

- S1 00:03 Welcome to the Sports Medicine podcast, brought to you by the Sydney and J.L. Huffines Institute for Sports Medicine and Human Performance in the Department of Health and Kinesiology at Texas A&M University. At the Huffines Institute, we're always working to facilitate, apply, and bring you the most up-to-date coverage of the wide world that is sports medicine and human performance, all in the language you can understand and share with your friends. And now, here's our host, the director of the Huffines Institute, Dr. Tim Lightfoot.
- S2 00:33 Well, hello and welcome to the weekly podcast from the Huffines Institute for Sports Medicine and Human Performance. I'm your host, Tim Lightfoot. And I'm so glad that you took the time to download us and you're taking the time to listen. Every week, we really work hard to bring you an interesting person in the world of sports medicine and human performance, and this week is no exception. We have with us in the studio today, a guest that we should've had on a long time ago, but we finally got him here. We have Dr. Rob Chapkin with us. Welcome to the podcast Rob.
- S3 01:03 Thank you. It's a pleasure to be here.
- S2 01:05 We're glad to have you. Rob is a longtime affiliate here in the Huffines Institute and he's a good friend of us, and some of the things that we've done. And I'm going to take a few minutes and tell the audience a little bit about you. Rob is one of the more distinguished scientists that we've had on the podcast. He has a bachelor's degree in nutrition and biochemistry from the University of Guelph in Ontario, Canada. He also has a master's degree in nutrition from the same place. He has his PhD in nutrition and physiological chemistry from the University of California, Davis. And everyone may be picking up at the direction that we're going here with nutrition. He did a post-doc in cell biology at the University of California as well in Davis. And he's currently here at Texas A&M. He's a distinguished professor, university faculty fellow, a Regents fellow, and Agrilife senior faculty fellow.
- S2 01:53 As a faculty member, he's probably got more titles than anybody else I know. And, for those of you who really don't know, in all seriousness, distinguished professor is the highest rank that faculty can achieve and that's really big deal. So we're really pleased to have Rob with us. As we noticed, he's in the Department of Nutrition. He's, as we've said, quite a distinguished researcher. He has several national awards. He has over 250 scientific publications, multiple million dollars of grants that have come from various federal agencies, including a really huge award that came from the National Institutes of Health from the National Cancer Institution, a grant called the R35 that hit last year. This is the Outstanding Investigator Award, and that's a seven-year award where basically they just give you money and say, "Go do whatever you want to do."
- S3 02:44 Well, we do have to provide some plans, but by design, it's supposed to be flexible to allow us to do transformative research.
- S2 02:55 And in the audience, again, doesn't realize, that's a fairly new program, but it's very, very selective. And they don't do many of those, so congratulations Rob. It's really an honor to have somebody here that's got one of the R35s.
- S3 03:05 Thank you, thank you.
- S2 03:07 So Dr. Chapkin does work primarily in a couple of areas. The website says dietary chemo prevention, and he works to improve gut health, and reduce inflammation through dietary methods. And so we're going to unpack that a bit. Let's start with you're probably best known, again, for some of your cancer work, the chemo prevention. And so tell us a little bit about that. You really do focus on the prevention,

cancer prevention.

- S3 03:33 Yeah, we're really all about prevention, because basically, you can't treat chronic disease very effectively through drugs. Drugs play a very important role, commonly referred to as therapeutics. They save people's lives. But they actually only help relatively small numbers of people and they cost a great deal of money. So they're really not cost effective. They are life saving and they are transformative, and we should continue to invest in them. Currently, NIH invests more than 95% of its portfolio. That's the National Institutes of Health, the major funding of biomedical research in the world. And really, almost ignores prevention and yet, all the experts say that the only way to combat chronic disease is through embracing prevention. And prevention is very broad, from sociological, lifestyle, you name it, and then where we come in at the mechanistic level. We really want to understand, what is it that diet does to our bodies? What are the mechanisms by which they either enhance risk or reduce risk? And in my lab, we focus primarily on colon cancer and different forms of inflammation, usually of the intestines.
- S2 04:46 So, that may have just caused some people to have a little slip of mind, because most people don't think about diet as a way to prevent cancer, but it's a very effective way.
- S3 04:55 Absolutely. More than 60% of all cancer - and this is being scrutinized for decades - is known to be related to diet. And I lump into that obesity, since obesity is a byproduct of diet to a very large degree and risk goes up for all chronic diseases with obesity. And you don't get obese basically if you don't eat, and so this triggers a very complex discussion on why can't Americans regulate themselves or people in the world regulate themselves more appropriately and get their body weights down. And the trajectory of this obesity crisis has skyrocketed over the last several decades. So it's not because of our genetics, it's because of our lifestyle that we have really changed our eating patterns and what we eat and how much we eat. And that's affected our body in many cases in a negative way, enhancing risk of cancer, which we study. But you can take heart disease, diabetes, you name it, every disease, even Alzheimer's can be affected. So we would like to get the word out to the American people. And they already know this, that prevention, preventing the problem from developing or slowing the development of the problem, in this case cancer, makes a lot of sense and we need to focus more on that.
- S2 06:18 Do you find people surprised by that message that they can actually lower their risk of cancer by what they put in their mouth to eat? Like you said, do you think they know it and they just don't want to admit it?
- S3 06:30 They have fragments of knowledge. They understand the intuitive message though that basically, what you are is what you eat kind of general dogma. But of course, they have little or no insight into really how does it work? They punt on that. And understandably, it's very complicated. So unless they have a specific training in areas, they're going to only imagine things. And that's where word of mouth really is an interesting distortion of some of these values, where people just get a perception of what they think is true from somebody they bumped into somewhere--
- S2 07:10 In the grocery store.
- S3 07:11 It could be anything and everyone experienced that. And people who don't have the scientific knowledge can't really weigh those comments against anything. So they don't know what the facts are and then they're sort of whimsically adapting behavior changes. Some of that can be beneficial and some of it can be totally counterproductive. So, that's where we weigh in. What are the scientific facts? What do these compounds do that we eat? Are they beneficial? If so, how do they work?

What context do they work? Do they stop working in certain cases? And remember, not one size fits all. We're trying to really personalize. The future is personalizing the nutrition. And the medicine is the same thing. Personalizing it by understanding your genetics and your lifestyle to really understand what is going on and why would something be effective or why would it fail? And if we really understand that, we can deal with these long-term issues, improve the quality of life for the majority of Americans and importantly, save the country from going bankrupt with its healthcare costs. So it's a double win-win.

S2 08:20 Right. It's amazing, people, yes, they know about prevention, but all the investigation as you said goes to the therapeutic drugs. But people forget that if we do simple lifestyle changes, it can save us money, it can make us healthier, it can benefit the United States in general.

S3 08:35 Yeah, absolutely. So depending on what your health plan is, again, people have very different political opinions about this, but we will go bankrupt as a country if we don't get our healthcare under control because dealing with people when they have full-blown crisis, biological crisis, is not cost effective. So we want to get people in, make informed decisions so they can reduce their risk and therefore, the cost of their care. And most importantly, to the person, their motivation be, "My quality of life will be improved." And that should be a winner for everybody.

S2 09:13 Well, and that's the first line of healthcare is the personal choices that you make as far as what you eat and whether you exercise or not as well. And sometimes that gets lost in the deal.

S3 09:21 It definitely does get lost. And nutrition is only one part of this. The whole lifestyle, I say that. That's why exercise, incredibly important. And how do we enable people to do these things? And it's really, we need as a society need to make significant changes or we're going to only exacerbate the problem. We'll put a little band-aid on it, we'll feel good about it and then we'll find the majority of the population are in desperate situations, and we're surprised by our failure. And that's where we've been for 20 years now. I mean, going downhill rapidly, with a few very modest exceptions. So I'm part of a group of scientists who feel, if we better understand the mechanisms by which some of these bioactive molecules work or don't work, then we can make informed decisions and maybe we bring drugs in, in some capacity. But again, it's through knowledge, not the denial of knowledge.

S2 10:21 So let me ask-- we'll ask a-- I'll ask a global question and then we'll talk about the mechanisms because you have some fascinating work you're doing with how the stuff actually works in the body that I want to get to, but we've kind of danced around the issue a little bit. So if you had to give some general recommendations for types of food people should eat that are chemo preventive, what should people focus on?

S3 10:42 Most of our data and there is growing clinical evidence, I'll use a term here and then I'll define it. I'm a very strong advocate of the pesco-vegetarian diet. So, that's a diet, the root words are pesco and vegetarian. First of all, high in fruits and vegetables. It's a high fiber diet. Fiber is something that our ancestors consumed a lot of and Americans consume actually very low levels now, less than 15 grams a day. And current estimates are, you need to consume at least twice that. The only way to get fiber is through the plant kingdom and so you've got to eat plant products. And the more you do, it seems that that really helps with a lot of risk parameters and improves them rapidly. The other is the pesco part and that's cold water fish.

S3 11:37 So we find when the bioactive components in both these worlds are presented, we get the greatest protection against colon cancer. And again, there's some clinical and

epidemiological evidence to support this. In other words, there's human data to support this. Most of our work is pre-clinical, meaning we use experimental models other than humans that we manipulate and probe mechanisms. And we spent over 20 years probing some of these mechanisms and really feel like we have an exquisite understanding of some of this. And we are hoping to recapitulate some of these findings in humans and writing grants to the NIH in order to conduct human trials to extend our knowledge from experimental animals. And that is the ultimate litmus test. But we're very confident that humans will behave in a similar way and--

S2 12:28 And there's anecdotal evidence out there.

S3 12:30 That's right.

S2 12:30 I mean some correlational data in humans that suggest that that's correct.

S3 12:33 Absolutely. So we're not grabbing at straws as it were. But the only way in science to prove things is to actually do the study and then to find out whether it was truly effective. And so fiber and the type of fat that you eat are two huge players in the cancer world, particularly the colon cancer world. And unfortunately, most Texans and Americans don't consume a lot of cold water fish: salmon, tuna, mackerel, herring, these kinds of fish - which I like personally - and fiber, meaning plant products. Now, most people will say, you consume things in moderation, that's fine. But if there's a chronic displacement in your diet, then all the data shows your risk of developing certain chronic diseases will increase. And most Americans, philosophically, don't really think about risk much. "I feel okay today, what the heck?"

S2 13:31 And it taste good.

S3 13:32 And it taste good.

S2 13:35 And we're in the middle of barbecue country.

S3 13:37 That's right. So I would say, you can barbecue in moderation, but barbecue actually has carcinogens in it from the smoke. So if you're barbecuing four times a week, you are increasing your risk of developing colon cancer.

S2 13:52 That's what the data shows.

S3 13:53 That's the data.

S2 13:53 I mean, people can be upset about that, but that's just what science tells us.

S3 13:58 Absolutely. So, that's why I eat barbecue, but I don't eat it on a regular basis. But that's my personal choice. And I personally look at the numbers and I'd like to be reflecting in my 90s on some of the good choices I'm making in life instead of something else happening.

S2 14:16 That's right. Well you know, and we mentioned mechanisms a few minutes ago. One of the avenues that you've gone down, you've really started to look at the gut microbiology and most people listening are familiar with what that is. So how are you linking the gut microbiome with this chemo-preventative effects of food?

S3 14:34 Okay. Well actually, there's a great deal of data on this in both humans and experimental models. And when I say experimental models, I mean everything from a fruit fly through a mouse and a rat. There's even primates that have been studied. And there's great over-- many of these mechanisms we study are highly conserved among species. So when your public say, "Why are you wasting your time studying something slithering in a dish?" It's because the biology has relevance to humans and we know that. But I won't get into that whole argument, although some people--

- S2 15:07 But that's an important point. That's an important point to make because people say, "Well I'm not similar to a fruit fly." Well actually, you may be more similar than you think.
- S3 15:16 And why support something like the National Institutes of Health - just to deflect for a moment - is a good point to make. They're supported by the federal government of the United States. They're currently under attack to cut their budget dramatically and they want the mechanistic answers and the translatable information to humans. And people ask, "Why not just let the private sector fund this?" I think this is an important point just to make to the public. The private sector is interested only in one thing and that's to make a profit. The federal government is not involved in the profit scheme. It's strictly knowledge for knowledge base and in this case, the knowledge can save human lives. That's one reason why you need to support this aspect of the federal government.
- S2 16:01 Right. And the industry doesn't want to fund prevention because it takes dollars out of their pocket.
- S3 16:06 They can't get the intellectual property but-- And that's partly why prevention is being ignored. There isn't a great commercial benefactor. I should go out and go to the insurance companies because they would save huge amounts of money if their clientele were actually healthier because their risk pool would shrink. But back to your original question on the microbiome. So basically, what happens is the plant product that comes in, some of that plant product is indigestible. So it's not absorbed in the small intestine. That's where the majority of molecules from the dye get passed into our body and then ultimately into our blood stream. So a lot of the plant product moves down the GI tract, the gastrointestinal tract until the large intestine, the colon. And in the colon, there's a huge microbiome, microbiota. Microbes by the trillions live there and have for thousands of years, maybe hundreds of thousands of years.
- S2 17:08 Get to know your bacteria.
- S3 17:10 And they symbiose with us, they live with us, they thrive in us. These are normal commensal bacteria, part of our very essence. And they chew, they further break down this indigestible material and generate small molecules, sometimes called short chain fatty acids, which are in high levels in the colon. For those scientists out there, millimolar levels, very high levels. And they impact the biology of the gut. So it's through the action of the microbes that many of the bioactives come indirectly and through the diet and then we use those molecules. And we've found that some of these molecules actually enhance the ability of the human gut to destroy damaged cells, cells that could become cancerous. There's a deletion mechanism called apoptosis. And that mechanism is enhanced by the consumption of the pesco-vegetarian diet. And this reduce risk and thus less cancer.
- S2 18:16 That's a nice mechanism.
- S3 18:18 Yeah, I mean I could go into more detail--
- S2 18:19 Sure.
- S3 18:19 -- but I don't want to bore your fans at home.
- S2 18:21 But you know, it really comes back to the increasing importance that what we know about of the microbiota. For many years, people didn't pay any attention to that. And over the last, what would you say, 15, 20 years, the importance of the microbiota, and microbiome, and our health has been gaining steam. And we know it's important to maintain the microbiome appropriately. And this is just another example of why it's so

important to have a healthy microbiome.

S3 18:46 We get a more diverse microbiome when we consume these high fiber foods. And diversity is generally considered very good when it comes to the microbiome. And actually, it's much less than that. Really, a technological advancement occurred where we could sequence the DNA from the microbiome very effectively. And that has been around for less than 10 years, so really a very short time frame. And there's been explosive interest. And if you look at the data just as a lay person, the microbiome appears to affect every element of our biology, from our cognitive capabilities to reproduction, obviously cancer, cardiovascular disease, chronic inflammation, and on and on the list. So you can imagine every walk of scientist is interested in, what is it doing? And I should say, the exercise of different types and durations, etc, also affect the microbiome. So were molding the microbes that live inside us through our lifestyle.

S2 19:48 By what we do.

S3 19:49 And basically, their health is our health. So it's time to clue into them as well.

S2 19:56 That's right. So to switch gears a little bit, we always ask our guest, what got you into this? One of the reasons we do this is because people are obviously passionate about what they do. You have spent almost 30 years doing this. There's a reason that you're still doing it. How did you get in this and what about this makes you passionate? Because people can hear you're passionate.

S3 20:17 I love to discover things. I mean, I think most scientists, what we do with most of our time, basically 99% of my time is research. Yes, I teach and do service, but the enormous contribution intellectually is coming through my research. And so we just keep following observations. And we find very interesting outcomes. And then the next question is, so how does that work? What's happening there? And what are ways to verify this? Should we come from a different angle? Do we need new methodologies, new collaborators? And this just continues to mushroom and grow. And in our business, usually, as long as you can get the resources to probe these questions, you can go to some pretty amazing places. And I've been very fortunate over my 30 years of research that I have managed to get most of the resources I need so that I could pursue the questions that really wake me up at night.

S3 21:16 And then in our business, we have to publish that knowledge in the public domain and then people read it. They get excited about it and we feel at some point, we can help move the human mindset into a place where we said, "This work actually did accomplish something," in terms of its translational potential. It finally has made its way into the human arena and it is impacting people who work in that dimension. They're asking us questions because they see the value in this new knowledge. And again, in the end, we're actually helping human beings improve the quality of their life and that's a very uplifting component. A secondary spin off of this is the great excitement and almost altruism associated with training other people to pursue the same vision as you. And you know very well, getting graduate students, undergraduates, and post-doctoral fellows in the lab is a way of really training the next generations of scientists to take up this gauntlet and to fight the good fight.

S2 22:21 Well, it's been great having you on the podcast. Our regular listeners know, at this time, we ask our guest what their take-home message is. So if there's anything that you want the audience to remember from this podcast, what would that be?

S3 22:33 Eat healthy and support higher education because we learn through knowledge. We've got to understand how our body is being affected by our environment and the only way to do that is to support science, and education, and our higher learning

institutions. So, that's my take-home message.

S2 22:52 Well excellent take-home message. And again, thank you for being with us today. It's been an honor to have you here.

S3 22:57 Always a pleasure to shake hands with you Tim.

S2 23:01 So, and we want to thank all of you for taking the time to listen. We always have at this time our podcast question of the week. And so here with our podcast question this week is our producer Carlos Guevara.

S4 23:12 What is a pesco-vegetarian diet?

S2 23:15 Great podcast question Carlos. Be the first one to send us the correct answer to that question. Send the answer to [huffines@tamu.edu](mailto:huffines@tamu.edu) and you'll get one of our nifty podcast t-shirts. Again, that's [huffines@tamu.edu](mailto:huffines@tamu.edu). And don't think you're too late. We've had a tendency to mail out multiple t-shirts some weeks. So get those answers into us. And again, we thank you all for being with us this week and downloading us. Rob, thank you again for being with us. Maybe we'll have to bring you back as we get closer to finding out how this works, huh?

S3 23:50 Looking forward to reengaging.

S2 23:52 There you go. And so we hope that all of you over the next week are able to stay active and healthy, and we'll see you next week.

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