Episode 83: Grey Market Peptides - BPC-157, Melanotan II and Toxicity

This transcript was created by AI from audio and lightly edited for readability. Treat it with caution, and assume occasional transcription errors may remain.

Transcript

Hi everyone, welcome back to the Tox Lab, I'm Rebecca. And I'm Rob. This week, we're gonna be taking a look at one of the stranger wellness trends that's going around the internet at the moment. Before I reveal exactly what that is, although I suspect the episode title may have already done so.

Probably. We are going to have a little bit of a quiz looking at some strange wellness trends from the past. Excellent, we do love a quiz. And I want you to tell me whether this is real or whether this is Rob Nonsense.

Okay? Ready. Goat testicle rejuvenation surgery. So a doctor claiming he could restore male virility by implanting goat testicle tissue into people.

I so desperately want this feature because it'd be really funny. Well, it is actually true. There is some truth in this. There was a doctor who was promoting, upgrading oneself with farmyard spare parts.

Coffee enemas for detox? That is a thing. That is a thing, correct. That one is a thing.

Many ways to enjoy a flat white. This is perhaps not one of them. Mitochondrial moonbathing, where people sit under blue lights mimicking moonlight. That's got to be false, right?

That is false. I've made that one up. Raw water. So untreated raw water because normal waters too processed.

False? This one's actually real. No, really? And how about people injecting tiny peptides on the belief that it will make them tan or improve their virility?

No, this is definitely true. You're right. And that's what we're going to be looking at this week. The grey market world of peptides.

Before we dive into today's episode, if you want to stay up to date with our content, you can find us on Instagram at @the_tox_lab. We also have a page on LinkedIn and we're fairly active over there. And for those of you who don't use social media but still want to get in touch with episode suggestions or comments for episodes, you can check out our new website at thetoxlab.co.uk. So firstly, before we dive into any papers, what are peptides?

So peptides are really essentially small proteins. They don't quite count as proteins because they're not quite long enough, but they're made of amino acids and they come in various sequences. And biologically peptides do a lot. They often act as signaling molecules within the body.

They're involved in quite a lot of complex hormonal cascades and peptides people might be more familiar with. And this really is the context for where a lot of this wellness trend has come from is things like the GLP-1 agonists. These are modified peptides. So they're peptides with a little bit attached that prevents their breakdown.

And as many people will be aware, GLP-1 agonists, so things like semaglutide, also known as Ozempic, have seen a large rise in popularity over the last few years. And the gray market peptide trend is really

an unregulated cousin of that rise in legitimate peptide medicine. And you don't have to try very, very hard to find on the internet websites claiming to sell you peptides. They're often marketed as not for human consumption, research use only.

And then the same website will also be selling these alongside vials of bacteriostatic water and syringes. And in terms of what is being offered, well, there's really a wide range of different peptides all being offered up for sale. Some of them have got a therapeutic background. They've been investigated.

There's some evidence. Some of them completely unapproved for use, really just experimental compounds with some fairly vague claims. And in terms of some of the effects some of these peptides are claimed to have, they really come in a few different categories. So there's those related to the GLP-1 agonists.

And these are typically touted as being fat burners or muscle builders or glucose regulators. There's a whole host of peptides which are claimed to help with wound healing and have anti-aging properties. And some products are claimed to do two things. One, they'll make you tan faster and also improve your sexual performance.

So why don't we first look at some of these wound healing peptides or one of these wound healing peptides in particular? Because this is a commonly sourced peptide that has some evidence behind it. So this first paper looks at the peptide BCP157 which also has other names including PLD116 or the pectin. And this has been shown in animal models to promote the healing of bones, nerves, corneas, tendons, muscle ligaments and other things.

And because of its potential in repairing tissues, enhancing exercise recovery and preventing injury, it has become popular with athletes and within the sport and fitness community. In 2022, this was banned by the World Anti-Doping Agency under the S0 Unapproved Substances category prohibiting its use in both training and in competition. And in 2023, the FDA classified it as a category two bulk drug preventing it from being included in compounded medications due to concerns about safety, impurities and insufficient human data. So there is some evidence in animals.

Yeah. And that's where the probably the origin of this peptide seeing use amongst athletes primarily initially and probably the bodybuilding scene. And it WADA banned it four years ago now. Yeah.

So this isn't a new compound but probably what we're seeing is a rise in it along with everything else given the more recent trends in peptide use in general. Yeah. Yeah, despite all of these restrictions, it's still really widely available on the Clear Web. It doesn't take a lot of digging to find places that will sell you VCP 157.

I've just stuck it into Google and there are Google ads popping up claiming to sell it to me. So the aim of this review is to explore the molecular pathways, its effects on performance and role in injury healing, its applications beyond treating musculoskeletal conditions and reported side effects of VPC 157. And there's very little to no data in humans. The effects described are based purely on animal models and VPC 157 appears to support healing and recovery by promoting new blood vessel growth, improving vascular stability and protecting cells from oxidative stress and mitochondrial damage.

It may also help to preserve nerve and muscle function, supporting communication at the neuromuscular junction and helping normalize disrupted neurotransmitter signaling. VPC 157 can also counteract beta adrenergic overstimulation and blockade preventing hemodynamic collapse, multi-organ failure and vascular occlusion syndromes. And it also appears to have anti-inflammatory and regenerative properties, reducing inflammatory signaling and fibrosis while promoting tissue repair. Animal studies also suggest that VPC 157 may modulate several neurotransmitter systems

including dopamine, serotonin, GABA and glutamate pathways.

And these findings have generated a bit of interest in potential neuroprotective and neuromodulatory applications, although the relevance of these effects to humans still remains unclear. This all sounds great, right? Yeah. And this is why there's such a trend.

These compounds have shown real potential in animal studies quite often and their translation to humans. I mean, if you could do all these things, sounds great, right? Yeah, it'd be amazing. And VPC 157 is thought to have quite a short half-life, but despite this, the angiogenic anti-inflammatory and tissue regeneration persist for weeks or months in animal models after the initial dose.

And this is thought to be the result of its ability to activate multiple gene expression pathways which then continue independently. So in spinal cord injury studies, functional improvements and reduced spasticity were maintained for 360 days after the administration of a single treatment. And that's massive, right? Yeah.

A single dose can help repair things into the future. Tissue specific effects of VPC 157 include accelerated tendon and ligament repair and improved tendon function, enhanced myogenesis, muscle fiber regeneration and functional recovery post-injury along with promotion of osteogenesis and accelerated bone healing. And when looking at musculoskeletal healing, that kind of occurs in what we know as three stages. So you've got the inflammatory phase which typically lasts one to five days, the repair and proliferative phase which lasts from like day five to two weeks and the remodeling phase, which is obviously a lot longer.

And VPC 157 targets all three key stages to accelerate the healing, particularly in tissues with limited blood supply. It is thought to improve the recovery process in athletes through accelerated healing and tissue repair leading to improved performance. And while there are no human studies for this, in rats treated with VPC 157, they demonstrated significantly improved recovery and healed tendons showed increased load detention failure and significantly higher functionality suggesting that VPC 157 may improve tissue function and integrity.

So going back to our intro, I feel like I may have done peptides a little bit of a disservice when I compared them to implanting goat testicles, for example. Yeah. There clearly is some evidence to a degree that these compounds have got real therapeutic potential, but, and there is a bit of a but. Yeah.

They're not approved for medicine. They haven't really been studied properly as medicines. A medicine is only good if it has both positive outcomes and doesn't have lots of negative toxic side effects. What do we know about those?

So there have only been three published studies looking at VPC 157 in humans that the authors of this review paper could find. And one of these was a retrospective study in 2021, which compared the effectiveness of knee injections using VPC 157 and VPC 157 combined with TB4, which is another anti-inflammatory peptide. They only used a total of 16 patients, but it did show that 14 out of 16 who received these injections showed significant pain relief. So it does look promising and no one in the three studies reported side effects.

But there is a question as to how long they followed up these patients for, whether they were asking the right questions on side effects that they might have been experiencing because that wasn't the aim of these three studies. Possible side effects based on their in vitro effects could include pathologic blood vessel formation, which is implicated in the proliferation of tumor cells and immune and inflammatory disease processes, formation of toxin metabolites and overproduction of nitric oxide. In particular, I was worried about tumor formation or enhanced tumor metastasis on the grounds of angiogenesis because that is a real risk.

As you say, the issue here isn't that these peptides are bad. The issue here isn't even that these peptides may have toxic side effects. The issue here is we just don't know. We've got no data that says these are going to be beneficial nor have we got data that says they're going to be safe.

They may well be beneficial and I'm all up for seeing the studies as they get done to investigate the outcomes of these. I think this could be a real potential turning point for regenerative medicine. This sudden rise in new peptides that can do great things could be really, really powerful, but we're not quite there yet. So why don't we look at one of the other types of peptides then?

I mentioned them briefly about the tanning aligned peptides. So melanotan products can be purchased over the internet and are injectable melanocortin analogs to induce melanocyte production and create a sunless tan. So for those who aren't aware, how we tan is partially controlled by various hormone and peptide pathways. And so these compounds really hijack that endogenous pathway and in theory lead to more tanning.

So to do this, they act on melanocortin receptor one in the skin to stimulate eumelanin, which is the most common form of melanin and cause this hyperpigmentation. They can also act on melanocortin receptors three and four in the central nervous system, which can lead to spontaneous erection and sexual arousal. And certain formulations have been investigated as potential treatments for sexual dysfunction at certain doses. And what's interesting with the sexual desire and the erection component is unlike Viagra, which is very much mechanical, will dilate some blood vessels by modulating nitric oxide.

This seems to have more of a almost psychological effect. It seems to influence desire at a more brain level. So we've got a case report now of where melanotan went wrong. A 55-year-old male presented to the emergency department complaining of a painful sustained penile erection that had been going on for 30 hours.

The priapism, which is defined as an erection lasting longer than four hours unrelated to sexual stimulation, started after self-administration of a subcutaneous injection of two milligrams of melanotan-2 into the abdomen. There was no proceeding trauma, sexual stimulation or other drug use. How many hours? 30.

That's got to be uncomfortable, right? Yep. He reported using these products before for over six years in an effort to darken his skin each year before summer. And it typically caused an erection that lasted a few minutes after the injection, which had spontaneously subsided and he had not experienced priapism or erectile dysfunction before.

After an examination, he was initially managed with intracabinosal injections of phenylephrine, which was alternated with injections of saline. This is also making me feel uncomfortable. Yeah, I do apologise. Ciphenylephrine is an alpha-1 adrenergic receptor agonist, which causes blood vessels in the penis to constrict, reducing blood flow, and allows trapped blood to drain.

And in this process, they managed to remove 150 cc's of very dark blood. People might have heard of phenylephrine because it's used as a nasal decongestant. Is that the thing in Sudafed? No, that's pseudoephedrine.

Oh, actually, there might be more than one version of Sudafed out there. Yeah. But it is used as a nasal decongestant and it's the same principle. It causes the blood vessels to constrict.

His erection visibly decreased on several occasions but kept returning. And because of the prolonged time of priapism and the fact that pharmacological management was unsuccessful, they proceeded with surgical management with penis growth or decompression. And this did resolve the priapism and

he was discharged on day two. At his follow-up 15 weeks later, he reported a degree of new onset erectile dysfunction with corpora fibrosis, so build up the scar tissue on examination.

And this isn't the only case report out there. There are two other case reports of priapism after taking melanotan products. And this takes us on to one of the other sides, potentially of peptides, and that's this potential off-target effects. Melanotan and other melanotan-like compounds are recognised as having this as a side effect.

So the metabolite of melanotan-2, which is bromelanotide, was developed for use as a sexual stimulant without the tanning effects, but clinical trials of this were halted because of concerns over increased blood pressure. And actually, this is crucial as well. This is a thought I've just had. We're saying there's no evidence out there for a lot of these peptides.

Some of them actually may have been investigated, decided that they had no benefit or were shelved. Yeah. And negative studies don't always get published. That is very true.

So clearly, this case report shows there are some risks that come with using these peptide products. And often, I think these risks have not really been fully understood. We don't really know what the likelihood is of some of these adverse effects, for example. This gentleman had clearly been taking this product for some time.

Why he was okay one week and then the next time he did it wasn't. I'm not sure we really understand. Now, as we were preparing for this episode, we did notice an alert put out this week by Victoria's Department of Health in Australia. So this alert was issued on the 19th of June, 2026.

So just over a week ago. And since January of this year, there have been six cases of liver injury in Victoria, Australia, and individuals who had purchased the peptide product labeled as Retatruetide, Reta, R10, or R20. And these were purchased online and it's been suggested that additional contaminants may have contributed towards the liver toxicity. Retatruetide is one of the GLP-1 adjacent peptides.

It's not quite the same, but it has similar reported effects to GLP-1 agonists. Yeah, it was being marketed for anti-aging, fat loss, recovery, and muscle growth. And symptoms that have been described in these case reports include tiredness or malaise, jaundice, abdominal pain, dark urine, abnormal bruising, and itchy skin. Classic drug-induced liver injury kind of picture.

Yeah. And I think this alert really summarizes quite a few of the risks. These are not being produced as medicines in pharmaceutically controlled environments. And so there is this risk, isn't there, of contamination, things that aren't meant to be in the peptides being in the peptides.

And actually another risk that has been reported with some of these peptides is endotoxins. So bacterial contamination or remnants of bacteria that survive the lyophilization process, but can actually have an immunogenic response in people who inject them. So there have been a few case reports of people injecting peptides and then suffering severe allergic reactions due to the presence of immunogenic endotoxins. And some of these websites are selling these peptides with certificates of analysis to prove what they are and what concentrations are in there.

And it makes it seem so regulated and official and safe when they might not be. And there are also other websites that will test your peptides and provide you with a certificate. So you can buy it from a supplier and you can send it to a lab that's doing peptide testing. So there's a whole host of labs out there that are essentially jumping in on this peptide bandwagon.

And you're right, it does suggest a level of safety that perhaps isn't there. I mean, I guess in some ways, if you can get it independently tested and you can find out that it's pure and you can find out there's

no endotoxin contamination, that is a sort of harm reduction practice in a way. But I think you're absolutely right. The fact that we don't know what these things can do long-term, we don't know what potential off-target side effects might be short-term.

The Milano-Tan case really does show that it could be a little bit unpredictable. So even though these compounds could be the future of medicine and I do fully acknowledge that they could well be, there could be some really incredible discoveries that have been made and just haven't yet been assessed properly in a lab for safety. We also don't know what drawbacks they come with and therefore you are essentially being a human test subject.

That is very true and I think there's a misconception that because they're peptides and your body makes peptides, that must mean they're natural and they're safe when we don't really know what some of these peptides can do. Your body makes hydrochloric acid. I wouldn't perhaps be injecting that. There are also concerns over batch-to-batch variability of these peptides that people are purchasing online, which might have influenced that Milano-Tan case study, whether the batch he had been injecting was fine and then this one was at a higher dose or for whatever reason led to those effects.

That's really true. Yeah, that's really true. So we need to look at the culture behind it a bit, don't we, because we've seen the GLP-1 rise and then we've seen the private clinics offering GLP-1 and then we've seen the price tag that comes with the private clinics offering GLP-1 and then you go onto a gray market website and they're selling similar compounds for a fraction of the price. So I can see why people are turning to these things and that's just the GLP-1s.

Yeah, no, they're definitely everywhere. Those case studies from Victoria, a lot of the people who were buying them were being sold them through social media. So they are kind of right in the forefront of people's day-to-day. You're seeing celebrities who are claiming or people claiming that they've been taking this, that and the other and that's why they look so good and people are naturally gonna try and emulate that and purchase these things without necessarily considering all of the risks.

Yeah, that brings me on to my second point. There is a huge influencer subculture of peptides and I think you're right. I think they could be being pushed as potentially more than they are. Potentially they do more than they claim, potentially carry with them bigger risks than is being also claimed by the same influencers.

I think you're right. As I say, I think these could well be really significant compounds. The wound healing peptide, I forget what its code was. Those effects that have been observed in animal studies sound incredible.

So as long as there aren't any serious negative side effects in humans like, I don't know, promoting cancer, this could be actually a really, really powerful compound. But until we've got that safety data, it's just a complete unknown, right? Yeah, it's really hard to translate data from like cell line models or animal models into humans because we do very weird things. So that does really need to be looked at and making sure there aren't any like weird interactions that we're just not considering.

So we need to bring it back a little bit to toxicology because we're not just here to dump on influencers. Is there anything we need to be thinking about here? I mean, you've pointed out the potential liver injuries. So, you know, actually a cause of liver injury could be peptides.

If you're working in emergency departments and you do see clusters of patients with things like liver injury, then there's, I guess, a potential there that you should consider it. The lab are unlikely to be able to help, right? We're not really that well-equipped. I'm certainly not.

I don't know about my colleagues to test for peptides. And to be honest, from what you've said, it sounds like they've got a really short half-life, some of them anyway, and have some gene modulation effects. So it might well be that they're not actually testable in the normal sense of what we're used to. Yeah, that's true.

So I think at the moment then, really it's more a case of being aware that this is a thing and knowing that it's going on. The evidence of harm is relatively limited, but also the evidence of benefit is also relatively limited. So we really are moving, I think, into a little bit of the unknown. There could well be some longer-term side effects that make themselves known, following this rise in the peptide trend.

And of course, it's a very fast-moving area. So new peptides are being marketed all the time. Potentially, something more toxic could come along. There's always a chance.

Well, I hope you've enjoyed listening to us this week as we explore the slightly strange world of peptides and grey market peptides in particular. Do, as always, if you've enjoyed, share with your friends, post on socials. We really appreciate all of that. Hope you all have an amazing week, and we'll see you next time.

Bye.