

Announcer:	00:00	Welcome to the Perioperative Nutrition Podcast, sharing knowledge with clinicians to ensure all patients are ready for surgery. This six episode series is sponsored by Abbott Nutrition and here's your host, Dr. Paul Wischmeyer of the Duke Clinical Research Institute.
Paul Wischmeyer:	00:14	Hello everyone, this is Paul Wischmeyer hosting another episode of the surgical nutrition podcast series. Again, I am a professor of anesthesiology and surgery here at Duke and direct the nutrition and TPN service for duke and I am really thrilled to have a true legend in the field of surgical and perioperative nutrition, Dr. Bob Martindale, who is the Chief of General and Gastrointestinal Surgery at Oregon Health Sciences Center and Medical School in Portland, Oregon. Welcome Bob.
Bob Martindale:	00:46	Glad to be here.
Paul Wischmeyer:	00:47	No, it's great to have you.
Bob Martindale:	00:48	I don't know if I'm a legend. It sounds like I'd be dead if I'm a legend.
Paul Wischmeyer:	00:53	The thing that we really are excited to talk to you about today and for our listeners to hear about is your longstanding career long, passion and interest in the role of perioperative nutrition to improve clinical outcomes in patients and your vast experience both as clinician, researcher and impassioned speaker and advocate for the role of nutrition in improving outcomes in surgery. And maybe you can start and tell us a little bit about your views on this and how your feelings around it.
Bob Martindale:	01:30	Yeah, well it truly has been my passion for the last, and I hate to say, almost 40 years now. I finished my nutrition training at UCLA many years ago and soon after that we became interested in the idea of using specific nutrients or specialized formulas and that was in the eighties and when there was lots of new ideas and renal formulas and liver formulas and all these specific diseases. And then in the nineties came some interesting work from the Burn Center at Cincinnati saying that maybe an arginine fish oil containing formula could improve burn outcome. And then that sort of progressed to Marco Braga's legendary work in

Milan, Italy and whipples and salpingectomies and difficult preop, difficult perioperative nutritional problem patients that he could show that he could significantly lower the metabolic and infectious complications in those patients by using this formula. And I think it sort of snowballed from there and now, as you know, we've got virtually a hundred prospective randomized trials in this area and they continue to come out.

Bob Martindale: 02:40

So I think it's an area which we've got now an overwhelming amount of data to prove that it works, you know, not in every patient and it's certainly not for minor surgery. Certainly, if you have a hernia and you're going home on the same day, you're probably not going to make a difference because you're going to eat when you go home. So, I mean, but patients that we can not only enhance their outcome or improve their outcome in surgery, we can shorten the length of stay now, but also, you know, we talked about preventing problems also, I think it's not just improving immune system, it's also metabolically modulating the patient's response to that surgery. I think that's the key thing that Marco Braga showed early and we've continued to show that, is that if we load the patient with these nutrients, we can literally decrease the metabolic response to that stressful surgery. And to me that's the exciting part that we're actually changing metabolic response and not just enhancing immune system, but changing the metabolic response

Paul Wischmeyer: 03:45

Yeah, I think the potential for us to make a difference, like you're saying, in patients with this high impact, low risk, low cost intervention is tremendous. So, I know you've trained many, many young surgeons over the years in all the places you've been and in all the work you've done. If you were educating or when you do educate your young surgeons, your young anesthesiologists, and the people you work with on how one might apply this knowledge and, like you said, now over 100 trials demonstrating that this is beneficial to patients and improve outcomes. How would you, how would you practically suggest they incorporate this into their practice?

Bob Martindale: 04:22

Yeah, you know, it's interesting. You know, I moved from the medical college at Georgia in 2005 to Oregon. Slightly

bigger program, we actually graduate 13 chiefs a year now here. So, it's the biggest or second biggest program in the country for surgical training. And I said, well, you know, they're very progressive out in Oregon, you know, there's sort of a blue state. They're willing to listen to others. And, so I thought well it'll be easy and I got out here and it literally took me a year to get an incorporation so that this immune modulation and metabolic modulation was part of the routine for our major surgical cases. And then-- but it's interesting because it took a while to get it in the system and get people using it, to where now it's routine and now, in fact, that it's like so routine that if somebody doesn't use it, you know, that they wonder what happened here? Where was our air, you know, what was our problem?

Bob Martindale: 05:15

And so we've got systems to catch if they don't use. So, we now routinely give this immunizing concept five days preop to patients that are undergoing whipples, salpingectomies, and complex colorectal. And then there's a few other select ones. Those are automatic. So, it's now become sort of automatic and it seems almost interesting to me to look back and say why was it such a problem to get going? But it is a problem to get going, and so when I try to teach young people, I first teach, try to teach them the science, which we of course have the time with the residents. And then you know, the anesthesia residents rotate through a service and they also then cover preop clinics. And so, they now are aware of the importance and actually encourage it and they're our best advocates now.

Paul Wischmeyer: 05:59

Yeah. That's remarkable, that basically what you're saying is in your major academic center it's the norm for patients to get immunonutrition and it would be an oddity or an unusual patient that wouldn't get it. And I think that's a step I think a lot of us, both in academic centers and community hospitals around the country are working to make, but, as you said, we sometimes face barriers. This is new knowledge. We know that medical schools aren't teaching clinical nutrition to the majority of our students and so it's not something they inherently get. And so, what did you do to overcome some of the barriers and what were some of the barriers you found in that first year to getting this to be routine in your care?

Bob Martindale: 06:47 Yeah, I think the first big barrier was not so much the clinic nursing staff resistance, it was in education base to the residents to make sure they ordered it, not to forget. And also, the, you know, the nurses are the ones that keep us straight so them to remind us if we don't order it, but also the, probably the bigger problem was the logistics of it. Now the ability to get this so the patient actually gets it into their hands, you know, we service a significant number of indigent care and that's about anywhere between \$30 and \$50 depending on where you buy the stuff, you know, and whether you have it drop shipped to your house or whatever. So, you know, even getting in our own formulary, we had this problem with giving it to people at cost. So, what I do is I use foundation money to just get 20 cases of stuff and have it available and when someone can't afford it we just give it to them. Because, you know, the hospital has been very supportive and, you know, they can see when I went to the executive board and showed that look, here's what the costs are, here's what we saved. And so, I think we should be giving this stuff to people who can't afford it. And they say fine. So, when you show them the numbers, everybody says, why would you not do this, you know? So, I mean, one infection, we save one perioperative infection in a deep space, in an esophagus or a pancreas, you paid for hundreds of people to get this formula.

Paul Wischmeyer: 08:04 It's really remarkable you know. Really beautifully, you and Dr. Michael Scott wrote a really brilliant editorial in the recent Anesthesia and Analgesia issue from the June issue in Anesthesia and Analgesia where you had an editorial titled Perioperative Nutrition: A High Impact, Low Risk, Low Cost Intervention, and for the listeners you can find this online. It's free to download and you even state some of this data that, you know, for every dollar we spend on these kinds of oral nutrition supplements, there's data to show, we can save \$52 in hospital costs and I think like you said, one surgical infection in a large major surgical case, like you said, pays for hundreds of patients. And so, it sounds like you've had some success going to your hospital administrators, and I've heard this story at other places, University of Indiana and others, who've had success getting administrators to pay for this. Do you think that's

the future, one of the futures that all of us should be striving towards?

Bob Martindale: 09:05 Yeah, I think so. Now I can say that if the patient has the resources, I see no trouble. They can get it for like around \$30 at Vanguard, \$35, they now charge at our outpatient pharmacy. There's actually a place in town that people can buy it for \$31, and if they have the money, great, because insurance doesn't cover it currently. But I would love to see the insurance carriers say this is cost effective and we've actually approached the insurance carriers and they haven't been too excited about this. You know, if they had a prescription for a preop perioperative period then they'd say-- you know, because the cost is virtually nothing. Our Hospital pays about 25 bucks for it for five days and I tried to sell it at a cost, but I was not very successful because there was a stocking fee and blah blah blah, you know. So, but I don't think the, the cost is not a big issue. I think it'd be great if every hospital paid for and just gave it to everybody that gets major surgery.

Bob Martindale: 09:58 There's got to be people that are willing to educate why it's important. And I think you know, which is interesting if the nurse just says, oh, on the way out, the doctor wants to you to get the stuff and drink it for five days before surgery. That doesn't work. We've actually tried that. In the early days in the late nineties we were doing big prospective trials with a formula, similar formula, which compared to what we have today, it was not quite as good because the fish oil wasn't encapsulated, so it was a little hard to get people to drink it. Their cats loved it, but the people didn't like it much.

Paul Wischmeyer: 10:32 Yeah.

Bob Martindale: 10:32 And that was it. Now that the fish oils encapsulate, you can't taste the fish oil. But anyway, people now drink-- and the trouble is if the nurse says that they'll pick this up on your way out today. You know, about half the time it gets picked up. If the physician who's there, who's talking to them about their surgery and says, now, you know, tomorrow or next week we're going to have a big operation. Here's what you need to do preop: got to make sure you don't ever touch a cigarette. You're going to

make sure you go get this formula. It's going to help your immune system. And once the people get the concept that they're actually potentially making their outcome better and this is up to them to do it, they are all over it and they will then say, where do you buy it? How much does it cost? When can I get it? You know, that kind of thing. But if the doctor doesn't say anything to them that's going to be doing the operation it's not as not as accepted by the patient.

Paul Wischmeyer: 11:26

So I think what you're saying is, and I think a lot of dieticians are the ones advocating for this in the hospitals, is the dieticians and the perioperative nurses who so often are the advocates for this really need to identify and build up a physician champion and probably many physician champions in their surgical group to say this is just as important as the preop antibiotics or the preop smoking cessation or any of the other therapeutics that the patient does. And that is what the key to compliance, and I think that's always been the challenge is. And we actually write prescriptions for it so that, you know, we give them their prescription for their preop antibiotics. We give them the prescription for whatever other preop pain meds they may need and then we have write a prescription for their immunonutrition and for their preop nutrition supplements, whether it's a high protein nutrition supplement or oral nutrition supplement. So, it sounds like you're doing the same thing and found that that's what the real key to success is.

Bob Martindale: 12:21

Yeah, I think it's truly a team effort. So they are told several times. Once by the doctor counseling them about their surgery, at the preop clinic when they talk to the anesthesia service preop and also by the nurse leaving the clinic. So they've heard it three times and then they started to go, gee, this must be good.

Paul Wischmeyer: 12:35

And do you have your patients, I know I always get the question and I've heard you speak about it many times, do we just give it before surgery, do we give it after surgery? Is one better than the other?

Bob Martindale: 12:47

Yeah, I think depending on the patient, if the patient is perfectly healthy, the data would say we probably don't

need to give it postop if everything goes well with surgery. I think if the patient comes in with some amount malnutrition or some compromise, then we should give it pre and post. That data is pretty good. The Marco Braga data is the best, with just preop. He did a three-leg study where he did one, standard of care, two, just preop, three, with preop and postop in a well-nourished population who had lost less than 10 pounds and several criteria, albumins are greater than three point two and I don't remember all the details now, but basically that was one published in 2002 in Gastroenterology. So, he took a well-nourished population and showed that in the well-nourished population who has an uneventful major surgery, they don't need the postop. If you take someone who's got some nutritional compromise, they do better with pre and post.

Paul Wischmeyer: 13:46 And so that's the other question I think you've really addressed it well is, I'll often hear, and I've heard you talk about, is this just for the malnourished patient or is this for everybody, you know? How do you address that?

Bob Martindale: 13:57 I can tell you that I had some surgery not too long ago, relatively minor and I know a buddy of mine, Steven McClave had a hip replacement and, you know, hip replacement, are now a day surgery almost, you know. And we drank it, believe me, you know. So, we drank the Kool-Aid of our own Kool-Aid,

Paul Wischmeyer: 14:17 Now we just need to get everybody else to drink the Kool-Aid.

Bob Martindale: 14:20 I think the metabolic modulation concept we miss sometimes because it goes, oh, it's immune enhancing so you know, and you go, well I got a normal immune, I'm just I'm not gonna bother. But it's a metabolic modulation and see a concept that for the same exact identical insult that you can lower that response with the fish oil concept and now we know so much more about fish oils that we actually enhanced the resolution of inflammation. We know that the fish oils go on to produce these specialized pro resolving mediators, or resolvents and those resolvents actually decrease the pain now. We've got two papers, really recent papers showing that with the use of

fish oils in the perioperative period, we lower the pain of the patient. It's like a no-brainer. So not only do you get all the metabolic stuff, we get decreased pain, shorten the hospital stay, less inflammation. You know, it just makes sense.

Paul Wischmeyer: 15:15

It's been a huge addition to the literature and I think it's part of the literature that most people don't know. Even those in the nutrition field are just hearing that, gosh, there's so much more to this, like you said, just the fact that we need to support the immune dysfunction that occurs after surgery to prevent infection, but like you said, we're manipulating metabolism, we're improving pain scores. I've even heard perhaps we're reducing DVTs, possibly some of the big data sets are implying because of the effects of arginine. And so, I think there's so many exciting directions and so many benefits for our patients that this could have. I guess, are there other things nutritionally that you think about with your patients. How have you begun to work towards nutrition screening and are there other nutrition interventions that you do in say higher risk patients?

Bob Martindale: 16:02

Yeah, you know, of course we're using cross-sectional imaging now and getting high risk, like the sarcopenic obesity we know now is our highest risk group and almost all these whipples and its objective is getting a staging CT scan so we have that data. So that's being used if we have that. We usually have it, you know, three weeks to a month before surgery. Even these big cases by the time they get worked up and their CTs and their consults and everything. So, we actually put them on an exercise program and a high protein diet for two to three weeks, whatever we've got before surgery and then five days before we switch them to this immune modulating formulation.

Paul Wischmeyer: 16:41

That sounds exactly the program we're working to start here at Duke as well, where we're doing the same. We're trying to screen them about a month out with the typical ASPEN/ADA malnutrition criteria that we've built into this PON score we published in that same *Anesthesia & Analgesia* issue. And then we too are trying to start up an exercise program that combines with a high protein oral

nutritional supplement or EN or PN depending on what the patient needs to try to, for the month before surgery, intervene on them. So, it sounds like we're all thinking very similarly. Have you had good success in adding the CT scan though, it sounds like, to look at lean body mass and do you have cutoffs you use for Sarcopenia or how do you clinically apply the data you get from the CT scan?

Bob Martindale: 17:25

Yeah, we have had success. When we look at the CT, you could almost look at it and say, oh, look at all that marbling in the paraspinal muscles and look at their shrinking down, and look at the amount of fat mass, so you can almost get a gut feeling. But now that the software is actually free, from that, I think it was January 2016, where it was, you know, we can get it for free. The first time I bought this software it was \$5,000, you know, and now it's free software. So, we get actually get it and use it. We just published a paper last month on in nonmalignant disease showing it's probably not as critical, but I know that Jay Patel has now got a couple of articles looking at the quality of the muscle by looking at the amount of fat actually in the muscle. You know, so that's gonna probably be the next wave is we're going to refine the idea of just cross-sectional volume. We're going to refine it and look at, you know, Hounsfield units and say, aha, this is fatty, replaced muscle and that's going to give us even a higher risk. So, I think the concept of cross-sectional imaging is well received. Our dieticians now at nutrition rounds will say, well, we looked at their cross-sectional imaging and, you know, it's pretty shocking to think how far we've come to have our dieticians now using CT imaging to help with their assessment.

Paul Wischmeyer: 18:38

Boy, for all the dieticians listening, this is an exciting new area to hear that this is becoming reality for all of us to possibly have our dietitians and our nurses and our nutrition teams be able to themselves look at this data. And so, what you're describing just for the audience is, are using the sliceOmatic software?

Bob Martindale: 18:55

Yes.

Paul Wischmeyer: 18:56

Yes. That sounds like the sliceOmatic software, which now it sounds as though I've heard too, you can get as freely

available. And the other things that we've just heard in the last few weeks is there's now an automated version that you can pay a little extra for that will partially automate the analysis and make it much faster, uh, for the analysis. And the other thing I just heard the other day, which excited me is one of our radiologists told me they now can do single cut CTs and only get L3 and expose the patient to less radiation than a chest x-ray so that we can do sarcopenia measurements, not as part of a routine CT, which of course you're right, we get in all the big surgeries, but if we want it to follow it or get it in another patient, they now have technology where they can do a single slice CT of the L3 and get us only nutrition information and expose them to trivial radiation and we can maybe someday finally get nutrition focused CTs with minimal risk to the patient. I haven't seen this in action yet, but we're gonna do some research, I think, coming soon and maybe even start a clinical program to try to take advantage of that. But it sounds like you're way ahead. You've got dietitians reading your CTs already and I think that's a real call to action, and exciting chance for all of our dietitians to have objective nutrition data. And I think the quality piece of the muscle is so key.

Bob Martindale: 20:12

Sure. I agree.

Paul Wischmeyer: 20:13

So the dietitians, must be pretty excited about that I would guess.

Bob Martindale: 20:18

Yeah, they are. I have to say I think that dietitians today are much different than they were 20 years ago. They're very much interested in the clinical science and they're young scientists, you know. They're out there asking the questions and kind of pushing the doctors and the doctors who were trained many years ago are looking like, what the hell, you know? So, I think it's a new era. It's a new era when you hear a dietitian go, well if you look at the cross-sectional imaging of L3 you'll see this patient is at very high risk, and the guy's looking at him like, who? What?

Paul Wischmeyer: 20:50

Yeah. For all the dietitians out there, you really are the future of nutrition care. And like you said, you are the young scientists because again, as we've said, three quarters of American medical schools aren't teaching

doctors clinical nutrition and so you are the, you are the champion. You are the knowledge base for the care of patients today. And so, I think this is just another opportunity just to build on the already amazing job our dietitians do. Any other words around the traditional things you do? I know you do some probiotic stuff and I know you're using some high protein oral nutrition supplements. Any comments around those?

Bob Martindale: 21:30 You know, I'm almost a fanatic with, as you know, with probiotics. Yeah, we routinely give probiotics with our bowel preps now based on some literature in 2015, which has progressed. You know, so they'll take a bowel prep, but then they'll get probiotics with that bowel prep and the literature has shown support for that. And of course, we give perioperative probiotics. We're a strong believer in prevention for c. diff. is better than treatment of c. diff. And we know that, you know, probiotics or a week sick once you've got the disease. But it's preventing the disease. The literature as well as last week's literature on a huge study, 6,000 patients. And in December 2017 we have great data in Gastroenterology on a 7,000 patient meta-analysis where it showed basically the same thing. If you give it on day one of postop, but there's good antibiotics, then virtually you eliminate c. diff.

Paul Wischmeyer: 22:22 Yeah, that's exciting. And are you combining that? You know, there was the big Nature paper that showed that a probiotic, prebiotic combination could reduce infection, sepsis, reinfections in many thousands of infants in India, which is amazing, right? And so, do you do some prebiotic combinations as well?

Bob Martindale: 22:41 Oh yeah. We do. We are big believers in, you know, I hate to say, but we're big believers in the concept that we need to get back to the basics. You know, we need to give a good mixture of prebiotic soluble and insoluble fiber. We're a little cautious in the perioperative period with the insoluble fibers. You know, we're fine with soluble fibers, but we're a little cautious with insoluble because we wait for motility before giving an insoluble fiber.

Paul Wischmeyer: 23:07 Gotcha. And then any other... that was really a great paper, that clinical nutrition, surgical nutrition guidelines.

Any other big recommendations that came out of that that you think the audience should be aware of that, that you found compelling?

Bob Martindale: 23:22

Yeah, I think the high protein data is still very strong. You know, and I think leucine, you know, I don't give routine leucine supplements, but I tell my elderly population that certainly exercise with a protein intake is critical and they're not going to do well without-- it takes both of those, not just one. So, I mean we literally get people on ventilators out of bed.

Paul Wischmeyer: 23:44

Yeah. And that was in the guidelines that we did, in the Anesthesia & Analgesia issue, that was one of our strongest recommendations, that all the perioperative patients should be getting high protein, more than one point two grams per kilo to deal with the metabolic stress of their major operations. And I think that's a push all of us can make that's a simple practical push using the high protein oral nutritional supplements that are widely available in the markets today. And the other interventions we have.

Bob Martindale: 24:08

We're actually shooting for two grams. We sometimes don't get that high, but we like two grams per kilo in the perioperative period.

Paul Wischmeyer: 24:15

Yeah, that's usually my goal too. And so, I think if we can get people all pushed towards that direction, I think it sounds like we'll do a lot of good things. And then the next piece is how we combine that with exercise, and I actually encourage my patients, the ones that lose a fair bit of weight that are willing, the branch chain amino acids containing leucine, I often encourage them to take them at night before they go to bed. There's some data in the elderly that show that can improve muscle mass, 17 to 20 percent because, you know, you're anabolic overnight. But I think that's something else that needs some more work. If we could, if you could summarize sort of the key thing you would want a listener to take away to really advocate for change in their hospital, what would it be? Would it be immunonutrition pathways? What would it be?

Bob Martindale: 24:58 I would say the concept of metabolic modulation to optimize outcome is in key, and I think the data is overwhelming. Whether it be preoperative lowering metabolic responses stress or whether it be the immune benefits of the arginine or whether it's the emerging benefits of nucleic acids. I mean, we're learning more everyday about all three of them.

Paul Wischmeyer: 25:18 So really, getting that five days before surgery, five to seven days before surgery with the immunonutritional supplement would really be the thing that you would key on.

Bob Martindale: 25:27 Absolutely.

Paul Wischmeyer: 25:29 Absolutely. And then, I suppose all of us wish we did better and better on the malnutrition screening, but it sounds like you're really seeing, to summarize, the CT scan is a big future for our abilities to help diagnose our patients and objectively measure their risk.

Bob Martindale: 25:49 Yes. I think if the patient has a CT. I'm probably not to the area yet where we'd order a CT just for nutrition, but maybe with the new data on the L3, single shot L3, that might be a future. But right now we have a CT, which of course most big operations in today's world have a CT scan.

Paul Wischmeyer: 26:00 Yeah, for sure. Any other final words of wisdom or inspiration for the dieticians and young physicians and others trying to push to champion implementation of this kind of care?

Bob Martindale: 26:16 I think just learn the science and it will be accepted by the old dogs like me. You know, it's hard to get them to change, but they'll do it if you teach them well enough and you show them the science. And hang in there because sometimes it takes some time.

Paul Wischmeyer: 26:29 Yeah. Change is a tough thing. Passion, purpose, and perseverance, right?

Bob Martindale: 26:33 Yes. Yes.

Paul Wischmeyer:	26:34	This has been really great, Bob. I always enjoy talking with you and really have been honored to be able to speak with you so many times and thanks for taking the time to help enlighten our audience and hopefully continue to help improve the care of our surgical patients.
Bob Martindale:	26:49	Great, Paul. Thank you very much.
Announcer:	26:50	Thank you for listening to the DCRI's Perioperative Nutrition Podcast, sponsored by Abbott Nutrition. More episodes are available on SoundCloud and DCRI.org.