match up as optimally as they could with what the job requires. And so I'm not saying that the hot shot crews are doing it wrong, I'm just saying that they could probably do it smarter, reduce the overall risk, and probably optimize the specificity of that early season training to match what the job actually requires. Rather than using sort of a shock and awe. How fast can you run a 4:40, how fast can you run a 40 yard dash? How many pushups can you do to failure? How many pull ups can you do to failure? Those are not things that happen on the job. If a crew is interested in obtaining a baseline understanding of what fitness levels a new crew member has brought to the table, there are safe ways to do that. Assessment with a standardized sort of fitness type test could involve some sort of timed run. It could involve some pull up push up assessment, but it's not five minutes to failure. It's how many pull ups can you do? Okay, 12, 10, four, whatever, and pooling those. The militaries become very good at at pooling those physical component assessments into one overall pt test and gaining an understanding of where this person's weaknesses

and strengths lie and then using that data you can better fine tune a crew member, shifting them more to an upper body fitness safe progressive program, or more towards aerobic fitness.

Brent Ruby:

I mean, most of the tasks that a wild land firefighter does is have an aerobic fitness nature. Unless something has gone horribly wrong. There's not a need to run a 4:40 as fast as you possibly can, or 40 yard dashes you possibly can. And so just making those good decisions in that early stage. The thing that's fascinating though is that hot shot crew, I talked to one of the guys from that crew long ago and he said, we've been doing that for decades, so and we've never had this problem before. What's going on? So it goes back to that idea of like, yeah, hot shot crews have been training aggressively, military or Marines and other military folks have been training aggressively for decades, but why now? Why are we all of a sudden seemingly all of a sudden seeing more and more cases of this? And it's probably just, we're not doing a good job of maintaining our baseline level of physical activity in the off season or on those other days. We, when we want fitness, we want it now and we want it, uh, we want to feel a certain way. We're using that sort of fatigue and soreness as our metrics to tell us whether or not we got a good workout.

Charlie Palmer:

Well, it, it's got to be a tough balance to right in the, as a supervisor, a crew leader, you're thinking, I got to see where my folks are at. I've got a, I've got to do some assessments, get an understanding of, of what their winter looked like and what level of fitness they've come in at. Both of you guys have said repeatedly that this level of fitness is such a driver with regards to being a counter measure for keeping yourself safe from all sorts of issues. So I, I can see how it's just really complicated in that you would want to see. I got to figure out where my folks are at because really realistically after this two weeks of training that we have, we might go on the board and and get sent down to the southwest into a really, really aggressive environment or sent somewhere where we're, we're going to have to be able to perform really, really well real early.

Chuck Dumke:

Yeah, and I think one of the challenges is one, we're not trying to change the culture as much and what IFC's are doing because we're not going to. But there can be smart decisions around that might possibly reduce those risks. When you look at the data and you see that people are getting this in the first or second day, is it possible to move those tests to the third day? Right. And ease people into it go, you know, do maybe more classroom stuff before hitting him with these tests and we're not trying to get rid of the tests as far as we agree. You kind of need to know where they are and indeed IHCs are probably the best at showing up the fittest. But that again doesn't protect you necessarily unless that muscle action is mimicking what you're going to be doing. And sometimes that's hard, you know, anticipating, but people are coming perhaps all from all over the country and arriving the day before this first day and boom, they're getting hit with these PT tests sometimes all in the same day. Pack test in the morning, calisthenics in the afternoon, challenges sometime after that. And that could perhaps be more thought out and spread out to avoid this potential.

Brent Ruby:

Yeah, I think we could. I think we could really. I think it's possible to provide a pretty comprehensive fitness assessment. We could easily develop that. I mean that's been developed for the military and it works very nicely and you can use that as a benchmark to make good decisions and how a person's next steps I guess towards a progressive training program could be built. Those are really easy. It's the. It's the shock and awe approach to fitness or to assessment. That's really dangerous. I mean if 10 is enough, why turn it up to 11? It's not going to do anything except prove that a competitive environment is what's going to percolate these clinical cases and I mean certainly hot shot crews are some of the the greatest research subjects that I've ever worked with and I've had an enormous. I continued to have an enormous amount of respect for their work ethic and their ability to turn it on in a professional way on the line that I've never seen before and yet these cases continue to happen and I don't... We're, like chuck said, we're not in the business of saying, oh, we're. The scientists let us figure out all your problems. We can solve everything. We're not in the business of that. We're just, we're in the business of providing an evidence based approach so that you, the practitioner, so to speak, can script out your early season training to be the most effective that it can be and the safest because if a person gets rhabdo in the first three days of training, well how does that, that's probably going to affect that crew's ability to get to a fire right away in the season and no crew member wants to have that delay. If they're ready, if they're on the board, they want to be able to go to the southwest and they're only going to be able to do that. If all the 20 people have the capability to do that and if one person gets injured, it's gonna, throw a wrench literally into the schedule.

Chuck Dumke:

I think we should at least mention and give credit to the fact that I think these are getting reported more as well. I think there is a shift in the culture that, you know, we don't need to hide this, right, because it makes us look bad. So the website, the lessons learned center has some of these cases reported and I think there has been a shift in the culture to report these, which is fantastic because as I pointed out, we can't study this in the lab, right? We need to learn from these case studies when they come up and I think that's what people should be taking back out to the field. What are the things to recognize and you know, there's some really good handouts to carry out and indeed even wildland firefighters, if they were to find themselves in this situation, need to actually let their clinicians know the emergency room, know that I'm a wildland firefighter and that this is a possibility because they are not used to people showing up in their emergency rooms with Rhabdo. So that is something that is possible to, to alert them to. And there are other things besides what we've been talking about, about novel exercise that can be compounding factors. I mentioned heat and that doesn't always have to be there. That might be a compounding factor. There's the energy stimulants. That might be a compounding factor. We don't always know that, but perhaps certainly predisposed and exercise and a or meaning, you know, similarly typed exercise and the repeated bout effect, but there's also a genetic factor. There are people called malignant hyperthermia that predisposes somebody for Rhabdo, so knowing if anybody in your family has had rhabdo might be a good thing to alert a crew boss to or if you indeed

have had a previous experience with it can also predispose a person and again, that shouldn't put hopefully their job security at risk, but can alert people to be aware of the symptoms and recognize and be smart about the progression of their training, etc.

Brent Ruby: It's also really important to note that most of these cases are happening in seasonal employees, so because they're seasonal, they're not really held accountable to their physical fitness practices. In that unpaid off season.

Charlie Palmer: It's more important that they hold themselves accountable...

Brent Ruby: And hot shots are just brilliant at that because they are at a level of professionalism that they take their job very, very serious and so most of the time in the off season, the physical activity patterns that they self select or migrate to our just conducive to being ready on day one. But what crews and crew bosses can do is lay out very clearly what the early season training regimen is gonna look like. Rather than surprise a crew. Give them a heads up on saying, hey, within the first week we're going to be doing this and we're going to be doing that and that's going to involve some pull ups and it's gonna involve some load carriage and it's going to involve some fast running or whatever. Uh, if you lay that out there early and these seasonal employees capture some of those expectations that provides them with the tools to train better for that first week rather than surprising them with something super aggressive that they don't know what's coming. Because the combination of not knowing, coupled with the competitive factor, coupled with maybe not enough of the right kind of training in the off season, that's the recipe that's going to create these clinical conditions.

Chuck Dumke: You know, I feel like maybe we haven't yet done a good job of how do you know? Right? How do I know when sorenesses reached rhabdo level, you know, so basically signs and symptoms, right? Well, we talked about the muscle contents being released and you don't know unless you to get a blood test, whether you're creating kinase is high, but you do know if you're myoglobin is high and of course everybody knows about peeing cola, colored urine and essentially that's the myoglobin you're peeing blood and unless you've had beats the night before, that can be a signal that you are have begun the progression towards rhabdo and it may not mean that you have to rush to the emergency room, but soreness, muscle soreness, muscle fatigue, and again, when does that soreness go from normal to bad is kind of an unexplained soreness, meaning a soreness that is not in proportion to the activity that you just did. And something unusual and all the people who are in these cases describe it as this weird sort of soreness and soreness, perhaps even in places that you didn't exercise. and that speaks to some edema, right? Some inflammation and indeed swelling is a big one. So you know, swelling in your arms and your upper body or in your legs. And those can all be symptoms you've heard perhaps about compartment syndrome, which is actually a clinical case that's separate but often correlative with rhabdo. Um, and that is when basically the contents of the muscle that we've been talking about are released

but can't be flushed out of the muscle. It's kind of like putting a tourniquet on your leg and that can promote some of this muscle wasting. And death in research is called apoptosis where muscle or cells die. So you know, that swelling that uh, you know, if you know, you have compartment syndrome and a lot of people have it that doesn't result in rhabdo, but if you know you have compartment syndrome you can be alerted to and be sensitive to further symptoms that might hint at whether rhabdo might be developing some of these others. The urine, the soreness, that's inappropriate to what you've done can all be kind of early signs to help catch the situation. And I think again, the wildland firefighter community is getting better at that. Some of the cases that we've been mentioning over the last few years, it's been a one or two day visit to the hospital and then they've been released and they've returned back to the job within a few weeks.

Charlie Palmer: So I'll just give you an example. Say I'm dehydrated and I'm going to. My urine is going to be a darker color, right? Because of that dehydration. And maybe I've had a difficult set of workouts or whatever. I mean, how do I know that, okay, here's my dark urine that I'm looking at cause firefighters, that there's pretty good training and things out there as far as firefighters are much more observant now and pay attention to urine color because it's been preached and educated that, uh, that's a good indicator of hydration level. And I think that's the armstrong scale in my right. Is that the. Okay. So is there something that a firefighter would need to know with a darker colored urine? Hey, that might just be dehydration or. Oh, that could be a precursor of rhabdo?

Brent Ruby: Yeah. I think, I mean, urine color is, is one indicator of hydration status, but you can't solely rely on urine color and when the urine becomes the color of cola and it progressively goes from a straw colored urine to a couple of days later, gradually getting darker and darker despite regular attention to fluid intake, then that's when it becomes a concern. I don't think we need to make firefighters obsessive about looking at their urine color or comparing, comparing urine hung the line,

Charlie Palmer: I'll show you mine if you show me yours.

Brent Ruby: Yeah! No crossing swords. Um, but they, uh, if you notice it getting to that dark colored urine, especially after a unusually aggressive exercise bout or workout that's emphasized the upper body, then that's a, that's a good sign. But we don't need to be obsessive looking at urine color and saying, okay, I'm based on my urine color. I'm about one liter shy in fluid intake. I will, I mean the body's pretty well calibrated to help you understand how much fluid to take in. And so when you develop muscle damage that's extensive from an unaccustomed bout of exercise, especially with the upper body, like Chuck is emphasized and you add to that other activities throughout the day that are occurring in the heat and your fluid intake is somewhat limited. Well, yeah. Then your blood volume, your blood can become a little bit more concentrated with those components that have leaked into the blood and then the kidney has to deal with that. So upping your fluid intake to normal, not necessarily 120 percent above normal. That's

going to be your best thing to. Well, the best thing you can do is to avoid those types of unaccustomed exercise, but I don't think you need to worry about like obsessively looking at your urine. You will know if it's dark, if it's dark and that's when you need to take care and, and get to the clinical setting.

Chuck Dumke: Well, and by dark, I think to take the soda analogy a little bit, step further, there's a difference between mountain dew, right? Which was kind of like a dehydrated a instance versus cola coke, right? And that the blood color that we're making reference to for rhabdo versus, you know, kind of just a, a dark yellow and that's, that's kind of where that step is taken in between the two.

Charlie Palmer: So we've talked about some risk factors. Overexertion coming in with a poor level of conditioning. a hydration is gonna potentially impact it. Prescription meds, I mean there's a lot of folks based on some previous research that we've done at the U of M that has shown that a fairly large percentage of folks in the wildlife community or on some sort of cholesterol reducing medication and the statens have been implicated. Then in potentially being an issue with regards to rhabdo, what can we throw out about that?

Chuck Dumke: So we get back and I'll remind you of the sort of challenge of studying rhabdo because it's only in hindsight and so I will agree that statens have a lot of side effects and I can't speak to a mechanism. Statins are drugs that lower your endogenous cholesterol production in the liver. How that relates to rhabdo. We're not exactly sure, but it does appear that there are situations which people who take statins get rhabdo. Is that causative? Is that correlative? I don't think we can say yet. Knowing that you're taking statins might be important for the people around you to know so that they can watch for symptoms, um, would be a smart thing to do. It could also be correlative because people who are taking statins to lower their cholesterol may not be the fittest people on the fire line. Certainly there are familial genetic relationships causing high cholesterol, et cetera. And that's a broad statement. But just again speaks to the difficulty in trying to make direct relationships. And I don't think we can yet, but again, the best thing we could probably say is to make it aware to people that you're on these drugs so that your crew boss knows and then if they start to see things that predispose or, or possibly relate to the symptoms of rhabdo that catch early on is the important part of keeping people safe and getting treatment as soon as possible.

Brent Ruby: Yeah, and I mean human physiology is incredibly complex and elegant. And so the factors, all the factors that can contribute to the development of rhabdo, there's so many of them. So it's impossible and it's, it's narrow minded to say red bull causes rhabdo. Crossfit causes rhabdo, statens cause rhabdo bad decisions cause rhabdo and uh, and doing training that you're not used to doing no matter what your, how elegant your diet is scripted out lack of a. If you avoid energy drinks, you avoid nutraceuticals. Or if you avoid prescription drugs or recreational drugs or whatever, I mean you can still get rhabdo. If the muscle is forced to do something, it's well beyond what it's currently trained to perform. And that's, that's the major key here rather than to say, oh, we can't have

energy drinks on the fire line because that's going to cause rhabdo and use that as a, the, as sort of a platform to to get rid of those on the line or before the fire line just not being accustomed to a task is, is the biggest problem.

Chuck Dumke: it's the challenge for us as researchers to try to draw conclusions from anecdotes and that is what we're being asked to do with rhabdo because you know, we have 26 anecdotes from the wildland firefighter community and you know, you can kind of look at things that are consistent between them and as we've been hitting the point, they're all happening in the early PT. They're all happening early season and they're happening when people are perhaps not prepared for what they're being asked to do.

Charlie Palmer: So are there other things then that can be done to try and avoid it to try and prevent it that the. As far as improving, getting those numbers down.

Brent Ruby: I think educating, cruise, educating incoming crew members on what is expected and also looking critically at those expectations. When you look at the crew management team, the crew boss, superintendents, look at those expectations critically and try to try to make sure that what you've laid out in your early season training matches closely with what you, the calibrated experienced hot shot crew boss or other crew boss is used to feeling and doing on the fire line, so creating an optimized early season regimen that is going to A, test the quality of your crew but B do so in a way that's very safe and progressive. I think that's one of the first things that can be done to change the culture of that early season training and also let the potential crew members know what is going to happen rather than surprise, okay, do this and then they're. They have no way of knowing how to better train for the early season regimen. Those two things I think are the biggest thing that could be done.

Chuck Dumke: I would just simply add, you know, knowing the signs and symptoms and that early recognition, which I think the community has begun to do much, much better in the reporting of these cases and knowing them, not just at the crew boss level, but also so that you can recognize your crew mates and seeing them perhaps even in yourself, um, possibly having to change the culture a little bit about admitting to the fact that like, I think something's wrong with me and I think I need some attention and that is a barrier that I think is, has been broken and is becoming much better at.

Charlie Palmer: Yeah, that's a really important human factor dimension of how do I step up and let other people know that I'm needing help.

Brent Ruby: Yeah. Because when one crew member is injured, the whole crew's entered, it disrupts the strategy. that is why they're there in the first place. They are professionals ready to do a serious job at these assignments and if one person gets injured in training, it's going to delay their deployment to what they really liked doing. Working on the fire line.

Charlie Palmer: Yeah. And I think that's a good segue into something that I also think is important, which is just keeping it in perspective, like rhabdo has gotten a lot of attention. There's a lot of different resources that are out there now in 26 cases since 2008 is a lot. I mean it's an impactful kind of condition were pretty much in every instance it's gonna require hospitalization, which is serious, but at the same time I think it's important to note that there's a lot of different ways that firefighters are hurting themselves or getting hurt, whether it's ankle injuries or knee injuries or back injuries or whatever it might be that are probably way higher numbers than the number of cases of rhabdo that we have. So I do think that it's important also to keep it in perspective and realize that despite how serious and significant it is, there are lots of other ways and lots of other things out there that really we need to be paying attention to as well.

Charlie Palmer: Gentlemen. Thank you. Dr. Ruby, Dr. Dumke For the great discussion on rhabdo. We will see you next time.

Charlie Palmer: You've been listening to On The Line a podcast for today's wildland firefighter, our audio engineers, Mike Matthews, production assistant Joey Moore, and I your host Charlie Palmer. Thanks for listening. We hope to connect with future.