

EP.116 – Sherine Chan, PhD, Co-Founder and CEO of Neuroene

Narrator: You're listening to *BioTalk* with Rich Bendis, the only podcast focused on the BioHealth Capital Region. Each episode, we'll talk to leaders in the industry to break down the biggest topics happening today in BioHealth.

Rich Bendis: Hi, this is Rich Bendis. I'm your host for *BioTalk*. It's really nice to get back in the groove again, because this is our first *BioTalk* since we had our BioHealth Capital Region Forum on September 20th and our Investor Conference and Crab Trap competition on September 21st. We thought we'd kick this off with a winner of our Crab Trap competition, actually our seventh annual Crab Trap competition, which we had at US Pharmacopoeia in person, which was nice to have everybody together in person this year. Our winner for that seventh annual Crab Trap is Sherine Chan, who's the Co-Founder and CEO of Neuroene Therapeutics. Sherine, welcome to *BioTalk*.

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Sherine Chan: Thanks, Rich! Yeah, we're really excited that we won the Crab Trap, and now I can pronounce it properly instead of—[laughs] because I was calling it Crab Pitch, I think, at one point. [both laugh]

Rich Bendis: Well, that's better. Some people were calling it Crab Feast, and I didn't have crabs enough to feed everybody there. The Trap was good, and you actually have a trap. We'll talk a little bit more about Crab Trap later in this interview we're doing in the podcast, but congratulations. Just for the audience, the judges, who were very prestigious, basically said, "It was the toughest competition we've had in seven years, and the quality of the presenters was fantastic." So, you really beat out four other great candidates, Sherine. So, congratulations again.

Sherine Chan: Yeah, thank you.

Rich Bendis: You're welcome.

I didn't know much about Neuroene until you entered the competition, because you're relatively new to the region. I think it would be good if you did a self-introduction for our listeners about you and your transition that you've made from academia to a bioentrepreneur.

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Sherine Chan: Yeah, yeah. Thanks, yeah. We recently moved to D.C. We moved to JLABS in May 2022, and then we moved properly in June, so we've only been here a few months.

So, a bit about me: I'm Sherine Chan. I'm the CEO and Co-Founder of Neuroene Therapeutics. We're developing mitochondrial drugs for difficult to treat

neurological diseases. The reason why we have our company today is based out of our academic research, so me and my co-founder, Dr. James Chou—Dr. James Chou, he’s a medicinal chemist. We started at the Medical University of South Carolina in Charleston, South Carolina at the same time in 2009 as assistant professors. We started our labs and were thinking about the types of things that we wanted to do together, the things that we might be able to collaborate together, and it turned out that we had a lot in common, actually, or a lot of overlapped interests.

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He is a medicinal chemist, like I mentioned, and he has a great interest in histone deacetylase inhibitors. Actually, he has a drug in Phase II clinical trials for a rare mitochondrial disease called Friedreich ataxia. I also talk to him about my interests. I’m a mitochondrial biologist by training, and I’m very interested in childhood mitochondrial diseases. A lot of kids who have mitochondrial diseases, they have seizures, and they’re pharmaco-resistant seizures, so they’re very difficult to treat. The drugs on the market, for the most part, have a hard time helping them, and some of those drugs actually make them worse and can be lethal. One of those drugs is valproic acid, which is a great anti-seizure drug for many people, but not so great for this population.

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So basically, we decided to write a little grant, because valproic acid is a histone deacetylase inhibitor, and we got that grant funded. What we did was we did a small screen. We screened zebra fish with seizures, with the different classes of histone deacetylase classes—inhibitor classes. We found that one of those actually worked to decrease seizures, which was really unexpected to us. We actually didn’t think anything would work, but one did, which was really great. Then, James, as the chemist, he noticed that the compound, looked a lot like vitamin K. That’s why we tested the different naturally occurring versions of vitamin K, and we saw that the smallest version worked the best. So, his students at the time made lots of different analogues to vitamin K. We tested them in the zebra fish model, and we found that it worked really well.

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We got the patent process going, and at the time, at Medical University of South Carolina, which I’ll now call MUSC, basically, they were very interested, and they helped us with the patent process. But in return we needed to start a company in order to go for SBIR grants from the NIH, for example. So, that’s how we started our company, because I had originally had no idea that I was going to go into the business side of things.

I’m originally from Australia, and I did my schooling there. I have a degree in veterinary biology with honors, and I have a PhD in clinical biochemistry from the University of Western Australia, and I did part of my PhD in Cardiff

University in Wales in the UK. Then I did my postdoc at NIEHS, in Research Triangle Park in North Carolina.

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That is where I did a lot of my training on mitochondrial diseases, although my first start in mitochondrial diseases was back in my first research position on reproductive biology and mitochondrial dysfunction with Dr. Jim Cummins—which he is my mentor to this day, actually, which is great. So yeah, I've gone through all the academic path, and now I'm here! I'm full-time with my company right now, and yeah. We just moved here, so very recently have I been a full-time business woman. [both laugh]

Rich Bendis:

Well, it's an interesting path you've had. Before you mentioned that you were from Australia, I was going to say, you don't have a South Carolina accent.

Sherine Chan:

[laughs] I have a very southern accent. [laughs]

Rich Bendis:

Oh yeah. [laughs]

Sherine Chan:

Southern Hemisphere. Yeah. [both laugh]

Rich Bendis:

For sure. That was one of the things, how did you get all the way from Australia all the way over to Washington, D.C.? But that's an interesting path you took. When you said you were at NIH down at Research Triangle, what attracted you to University—Medical Center of South Carolina?

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Sherine Chan:

Yeah, MUSC. During my postdoc at NIHS, there came to be an award called the K99R00 Pathways to Independence Award, the grant award from the NIH. That is where you have two years of mentor training, and then you go to do your academic faculty positions. I was looking for universities that had a good mitochondrial base, so I had interviewed with several places. This place was particularly good, because so many researchers were working on mitochondrial diseases, and particularly the people who were very interested in understanding mitochondrial respiration and how it works in a model organism, which was what we were trying to do at the time.

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What attracted to me also was that they had a good drug discovery department. My goal at the time was to find a university that would allow me to branch out into developing new model organisms for mitochondrial diseases, because my academic lab at the time was looking at developing these animal models, for which in mice, they—unfortunately some of these mice who had these knockouts, they died in utero, which didn't necessarily replicate some of the disease processes that are found in humans. In zebra fish, I thought that it would be great, because they're small, they're transparent, you can have hundreds of them in a single clutch—embryos—and you can use them like cells in a dish, so

they're great for drug screening. When I talked to the people at MUSC—who I met at a conference, actually. I met a few of the key players in the department at a conference, and we got excited about the things we could do. So yeah, MUSC was a great place to start my life. Yeah.

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Rich Bendis: Well, that is fantastic. I would imagine they did a good job in helping you get established to create Neuroene, but I'm sure they're sad to see that you have moved to Washington, D.C.

Sherine Chan: [laughs] Yeah, we're very happy to move to Washington, D.C. Charleston is a very nice place, and a very, very supportive place for small businesses. I think because we are small, everybody banded together. The community was small but very nice, and at the time we were starting our company, MUSC had sort of like a mini-accelerator program for businesses, and they had a lot of mentors in the area who had come to Charleston to retire or still dip their foot in to help small businesses, but they didn't have the big jobs at pharma anymore, for example.

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This was a multi-week course, and basically they helped us with our pitch deck and thinking about our strategy, and it was really good. So, some of the mentors that we had at that time, we still continue to interact and connect with. They were instrumental for us to write our SBIRs as well. Unfortunately, I don't think that that program is still occurring, because the person who was in charge of that moved to a different university, but at the time it was fantastic, and it really got us understanding how to—yeah, what we really needed to work, because we came from an academic background and we had too many slides, too much data, too much everything. So, they really helped us to hone our deck. Over time, our deck has changed quite a lot.

Rich Bendis: Probably less science, and a little more business and commercialization opportunities, which investors like to see, right?

Sherine Chan: Yes. Yeah, for sure. Yes. [laughs]

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Rich Bendis: Tell me about this connection from MUSC and the transition to JLABS. How did you come in contact with JLABS?

Sherine Chan: I have a friend who moved to D.C. several years ago, and she, I met through MUSC. She used to be a professor at MUSC as well. She moved to D.C. a few years ago to work for BARDA, and actually I had heard of BARDA before, but I had not known exactly what they did. She was working on the COVID response, actually. Basically, she told me a lot about BARDA, and through her I was able to meet a lot of different people in the program. I came to know about the Blue

Knight program at JLABS. The Blue Knight program, as you know, is a partnership between BARDA and Johnson & Johnson Innovation – JLABS.

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It's an award where they're looking for companies that are working on such things for public health emergencies, such as medical countermeasures for nerve agent exposures, which is what we are also working on. Also, for different types of products that Johnson & Johnson potentially would be interested in. It was quite a process. There was an application process, and then I had a couple of interviews. We were lucky to be awarded the Blue Knight award, and this is an amazing award because it covers not only the lab space, which is beautiful. I don't know if you've been to JLABS, but it's an amazing space. You should come over.

Rich Bendis:

Yeah, Sally Allain is on my board, and she speaks highly of you by the way.

Sherine Chan:

Aww, thank you! Yeah, Sally's been awesome. Yeah, from the get-go. She's got a great place. It's got beautiful lab space, so much amazing equipment, so not just the lab space and the work space, but also provided by the Blue Knight program is mentorship by both BARDA and by Johnson & Johnson Innovation.

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It's been really nice, because this is what we really needed—this juncture. We need mentorship to get us to that next level, so we've been talking to people who have been instrumental in developing drugs for epilepsy, for Parkinson's disease, for medical countermeasures, also for regulatory as well. We're really interested in that next step. If we had not come to JLABS, it would have been a lot harder to find these types of mentors.

Rich Bendis:

Well, welcome to the BioHealth Capital Region. We think we have one of everything that can help you progress, for sure. Let's talk a little bit about coming from academia to being an entrepreneurial CEO in bio, and the funding path, and how much fun you've had in raising money for your new company.

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Sherine Chan:

Yeah. Originally, James and I had written a very small MUSC grant, pilot grant, and that was for \$50,000, which allowed us to buy the equipment we needed to monitor the motion of the zebra fish in a 96-well plate and to buy chemicals and a few other things. From that, we were able to use our startup monies, as well, to do more experiments in that area. Then, once we started our company, we went for STTR and SBIR grants. We were awarded a Phase I STTR at first, from NINDS, who have been extraordinarily supportive of our work. One aside is that coming to D.C., we've been able to meet our program officers in person, which is amazing! We actually met them at JLABS. So, we've got the STTR, and then we went for our Phase II, and that was an SBIR, which we were awarded. We've

also managed to get administrative supplements to fund diversity people for our lab as well.

0:15:05 We have had other funding through the state of South Carolina. South Carolina Research Authority has been very fundamental for funding some of those matching funds for our STTR and SBIRs. We have had some small foundation funding for our Parkinson's work, and we have three grants pending—two that have gone through study section. Those two have received really awesome scores, so we've been talking to our program officers, and we hope to get those funded soon, hopefully, which would be great. Then we can start more studies here at JLABS.

Rich Bendis: It's exciting that you've basically been able to fund a company to this point with all non-dilutive funding. You haven't had to do your friends and family, or angel round, or your pre-seed round at this time.

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Sherine Chan: Yeah. We've been very lucky; very, very fortunate, yeah. All non-dilutive so far. Yeah.

Rich Bendis: Yeah. Well, it's nice to control your equity, but at some particular point in time, you'll have to get into the real world, especially if you advance into the clinicals. I think you've got great mentors, though, because the type of pitch you had to do for Crab Trap would be more traditional for that which when you're going to have to go for equity funding.

Sherine Chan: Yeah, great. Yeah, that's true. Yeah. I'd really like to thank the people on the coaching team for the Crab Trap, because that really helped me to add more things that I had forgotten to put in the pitch deck. For example, Ethel Rubin, who had amazing comments and helped us for the coaching, she had mentioned that the University of Utah, who did all of our animals studies—our mouse and rat studies—there's anti-seizure animal models that are funded through the NIH, actually.

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The University of Utah have anti-convulsant drug development program, and that's run by Dr. Karen Wilcox, who's our long-term amazing collaborator. Her site is actually the NIH epilepsy therapy screening site, so the contract site. They have a lot of funds to test all compounds from academia, from biotech, pharma. Pharma uses—most of their drugs that have come out in the market have actually gone through her labs. Ethel had mentioned that a lot of these drugs don't do so great through the battery of tests, so it's rare to see a drug that has such broad-spectrum activity. That's what our collaborator says, too, so we think we have something. [laughs]

Now, we have—through our SBIR fundings—we’ve now got a lead clinical candidate that I mentioned at the pitch. So, that compound has, like I mentioned, broad-spectrum anti-seizure activity.

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It’s very fast-acting, and it can be used as a chronic therapeutic, so this is one of the reasons why it could potentially be a good countermeasure for nerve-agent induced exposures where there are seizures. Also, Parkinson's disease could be an outcome from these nerve-agent exposures as well, because our compounds also work in Parkinson's disease animal models.

This compound, it’s also received orphan drug designation from the FDA for Dravet syndrome, which is a rare childhood epilepsy. We are ready for idea-enabling studies, for which we need quite a lot of funding. We’ve been talking a lot to pharma, and we started talking to ventures. The pharmaceutical companies that we talked to since our ODD came out, they’ve been very interested, they’ve been in our data room, but they want us to get a little bit further, so they would like to see human clinical data.

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For that, that is why we’re talking to potential investors right now, because we want to get there as soon as possible to get to that next step. Part of the grant funding would cover some of those studies, but not all of the studies.

Rich Bendis:

I think you’re finding that you have the challenge of an early successful bioentrepreneur right now, because you have multiple opportunities with your technology and your science to go in several directions, and the question is: How do you stay focused? Because you can’t fund everything at one time. You can do some things in parallel, but you have to make some critical decisions when you go out for your money, because different investors or strategic partners are looking for different things that you may have to offer. How do you balance all of that, Sherine?

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Sherine Chan:

Yeah, that’s exactly right. Limited funds means you’ve got to be ultra-focused. When we were in academia, we actually tested quite a few different disease indications, different animal models. It does work in different seizure types. It works for two different models of Parkinson’s disease with mitochondrial dysfunction. It works on rare mitochondrial disorders using the models in my old lab and a few other disease types. The way we mitigate that, is we have now developed partnerships or collaborations with people who have the disease models that we’re interested in. If there is a hit and it looks really good, then we are writing SBIRs to follow up on those. If we had unlimited money, we would test everything, but for right now, yes, we have to be laser-focused on Dravet syndrome and those rare childhood epilepsies for right now.

- 0:20:55 But that's not to say that we recently talked to a large pharmaceutical company about our Parkinson's work, because their focus is not really on epilepsy, but they're very interested in Parkinson's. So, we've just started to talk to them now. So, we have that as our second indication in the pipeline. We have more than 200 different vitamin K analogues. It does seem like some of these analogues do work a little bit better in different disease types, too. So, there's that. If we hit it big we can branch out a little more. [laughs]
- Rich Bendis:** I'm sure you can. It sounds like NIH has become your best friend right now.
- Sherine Chan:** We love the NIH, yes! [laughs]
- Rich Bendis:** You love the NIH. You mentioned something that a lot of the listeners and early stage entrepreneurs—I'm talking to Sherine Chan who's the CEO and Co-Founder of Neuroene Therapeutics—you mentioned having the ability to meet with the program officers in person.
- 0:21:50 That's a luxury that a lot of people don't understand how nice it is to be able to look face to face and meet people personally, so they get to really see the real scientist that they potentially might be funding, because a lot of these things are done by scientists who are, as you say, scoring SBIR applications—never get to meet the people, never get to know what's really behind the company and the science. This opportunity to meet with people face to face, I think, is a real benefit to being in the BioHealth Capital Region.
- Sherine Chan:** For sure. Definitely, yeah. I've been to a couple of conferences now, and I've been able to meet with program officers from such as DOD and DARPA and other agencies that we are very interested in applying our work for. So yeah, it is a luxury, especially in this time of Zoom meetings and all that; I think that in person is really nice. There's something extra that you can really have from meeting someone.
- Rich Bendis:** Right. Well, we think you're a great new participant within our area, and you're definitely going to be successful.
- 0:23:00 Let's talk a little bit about the challenges of the CEO, identifying what your next major goals and milestones are, Sherine. Tell us a little bit about what your next plans are for the next, I don't know, one year, three years, five years for Neuroene.
- Sherine Chan:** Like I mentioned, our overall dream would be to develop drugs for all the difficult to treat neurological diseases, especially where there's mitochondrial dysfunction that occurs. So, in the next year, we hope to have enough funding to start our R&D enabling studies. That will go for a year and a half or so, and then, pending funding, as usual, we will start our clinical trials. We've been talking to companies in Australia. Actually, at the Maryland Bio that I went to last week, I

went with a great group. They run clinical trials in Australia, and they also have a subsidiary here in the US as well.

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Our first-run trials will likely be in Australia, because one, they're cheaper, not just because of the exchange rate, but also because of the various research and tax credits that they have for these types of studies. But they also can be run a lot faster, as you know. So, our goal is to get to the clinic as fast as possible. That's our main goal over the next one to three years.

Rich Bendis:

Great. I think it will be achievable, because you have a lot of support and good mentors helping you right now. Is there anything you'd like to tell the listeners we haven't talked about? Would you recommend becoming an entrepreneur to all of those people out there who are considering starting a bio-business?

Sherine Chan:

I think I would, actually. Yes. I had to think about it, because it's hard. The economic climate right now is possibly not the best, but I think if you believe in what you're doing and you meet the right people, I think you can do it. Yeah. So go for it.

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Rich Bendis:

Yeah, definitely with the right attitude and positive thinking, it does go a long way, but you do have to have a good platform and good science and good teamwork in order to make that happen. It sounds like you're surrounding yourself with the right people right now, too, which is critical.

Sherine Chan:

Yeah, we're very lucky. Yeah, very, very lucky to be here. Couldn't do it without being here.

Rich Bendis:

We think that Neuroene is one of the stars of the future for our region. I think you're a good role model for other emerging people, especially women in bio. I don't know if you've joined Women in Bio within this region right now, but you'd be a nice role model for that organization. We have a number of people at BioHealth Innovation that belong to Women in Bio, and they have a nice chapter in Washington, D.C., so that might be an interesting organization for you to interact with.

Sherine Chan:

That sounds good, yeah. I have to look into that.

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Rich Bendis:

We'll get you connections to that.

Congratulations to all you've achieved. I want to thank you for being on *BioTalk* today. Hopefully, we can follow up with you again soon and see what other things we can do to help you in your growth and your path to the future in getting to the clinic, because we know that's the most important step right now: identifying strategic, good investors, and then really getting those board

members that can add value to your company as you grow. So, Sherine, thank you for being on *BioTalk*.

Sherine Chan: Thank you very much, Rich.

Narrator: Thanks for listening to *BioTalk* with Rich Bendis.

End of recording