

Written Transcript  
On The Line Episode 1.6 “Tactical Nutrition”

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Charlie Palmer: We're back On The Line, a podcast for today's wildland firefighters brought to you in part by The Black. Today we're joined by kind of a repeat customer here, Dr Brent Ruby, I really enjoy my job now and probably the biggest reason that I really enjoy my job is that I get to work with some incredibly smart people who are passionate about what they do and Brent epitomizes that and is probably the world's foremost expert on firefighter nutrition. And I hesitate to use the word expert because it gets thrown about a little too readily, but in this case I think it absolutely applies in that I don't know if there's anybody on the planet who knows more about the nutritional demands that wildland firefighters face, and so we are happy to have him on the podcast today to talk about nutrition. We recognize that nutrition is a very, very complex topic and we are going to divide it into two different podcasts. This will be the first of two different podcasts. This one we are going to call Tactical Nutrition. Brent, welcome back.

Brent Ruby: Thanks so much!

Charlie Palmer: All right, so what can you give us with regards to these unique nutritional demands that today's wildland firefighter face?

Brent Ruby: Well, these are like we've talked before, these are some very unique tactical athletes. So it's an occupation that demands a great deal of unique skills that they have to train specifically for and then when they're on the line they have to take care of themselves in a very unique environment and they have to do so with limited resources. Knowing full well that they're going to have to carry most of their fatigue countermeasures in the form of their nutritional supplements, their sack lunch all day long. And so it does create some unique logistical concerns.

Charlie Palmer: You've been looking at this issue then for about the past 20 years. You've been at the University of Montana for about 20 years now. You hit the ground running with regards to looking into wildland firefighters and some of the first work that you did was with regard to kind of the energy expenditures that they face and one of your really most seminal pieces of work is just identifying what are the demands with regards to energy expenditure. Can you kind of bring us up to speed on on that piece of work?

Brent Ruby:

Yeah. We started, so I've been at the university since 94 and shortly after arriving, partnered very closely with Brian Sharkey, who was at the Missoula technology development center at the time and a grant came available or an application came available. I had to fight for the grant through the army and the focus of that grant was the defense women's health research program and I casually brought it up to Brian and said, hey, wouldn't it be neat if we use wildland firefighters as a surrogate population for this army study idea? And the army loved it. So ever since then we've been using wildland firefighters as a surrogate for today's modern military warfighter athlete. Because we can study wildland firefighters a little bit easier than combat scenarios, so back then we really didn't know how to tackle studying these characters and what are we gonna do and how are we going to best learn about whether or not science or the field of exercise physiology or sport nutrition can have an impact on these teams.

Brent Ruby:

So very early on, my original goal with that project was to first and foremost, what am I playing with here? What are the energy demands of the job? Once we know the energy demands of a typical 24 hour day in this population or any other athletic population or clinical population, then you can start to slice up the menus and slice up the feeding strategies for these guys. So that was our initial goal. Well, if all we were going to do is measure energy expenditure in a laboratory setting, we can do that all day long. It's super easy with the right equipment, but in order to accurately measure that, you have to have an apparatus that they would work on, which is like a treadmill or a cycle ergometer or rowing machine or whatever, but you have to have a way to capture expired air samples. So those expired gas samples are analyzed for oxygen and carbon dioxide and then you can very accurately measure the energy expenditure of the task.

Brent Ruby:

Well, fires don't happen. Hopefully fires don't happen in the lab. We've had several fire like activities in the lab, but we can't fully simulate the real job and I was passionate about capturing the real job, I've always been passionate. If I'm going to study firefighters, it can't be in the laboratory. It's got to be on their terms, on their turf. And so we worked with a researcher who is by far the best in the world at measuring human energy expenditure in sort of free range settings. And his technique that he refined in the eighties uses to stable isotopic tracers that are delivered orally. It's very expensive technique, but it is the human or animal. It's really the gold standard field methodology for doing this. The beauty of that is we could deliver the isotope in the evening and then initiate the study the next morning. So we can use this technique to very accurately define the energy costs of an individual over a three day window or a five day window. What it provides. It provides some of the same calculations that we would capture if we were measuring it in human air samples, but it does so through changes in these two stable isotopes and so all we have to do is capture urine samples and then those are analyzed. It's a lot of money in a lot of effort to get a single measure which is K Cals per 24 hours. Which is the total number of calories in a 24 hour day and it gives us the total value for the entire measurement period. So the first study we did was about a five to seven day

window. So we have one number that comes out of that which is an average energy expenditure over the five or seven day cycle. We split that up in that first study because we were concerned is the energy demands the first couple of days or the first three days more exaggerated than the last three days or five days, and so we did slice it up a little bit like that.

Brent Ruby: But overall when we talk about the total energy expenditure, it's in calories per 24 hours and in that first study we noticed a couple of really unique things that are not present in a lot of the studies that use that technique. The first thing we noticed was how rapidly they turned over body water within themselves. And that changed how we had to deliver these tracers a little bit in terms of the dose. But bottom line is we were seeing numbers ranging from about 3,500 calories in a 24 hour period all the way up to over 6,000, about 6,200, 6,500 calories per day. And those are average numbers. So when I say we have a number that's 6,500 calories per day, that is the average number over five days. So it's not just like one big day, one little day, we can't slice up the technique quite that sensitively, but we do have these big numbers and so once we establish that energy demand, now we can expand and we can start to slice into how are they fed their breakfast, what are they taking out on the fire line, how are they fed their dinner. So as to match that, because if you know what the energy demands are, you need to provide that. The catering contract and the crews themselves need to be aware of how many calories they're expending.

Brent Ruby: Now obviously not every assignment is the same and the energy expenditure within even a 14 day duty cycle can vary drastically depending on where they go and what they're doing. So gaining that or building that foundation was very critical and that really set the stage for a lot of the other research that we've done.

Charlie Palmer: Just to be clear then. So at the top end of in your subject pool, at the top end of, there were subjects who were extending upwards of 6,500 calories a day.

Brent Ruby: Okay. Yeah, you're right Charlie. All the dietary labels now say based on a 2000 calorie diet, and so if you have a 3,500 calorie diet, well that's more a big Mac is right around 550 or so calories, so you do that on the highest end at 6,500, that's almost 12 big macs in a 24 hour window. Most people understand the big Mac currency in terms of these calculations, but yeah, it's an enormous value to sustain for long periods of time. In upwards of say 10 shifts on a 14 day assignment.

Charlie Palmer: And then your average across the board was about 4,600 calories a day for males.

Brent Ruby: Yep.

Charlie Palmer: And about 3,550, 3,600 calories a day for females on average.

Brent Ruby: Yeah. So when we looked at that, because a big part of that study was to look at the differences across the sexes and when I remember a reporter asking me about those numbers and saying, well it looks like the females aren't working as hard as the males because the numbers are lower. I'm like, well no, that's not at all the case because when you adjust it for body size, they come out exactly the same. So when you express it in multiples of resting energy expenditure, there's no difference across the males and females.

Charlie Palmer: Bodyweight impacts...

Brent Ruby: Bodyweight totally impacts the total energy demand, so the bigger firefighters have a higher energy expenditure because they got a lot more to move across that line.

Charlie Palmer: All right, and then you mentioned with that many calories that becomes important then to distribute those as best you can throughout the course of the day and what you and I have talked about previously is this interesting phenomenon of oftentimes there's a whole bunch of calories in the morning at breakfast, a whole bunch of calories in the evening at a dinner time, and yet for firefighters at least you have this huge period of time in between those, which is their working time. It becomes very, very important then for them to time those calories out really well. What can you tell us about that?

Brent Ruby: Oh, absolutely. It's, I mean it's a huge logistical challenge just to figure out how to feed a camp of say 500 people and everybody is different nowadays. There are food sensitivities and allergies that we got to watch out for and so it becomes a massive logistical challenge. But historically the way it's done with the caterers is the crews are sleeping and working in and out of this fire camp, so in the camp in the morning, they eat an enormous breakfast of semi diverse food choices or options. And then there's a monstrous gap of time before they can have another hot meal that's prepared for them by the caterers and that's in the dinner time. So oftentimes these crews, they might eat at 6:00 in the morning and then they might not eat again until 9:00 at night and so throughout the whole shift, that 12 hour window or whatever, they have to be self-sustained. So they have to self sustain their own feeding strategies and that's accomplished in part by the sack lunch program and the food components that get packaged into sack lunch.

Charlie Palmer: A firefighter. Then after eating breakfast, typically we'll swing by the refrigerator truck or somebody on their crew will and they'll grab the number of sack lunches, one per person generally that they'll need for themselves or their crew that day. And there you go. Right? There's your. There's your lunch for the day. Tell us about that.

Brent Ruby: Yeah. I think that the lunch for the day and just thus the concept of sack lunch. The concept of lunch and general speaks to our normal day to day habit, which is, it's been about five hours or so since I've had breakfast. It is now time to for lunch and you sit down and you unpack your lunch and you consume it, and

then you go back to work. Well, the firefighter cannot afford to take that kind of day to day practice onto the fire line. It would be completely inadequate for them to unpack all the 1700 calories or whatever's in that sack lunch and consume it all at one time in one sitting. It's not like a bell goes off or whistle blows and it's lunchtime and you open up your lunchbox and there you go. And then you're back to work, they have to tactically spread those calories out throughout that 12 hour window. And that's where the design of the sack lunch program or shift food, whatever you want to call it, tactical field food that needs to get reconsidered and reconfigured. Because the way that the sack lunch is packed, it's not conducive to eat on the move items. But we have done several studies with the army as well with different rations systems and the bottom line from a lot of those different studies is when we feed on a regular hourly basis, either with a liquid feeding that we developed through a canteen feeding program where we were delivering calories in liquid form.

Brent Ruby: Whether we deliver it in solid form in the way of just supplemental bars or other foods, or if we just simply increase the frequency at which somebody eats something. Increasing the number of eating episodes is so much more important than fine tuning the intricacies of one or another particular product that might get consumed throughout the day. So increasing the eating episodes is by far the most important thing that they need to unpack. Hopefully when they listen to this and when they discuss these kinds of findings with their crew.

Charlie Palmer: The sack lunch had to change incorrect? Traditionally in the old days, again, that weren't that old. They weren't that long ago. You would traditionally get a couple of sandwiches, you'd get an apple, you'd get a can of juice, probably a salted nut roll or some other candy bar that wouldn't melt. And that was your lunch for the day. And now in order to feed better and based primarily on your research, it was identified that the sack lunch then how it was delivered had to change to better allow these tactical athletes to feed themselves through this more optimal strategy that you've described.

Brent Ruby: Yes. So it is nice to see that some of the research findings have been integrated in some way, shape or form into revising the shift food. The unfortunate thing is when you suggest that multiple food items need to get consumed on a regular basis, that provides a license for the caterers to say, okay, we'll just buy a bunch of prepackaged whatever. So that sort of changes the rules a little bit and doesn't really play following the rules and that's not what the research suggested, but it's not like you can just put a bunch of candy bars in the sack lunches and call it good or add another sandwich. Humans are incredibly complex in that there's very few food or beverage habits that we retain on a daily basis. Coffee is certainly one of them. Social Drinks, maybe another one, but those are out the window on a fire camp.

Brent Ruby: But coffee is a regular beverage that we have food items. It's. We don't. We don't have a lot of habits. We don't like a lot of habits, like a lot of diversity and so that's a big challenge that these caterers are going to face. No matter how you feed. There's not a single most optimal bar or other beverage. You have to

provide a lot of different options because they're are going to be doing this all summer long and so they can't get sick of it. As soon as they get sick of it, their caloric intake doesn't even come close to meeting the caloric expenditure. And then they start to go downhill.

Charlie Palmer: And part of that means losing weight. Correct?

Brent Ruby: Yup.

Charlie Palmer: Through your research then you found some pretty amazing things when you compared people who ate or firefighters who ate the traditional sack lunch, say at about noon versus firefighters who would space it out through the course of the day. Eating every 60 to 90 minutes is basically about what you recommend. You saw some pretty amazing differences between those two groups with regards to that timing. What can you tell us about that?

Brent Ruby: Yeah, and in trying to design studies where you manipulate an individual's diet, that's pretty easy to do in a lab setting. It's a lot more difficult to do in a field setting, like on a fire. So the first series of projects that we did was we used the same group of firefighters for repeated shifts. The benefit of doing that with humans is they carry their same behaviors from one trial to the next to the next. And so you get a lot more statistical power. So one day the crews ate however they wanted to, they had an Ad-lib feeding schedule. They could choose whatever strategy they wanted to. On another day, we only allowed them to eat their sack lunch during the typical time, which is somewhere between 12 and two, and then the third option we provided either a liquid or a solid or combination of small food items like very small amounts like 25 to 40 grams of carbohydrate each hour. And on that particular trial, what we saw was an increased work output during the latter part of the morning and most impressively during the latter part of the afternoon. So increased work output. How in the world did we measure that? Because these guys aren't wearing monitors all day long. We have a little system that's an accelerometer system and accelerometers are so commonplace now. They're in your cell phone and everywhere, but these little systems are designed for animal and human research just to look at movement patterns. And so we put these things on a hard foam core card, put them in the left shirt pocket of their nomex shirts, and that accelerometer movement pattern is a function of how much the firefighter works or moves in the xY, , z. three planes, up, down, side to side, front to back. And more movement typically means more energy expenditure and so that was our signature or that was our metric of work output, so it's. It's a lot more sensitive than just counting steps like a pedometer might do, but when we fed them on the hour by hour basis, no matter what options we provided, they had a more stable and better blood glucose profile, so they're taking finger stick blood samples every hour or two. And the movement patterns were higher, so if there's more movement patterns that strongly suggests that they're more aware of their surroundings, they're making better choices, more likely, and there's not sluggish or slothful on the line.

Brent Ruby: I don't really care if they're digging line faster, but the fact that they're up and vigilant that monitor is picking that up and that is a massive improvement in performance.

Charlie Palmer: Especially when fire behavior is probably picking up commensurately towards the late afternoon as well. That's usually when things get cranking.

Brent Ruby: Absolutely, and so the choices that they make throughout the morning, throughout the am period of the shift and on into the afternoon are really going to dictate how well they're set up from a muscle health and fuel standpoint for when it really matters. Which is, I mean in the later afternoon. I mean that's when the fire activity is obviously picking up because of weather, but they have to be on their game big time. Otherwise the risk of injury, the risk of accidents or worse is certainly possible

Charlie Palmer: And we've talked about MRE's meals ready to eat. Oftentimes firefighters because they're spiked out or they just. They can't get back to camp to get that meal that they will have to sustain themselves on these MRE or meals ready to eat which average about 1,250 calories or so. There's variability in which pack you grab as far as what's in it, but on average there are about 1,250 calories and they attempt to be balanced with regards to the macronutrients, carbohydrates, proteins, and fats. What do you know about the MRE's and say a firefighters in that position where maybe for an extended period of time there subsistent on those things. What do we know about those?

Brent Ruby: Yeah, the MRE is certainly an improvement on the original C rations, but it's not really meant to be a tactical nutritional sustaiment type of product. If they were sedentary and a prisoner of war camp, sure they'd be okay. But to try to superimpose MRE diet onto an individual that even as extending 4000 or 5,000 calories per day is completely off the charts inappropriate. Uh, the military knows that they've redeveloped the MRE for more of a tactical nutrition product and it's called the first strike ration. And that fits very nicely with the work that we have done with firefighters both on our own and in conjunction with the army's military nutrition team. So we helped evaluate that ration packs system the first strike ration years ago, uh, with some of their military nutrition researchers. And that is packaged in such a way that it's easy to get to lots of different food items.

Brent Ruby: And there's quite a diversity. There's 20 plus food items in that package and it's about 3000 or 3,500 calories in one package, so it's a lot easier to carry. It speaks to the evidence based approach of eating frequently, increased number of eating episodes so that that system works very well. I have never seen one of those on a fire. I don't even know if you can get them, but if there was a way that you could, that would be another option, but the MRE is not meant to sustain and in a future podcast that we'll do on tactical nutrition and looking at muscle recovery in between shifts. That is certainly where the MRE starts to fail. Uh, it's completely inadequate in terms of the amount of carbohydrates necessary to restore in the liver and the muscle to get ready for the next shift.

But if you're, if you're trying to eat frequently during the day, the MRE fails you yet again, because there's not that many food items in there and it's not meant to be eaten on the go.

Brent Ruby: You have to lay the product on the ground, get the rock out, prop it up to the appropriate degrees, get your protractor out and make sure the heating element is going to uniformly heat your Chili, Mac or whatever, and then you just shovel that down in 500 calories or 600 calories and then you move on. It's not designed to eat on the go. And that's what any sack lunch or any supplemental strategy has to assume control of. You have to be able to consume food items frequently.

Charlie Palmer: These caterers do a fantastic job. I mean you think about the logistics of what's involved. They get a phone call. They say, we need you in this field that we've rented out to set up camp and to be able to feed 500 people tomorrow, breakfast, lunch, and dinner. Absolutely amazing that there are people out there that can staff that and meet that demand. At the same time, there are improvements that can be made that the system could work better and there might be changes afoot. With regards to some of those contracts and how this all happens. Is there anything you can tell us about that?

Brent Ruby: Yeah, I just to certainly agree with you that the ability for that team of people to be mobilized to a remote location, get power, get fresh food, get food set up and cook for 500 plus people or whatever. It's. It's incredible and it's not even like it's a wedding. It's a. it's even remote. I mean it's so remote, but there are definitely improvements that can be made. I mean the caterers are at the mercy of the food distribution system. The food distribution system is dependent on what's available based on geography and they have to rely on foods that have a pretty good shelf life.

Brent Ruby: At least the foods that are going to get deployed during the work shift during the breakfast morning hours or the evening hours. Then that's when they can introduce other foods and fresh foods and no matter how you change the catering contract, no matter the quality of the caterer, it just gets tiring trying to eat that much and even the best salad bar in a fire camp is still the same salad bar day in and day out. And so that sort of eating fatigue sets in. But there are, I think there are definitely some caterers that crews really like better than others and there's this big debate about that. But I think the way that the contract itself gets restructured, they really need to put some thought into, developing a team of individuals to make that happen. And it should involve a lot of firefighters. It should involve, and I think it will involve folks from our team and folks from the army's military nutrition division. Perhaps folks from the US FDA. All of those individuals. We came together about a month ago in Maryland at the USDA human nutrition labs and had sort of a one day think tank about how to best feed the wildland firefighter. And the head of military nutrition was there. The head of the USDA labs were there and it was really a neat group to pull together. The one thing that we were missing though is we didn't have any firefighters. They're in all the studies that we've ever done. I've made first

certain that firefighters are involved with the design, and so in order for the catering contract to be successful, uh, firefighters that are on the ground used to spending 5,000 plus calories per day, need to be involved in those discussions. They have to help dictate what works and what doesn't work and how this whole thing gets rebuilt. But I have, I have high hopes for a team being put together that tackle some of those very questions.

Charlie Palmer:

Okay. We know then that you're really advocating this shift food kind of tactical athlete approach where you're eating every 60 to 90 minutes to keep your carbohydrate stores sustained and all of that. And we're hopefully getting that message out there and firefighters are going to start adopting that more and more over the course of the work shift. It still leaves these book end periods of the breakfast and the dinner. What advice do you have for the firefighter who was standing in that line every morning, every evening when they come back and sure, the choices are somewhat limited, but there are still plenty of choices that that person has as far as sure they're going to get a plate and the caterer is going to put on that plate, the protein and everything else, but even still that firefighter has some freewill to make some of their own choices. What, what advice do you have for that person?

Brent Ruby:

Yeah, I mean what gets put on the plate and how that gets built. I am certainly not a clinical dietitian. If you were to introduce a clinical dietitian to the world of the fire camp, their heads would spend because they would start to break down what micronutrients were not provided in abundance and, and without even getting to a macronutrient distribution of what's on that plate. But what gets on that plate, the individual has a little less control over then sort of the auxiliary food items that might get built around that main meal. And those are foods in the salad bar and the fresh food bar. Uh, and then some of the drink choices that they have, there's always milk, there's always juices, there's all kinds of fresh foods and salads along the salad bar. And so that's really where they have a lot more say or a lot more self direction on what sort of choices they make.

Brent Ruby:

Most of them, even the inexperienced firefighters, they may not know precisely what to eat and I'm not going to be the one to tell them, oh my gosh, you need a serving size exactly of this, and you have to measure out one cup of nuts to add to that. I'm not going to be the one doing that. If they've got a craving one direction or another, I would suggest they go in that direction because at 6,500 calories or even 5,000 calories, you've got a lot of flexibility in terms of what you can tolerate and the choices that you can make. So getting enough to eat is usually not too much of a problem when you add it all together in a 24 hour window. But it is oddly displaced, heavy in the breakfast and heavy heavy at night and not a lot of solid distribution of those calories throughout the day, mostly because they've got to carry all that stuff, but there are ways to use different food items. Even if they took the sack lunch or even if they took the sandwich in the sack lunch and cut the sandwich into four pieces and put it in a resealable bag, I mean then the individual can open up the sandwich packet and tackle part of that giant sandwich just a quarter of it and have that be one of the food items for one hour or one 90 minute window. That would certainly work

better, but the problem is the way that the protein is taken in, it's taken in large doses in the morning. It's taken large doses at night and that becomes potentially problematic in terms of maintaining healthy protein turnover within the body. It's certainly not optimal, but they do what they do and they work in the environment. That doesn't have a lot of flexibility. I don't see them introducing fresh food vendors as one of the. Oh, I'm a safety officer. Oh, I'm a line officer. What are you? I'm a fresh food vendor. I traveled the fire line and give these guys fresh food all day long. That's not gonna happen.

Charlie Palmer: Probably not... I know that during my time I kind of got to the point. I'm kind of a picky eater. Kind of finicky. I know what I like. I definitely know what I don't like. I, I found myself in a position where I kind of had to augment myself. I had to bring things that I knew that I would eat, that if it was extended operations I wasn't necessarily going to count on the sack lunch meeting those are the caterer meeting those. And I got to the point where I carried a lot of my own things at my own expense and I was happy with that. What are your thoughts there? That there might be a little change in expectations as well from the operational folks that uh, you might have to bear some of this burden yourself?

Brent Ruby: Yeah. And that I don't think that's ever gonna go away and maybe it shouldn't. Um, but as people talk about, oh, the catering contracts got to get better or they got to revise the sack lunch program, we're not getting what we need. Well I don't get what I need from the university in terms of dietary options every day. I have to bring my own food or purchase food that they might have available. And so I think the benefits of bringing some of your own food, A, you're more likely to consume it B you're more likely to stick to an evidence based feeding strategy that we know works and we know it works because we've studied it on the real fire line with multiple studies. And we see the same thing over and over and over. And so bringing your own foods isn't a bad idea. I mean, yeah, it can get expensive here or there, but you have to feed yourself at home anyways.

Brent Ruby: So you can't expect to be 100 percent sustained by the agency. I don't think that's fair to the agency. At the same time, I think the agency can make some simple yet far reaching almost dramatic improvements or they can do small changes and it could lead to dramatic improvements I think. There's talk and there is a supplemental food policy that is apparently available. I don't hear it talked about very much, but it allows crews to pre purchase specific items or items that fit a supplemental food policy qualification list. I guess they're able to prepurchase those, and as they use them on an incident, they can submit the paperwork or whatever to get reimbursed for the use of those and they can charge that to the incident. That is another potential option down the line to refine the list of what's a viable product that can be reimbursable and then crews can front load their own rigs and their own individuals with food items that they want, that they enjoy as a crew or individually and I think that that would be a huge leap forward.

Brent Ruby: It provides what they want, but at the same time it's reimbursable. The incident pays for it like they pay for the caterers, but then you got bean counters that are

going to say, wait a minute here, we're already providing them everything. No Way. They need to step up and provide some of their own stuff. So I think the happy medium needs to get established between the two extremes.

Charlie Palmer: Okay. A different question. Anecdotally, I know from some of the traveling that I do and work with firefighter groups that more and more they seem really in tuned with nutritional issues. So many of them are really on top of the game with regards to what they eat and in really pretty refined understandings of how nutrition impacts performance. And yet we could look at a couple of studies. There's a study from one of your graduate students of 2003, Kristen Kodeski. There was a piece of research that literally just came out a couple of weeks ago from some folks over at the University of Idaho. I think in both of those, the, one of the findings was that, uh, there are some misperceptions in the firefighter population with regards to nutrition and just a lack of understanding, I guess might be a way to put it. With regards to the role that nutrition plays and in both of those studies, the recommendation was that there should be some sort of nutrition education programs for firefighters. What are your thoughts on that?

Brent Ruby: Well, you could serve a, any subpopulation, you could grab a middle school kids, you could grab people in a nursing home, you could grab firefighters, officers, ER docs, whatever, and every one of them is going to have some misperception of nutrition, because every job out there has a wide range of physically demanding or non demanding tasks or mentally demanding mentality.

Brent Ruby: And so tactical nutrition, when I think of it, I don't break it down into how many grams of macronutrients do you have, how many milligrams of this micronutrient is necessary? And the problem with getting too involved with an individual's diet, with an athlete's diet or with a soldier's diet, or even a firefighter, as soon as you start to fine tune it so much, then the person can become quickly obsessive compulsive about, wait a minute, I need that supplement. Otherwise I can't perform. I'm not going to do well on my math test this morning because I didn't have my multivitamin. What? Uh, and, and they start to get borderline obsessive compulsive and diet is famous for creating those possibilities and coaches and trainers and even clinicians sometimes pave the way for some of these disordered eating patterns that we see. And so if a person is a picky eater or a compulsive eater, they could have problems on the fire line because a lot of that stuff is you get what you get and go ahead and throw a fit, but we're not going to care.

Brent Ruby: You have to either sustain yourself or eat what you, what you're given. And so to a degree, I think that nutritional information can easily be disseminated to crews, but the messages do not need to be about make sure you're getting enough vitamin D, make sure you've got enough folic acid in your diet or whatever. They don't need to be that fine tuned. If a researcher or a nutritionist were to ever talk to a group of firefighters and I heard them say some of those things without first saying increase that number eating episodes, each work shift, then they're going to lose me. And that is by far the most important

nutritional message that these crews need to take out on the line with them is simply increase the number of episodes. That is by far the most important thing. I mean that's how they feed themselves in the tour, that little bike race in France, they don't take a break and take a giant lunch. It wouldn't be hard to implement a nutritional education material in the fire refresher course, but I do not think it needs to be exceedingly detailed in terms of fine tuned particulars.

Charlie Palmer: Sounds like a great way to end it. Realizing that we're going to come back to nutrition from a recovery standpoint in a future podcast.

Brent Ruby: Absolutely.

Charlie Palmer: Dr Brent, Ruby, thanks for your time on the line.

Brent Ruby: Thanks so much.

Charlie Palmer: You've listening to On The Line of podcasts for today's Wildland firefighter. Our audio engineer's Mike Matthews, production assistant Joey Moore, and I'm your host, Charlie Palmer. Thanks for listening and we hope to connect with you again in the future. On The Line.

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