THE IMPORTANCE OF MUSCLE MASS & HMB DURING ILLNESS

Featuring :: Suzette Pereira, PhD

TRANSCRIPT

Maura: I read something from the Harvard Medical School recently. It was a quick article from *Harvard Men's Health Watch*—I just stumbled across it in my research—and one quote caught my attention. It read: "The saying goes that there are two certainties in life: death and taxes. But [people] should add loss of muscle to the list."

Maura: Indeed. A quippy comment, but it hit home. Use it or lose it, right? Age-related muscle loss—or, sarcopenia, as you may like to call it—is a natural part of aging that can begin as early as our 30s. We can work to maintain it by eating the right things and keeping our bodies moving. But as we lose it, we run the risk of diminished strength and mobility, of working a little harder in our daily lives, or struggling a little more when we're not feeling well.

Maura: Now, consider these basic ideas in the context of Covid-19. If you've been following this podcast series to date, you've probably noticed that many of the experts I've interviewed so far have stressed the importance of lean body mass in fighting and recovering from this virus.

Maura: Our guest, Suzette Pereira, PhD, is a Senior Associate Research Fellow at Abbott. Over the course of her 18-year tenure at Abbott, she has led muscle research aimed at understanding mechanisms leading to muscle and functional loss due to sarcopenia, malnutrition, hospitalization and chronic disease. She conducts both clinical and preclinical research towards developing therapeutic nutritional interventions such as HMB, or beta-hydroxy-beta-methylbutyrate.

Maura: Suzette, welcome, we are thrilled to have you on the podcast today.

Dr Pereira: It's my pleasure to be here. Thank you for inviting me.

Maura: One thing to note: This podcast recording may sound a bit different than you're used to hearing. For the sake of social distancing, Suzette and I are both dialing in for today's discussion rather than sitting in the studio.

Maura: Suzette, before we start, can you tell us a little bit about yourself, your current role, and what brought you to focusing on muscle health in your research?

Dr Pereira: I am a Molecular Microbiologist by training, received my doctoral degree and post-doctoral training at the Ohio State University. After that, I joined Abbott as a researcher. I have been at Abbott for almost two decades now and spent most of my career researching muscle, muscle metabolism, muscle loss, and then also trying to understand if there are specific nutrients we can identify that can help preserve muscle. The reason why I've been focused on muscle health research is because over the years, there's been a lot of research that shows that if you lose muscle, it can have a really devastating effect on your health and your outcomes.

Dr Pereira: But the problem is people are not aware of muscle loss—not even physicians sometimes. So there is no

real, easy way to make people aware of this problem. I thought it would be a really good idea to really understand what causes muscle loss, and if there are nutritional solutions for patients to address this huge problem. Because eventually we all want to live an active and healthy life, especially as we get older.

Maura: Those are all great points already, because it seems like we don't tend to hear about muscle mass as much as we do other health concerns with patients. Why is muscle mass for important for health? And why do you think we don't hear about it more often?

Dr Pereira: You are correct, Maura, in saying that we rarely hear about muscle. What surprises me is that when you look at muscle, muscle is one of the biggest organs in our body. Around 30-40% of our body is made out of muscle. We use muscle all the time—we use it to move, we use it for physical function, but I think people don't realize it's key for a healthy metabolism as well. So blood glucose control—a huge issue for people with diabetes—is actually a muscle dysfunction problem. When you're ill—especially if you're hospitalized with an illness—your muscle is really important because your body reaches to the muscle for amino acids, for nutrients, and so your muscle is almost like your insurance agent.

Dr Pereira: The problem is that people cannot see muscle loss so it not top of mind. And this is especially true in this day and age where people are overweight. So you really cannot see your loss of muscle because your body weight might not change very drastically. People weigh themselves all the time on the scale, but that will not reveal your muscle mass. And people are aware of BMI—the body mass index—but that, too, is not a great indicator of your muscle mass. And because you cannot see your muscle loss and you're not aware of it, people do not think about muscle. But it is a problem, it's happening to a lot of us, especially once you hit the age of 40. And we need to address it before we have extreme muscle loss.

Maura: So as you said, you've spent most of your career researching this topic. And when you think about your research, as well as research from others, what have you identified as the main risk factors for muscle mass loss and what patients are at highest risk for losing their muscle?

Dr Pereira: Aging is one of the key risk factors for muscle loss. Research has shown that as we age—so once we hit the age of 40—we will start lose up to 8% our muscle per decade. Once you cross 70 yrs, that really accelerates, and you can lose up to 15% per decade. So that's a huge amount of loss in a short period of time. And associated with this loss of muscle mass, is loss of strength and physical function, and that is now termed "Sarcopenia."

Dr Pereira: If you have a chronic disease—something with high inflammation, like cancer or COPD, you are at very high risk of muscle loss because the inflammation, the inflammatory factors circulating through your body actually target muscle.

Dr Pereira: Also, we know now from our research, as well as research from other labs, that if someone is on extended bedrest—if they're in the hospital for an extended period of time, this immobilization accelerates muscle loss. Research has shown that older adults can lose almost 1 kilo (~2 lbs) of muscle mass in their legs in just 10 days of hospitalization. So that is a lot of muscle to lose in 10 days.

Dr Pereira: If you're in the ICU—of course these patients are very, very sick with high inflammation—they can lose 2 lbs of muscle in just three days. So you can see that as people are subjected to more inflammation, more immobilization, they're at a very high risk for losing muscle, and that muscle loss can have devastating consequences on their recovery.

Maura: When you look through the lens of the current COVID-19 pandemic, which as you know is impacting so many individuals globally, what is the further impact of muscle mass loss in these patients? And are these patients with COVID-19 at greater risk for muscle mass loss?

Dr Pereira: Yes these patients with COVID-19 are especially at high risk of muscle loss, especially those patients that get hospitalized. Because we know that from research that if you immobilize someone for a long period of time, even up to 10 days, it can lead to acute loss of muscle in a healthy person. If you're sick, if you have high inflammation, which is what a Covid-19 patient is experiencing, since many of them have the cytokine storm going on in their bodies, this will lead to very, very severe muscle loss that will have a devastating effect on their recovery, getting back to their feet, if they don't do something to preserve their muscle and to try to prevent that loss during the hospitalization.

Dr Pereira: One of the things we need to remember for Covid patients—they may develop malnutrition along the way because they're not eating, there's a lot of inflammation, and this combination of malnutrition and high inflammation will accelerate muscle loss.

Maura: And when individuals lose muscle mass, how does that impact their health status and clinical outcomes?

Dr Pereira: If you are a healthy aging person, you will lose some amount of muscle. You may not see it but you will start to feel it. You'll start to feel less strong—so a little weaker, and maybe not able to do things you can normally do, like climb stairs or walk at your usual pace. But you really feel the effects of muscle loss when you are a clinical population—so when you are hospitalized or you have chronic disease. In clinical populations, such as hospitalized populations and , such as people with cancer or COPD, there's numerous studies that now show that if these people lose muscle, and they also start with low muscle, they have worse health outcomes. They have slower recovery time. They have higher risk of infections. They have a higher risk of readmissions to the hospital, and also there's a higher risk of mortality. So your muscle mass can actually dictate your survival, which is a really scary concept if you're not thinking about your muscle.

Dr Pereira: In cancer patients, it has been shown that patients with higher muscle mass were better able to complete the chemotherapy regimen. So they had less side effects of chemotherapy, and this led to higher survival rates. So even with a patient living with cancer, they may not be thinking about muscle but they should, because that is going to improve their outcomes in the long run.

Maura: So let's switch gears and focus on what can be done in terms of intervention for these patients who have muscle loss, and what specific nutrition intervention can be provided.

Dr Pereira: If we want to address muscle loss, we need to start thinking about nutritional ingredients that focus on rebuilding muscle. So of course the first macronutrient to come to mind is protein.

Dr Pereira: The reason protein is so important to muscle is that protein provides the amino acids or building blocks that go into making muscle. If you don't have enough protein, you're not going to be able to build or rebuild your muscle. Now, we know there is a daily recommended allowance of protein, but as you get older, experts now believe that people should be getting a lot more protein than the recommended daily allowance. Experts recommend that if you're a healthy older adult, you should get at least 1-1.2 g protein/kg bw/d. And you're hospitalized with a chronic disease, you need much higher: 1.5-2 g protein/kg bw/d.

Dr Pereira: Besides protein, of course we need to make sure—especially for people in the hospital who may be malnourished—that they get key vitamins and minerals that be needed to help muscle as well as the calories, because if you're malnourished, you do need calories. We have been exploring some new nutritional ingredients that can target muscle loss, and HMB is the key one that comes to mind. What we've shown is that HMB can preserve muscle, especially during catabolic conditions where there is a lot of muscle loss. And so we think combining HMB together with protein and key vitamins and minerals would be a good approach for patients, especially those in the hospital who are losing muscle.

Maura: I'm glad you mentioned HMB, which as we know is a metabolite of the amino acid leucine. Can you tell us a

little more about what HMB is and what its' benefits are?

Dr Pereira: Sure, HMB is naturally occurring ingredient that occurs in your body when you eat protein. The protein is broken down into its respective amino acids, and leucine is an amino acid from which HMB is made in your body. You can also get HMB in certain foods like avocado, grapefruit and catfish, but it's present in very small amounts.

Dr Pereira: What our research has shown is that HMB can help muscle health. There's a lot of research on HMB and exercise, and what that research has shown is that HMB can help build muscle in the context of exercise. But our research, as well as research from other labs, has shown that even during conditions where there is muscle breakdown, HMB can actually preserve muscle—so it can protect the muscle from breakdown under these stress conditions. We have some new research that has also shown that HMB can help muscles recover, and can help muscle rebuild itself after injury, so it's a really interesting ingredient to target muscle health.

Maura: And in your research, what patient populations can benefit from nutrition intervention with HMB? Are there patients of certain age groups or with certain acute or chronic conditions that could most benefit?

Dr Pereira: I would say that any population that is at risk of muscle loss or experiencing muscle loss will benefit from HMB. We already talked about how, as people age, they experience muscle loss naturally. And those people would definitely benefit from HMB because we know it can help preserve muscle mass over time. If you have someone in the hospital, someone who is malnourished, someone with a chronic disease like cancer or COPD, were there is a lot of inflammation that can impacts your muscle, that's where HMB can have a benefit, because we have data showing that, under highly catabolic conditions, HMB can actually preserve muscle and protect it from catabolic molecules that signal muscle breakdown.

Maura: From your preclinical and clinical research with HMB, what have you found the most surprising and exciting in terms of results of the benefit of HMB?

Dr Pereira: We and others in the field have been researching HMB for a long time, and what we found is that HMB plays a dual role in muscle. On one hand it can help muscle build itself, and it does that by stimulating the signaling pathway that leads to muscle protein synthesis. Muscle protein synthesis just means that building muscle and tissue. But what we also found on the other hand is that under catabolic conditions—conditions when there is inflammation, and signaling molecules that cause muscle to break down—HMB can mitigate that loss. It lowers the signaling molecules and pathways, and this leads to preservation of muscle. So in this way, HMB helps maintain the muscle in homeostasis, and it preserves it so there's no loss, even during a catabolic state.

Maura: Can you tell us in that context, what are the clinical guidelines that recommended the use of HMB?

Dr Pereira: As I said, there is a lot of evidence. And the evidence is growing on HMB, and the benefits of muscle. ESPEN recently put out guidelines on how to help polymorbid internal medicine patients through nutrition. In these guidelines, they include patients who are hospitalized and have at least two comorbidities. These guidelines are based on research they conducted, looking at over 4000 studies, and from those 4000 studies, they found 38 to base their guidelines on. In the guidelines, they recommend that a malnourished polymorbid medical inpatient—people who are in the hospital—those at high risk of malnutrition, would benefit from nutrition-specific oral nutrition supplements that contain HMB. And what they mention is these nutrient-specific oral nutrition supplements should be administered, because they help maintain muscle mass, reduce mortality or improve quality of life.

Dr Pereira: This is very exciting because we have a scientific society that has come together and is recommending the use of specialized nutrition—nutrition that contains HMB—to help a hospitalized population, maintain muscle mass and improve their quality of life.

Maura: What do you think the future holds in terms of HMB research and how it can benefit patients with muscle mass loss?

Dr Pereira: I believe the future is really bright for HMB. Every day we see more and more clinical evidence coming out from labs all over the world where people are exploring HMB in many clinical populations, and they're showing a benefit on muscle loss. We believe that if we combine HMB with protein and other key vitamins and minerals, it can provide a power nutritional solution for patients in hospital, for patients experiencing muscle loss due to chronic disease, for people who are recovering at home after they got out of the hospital. Eventually our goal is to get these people back on their feet and able to lead a healthy and active life and do the things they want to do. And I believe this is especially important during this COVID pandemic, because we're going to see more of these patients who are experiencing severe muscle loss and are now at home trying to recover and regain their strength and energy. What they need are specific nutritional solutions that is going to help them get their muscle mass back and feel more energetic as they get back on their feet.

Maura: Lastly, how can clinicians caring for patients on the front lines of healthcare take this research on muscle mass and HMB and implement it into their practice? How can they take all the exciting research in this area and make it real in their health care setting?

Dr Pereira: Well, there is a lot of scientific evidence is out there showing how HMB can benefit muscle, how it can preserve muscle during catabolic—conditions that physicians see all the time in the hospital with their patients. And hopefully, those who have not been aware of muscle loss, after listening to this podcast will become more aware of the importance of muscle health for their patient and start to think about nutrition as a solution as they journey through this recovery process.

Dr Pereira: Maybe it would be useful for physicians to be intentional about recommending muscle building foods; food that are high in protein, that deliver enough protein in the right format for these patients so they can get the protein they need either because they're ill or because they're aging or because they've just come out of the hospital. If patients cannot eat food, there are many, many options out there like oral nutritional supplements that can provide not just protein and calories but also specific ingredients such as HMB, because we know HMB has a benefit on muscle health.

Dr Pereira: And lastly, exercise. We know that exercise is so important for muscle health. If they can encourage their patients to incorporate some form of exercise into their lifestyle, that would definitely be beneficial overall for their muscle health, and of course we know if you combine exercise with the right nutrition, you'll have the best possible outcome for your patient.

Maura: This was fascinating. Thank you so much. We appreciate all you're doing to help build awareness for the important role nutrition has to play in the management of patients with this virus.

Maura: Now, for our listeners, if you're hoping for more podcast episodes on nutrition and immunity, rest assured we're developing a series of additional episodes to help support you—in fact, we have a host of Covid-19 related episodes already on our website, and we'll create more each week until this virus begins to subside. You can find these recordings on anhi.org by clicking "RESOURCES" then "PODCASTS & VIDEOS." Don't miss an episode: Become an anhi.org member today by clicking "REGISTER" at the top of our homepage to receive regular nutrition science news updates from our team. Or, follow the Abbott Nutrition Health Institute on LinkedIn.

Maura: Finally, our website, anhi.org, has a series of printable resources related to this topic—for instance, infographics on **nutrition and immunity**, **dehydration**, and **why maintaining muscle matters**. You can find these resources on anhi.org by clicking "RESOURCES" and "PRINTABLE MATERIALS."

Maura: Thanks everyone. Stay healthy and safe.