

NECTAR 2021 Podcast

Episode 2: Tilo Kunath

Host: Stevie A Bain

00:00 Stevie: Welcome to the NECTAR 2021 podcast. NECTAR 2021 is hosted by Dr. Tilo Kunath at the University of Edinburgh and will be jointly held with the 16th International Symposium on Neural Transplantation and Repair, INTR. The conference is sponsored by Guarantors of Brain, CARE - the campaign for Alzheimer's research in Europe, Blue Rock Therapeutics, Roslin Cell Therapy, ProteinTech, Cell and Gene Therapy Catapult and Novo Nordisk. NECTAR - the network for European CNS transplantation and restoration was founded over 25 years ago with the aim of bringing together European groups who share the common goal of protecting, repairing, and restoring the central nervous system from damage caused by degenerative disease or injury. In this episode, I talk to Dr. Tilo Kunath, Reader of Regenerative Neurobiology and host of this year's NECTAR 2021 conference about his research journey from developmental biology to Parkinson's disease and his involvement with NECTAR.

01:10 Tilo: I am from Toronto; I went to university at Queen's University in Kingston and I immediately went into biochemistry. Then I did some cancer research, but my real love was Developmental Biology. And then I really focused on joining a lab in Toronto that was a very famous developmental biology lab run by Professor Janet Rossant and I eventually got in. There was a lot of badgering and hard work to convince her that she should take me and I did my PhD with her. And this was in understanding how early embryos develop and just understanding the molecular mechanisms of the development of mammals. And this is where my true love for, for research happened in that, in that lab.

01:52 Stevie: So you were working on developmental biology and then that somehow led you to your current work on Parkinson's disease. So how did that transition happen or is it a transition, does it naturally link?

02:06 Tilo: It wasn't a direct transition. So part of my developmental biology work involved using stem cell systems to study development. In Toronto, I was looking at a very unusual stem cell. A stem cell that makes the placenta, trying to understand how the stem cell system could help us understand the placenta in, in vivo, inside the mouse. So I had a lot of experience with cells, I was culturing lot of cells and, and dissecting and analysing a lot of embryos. And then I moved to the UK to work with Austin Smith, who was a stem cell expert, actually probably the most formal stem cell expert in the world at the time. There I was using stem cells again, but this time to make neurons and neural tissue just trying to understand how a stem cell that is pluripotent can turn into a neural tissue, this concept called neural induction. And then after working on that for several years, I then moved to trying to use a stem cell system to understand Parkinson's because I had the expertise to make neurons. So it was a sort of a double jump from trying to understand the embryo, looking at stem cell systems and then trying to make neurons in culture without any link to any disease. And then, the link to disease came several years after arriving into the UK.

03:31 Stevie: Okay, so then can you tell me just a bit about what you've got going on in your lab right now?

03:38 Tilo: So right now, we are working with stem cells that we have derived from patients with Parkinson's. So about ten years ago we made a number of induced pluripotent stem cell lines. This is a type of stem cell that you can make from adult skin or from blood. So we made some of these stem cell lines from a family that has a genetic cause of Parkinson's. So we use these stem cells and my expertise in making neurons to turn them into neurons and try to study Parkinson's. We're also using the stem cells in collaboration with different groups to transplant into animal models of Parkinson's to ask the stem cells to turn into neurons in vivo to fix the neurons that are broken in the animals. One of the projects that is happening a lab right now is in collaboration with Asuka Morizane who is one of the speakers at the NECTAR meeting. And it's a jointly funded project by the Medical Research Council, MRC in the UK and the Japanese version of that called AMED. And this is a bit of an unusual project because we are trying to monitor the conversion of stem cells into neurons using non-invasive methods. Meaning we don't disturb the neurons, that we don't take them out and analyse them by different molecular methods. So the way that we're doing that is that we are analysing the medium that the neurons are growing in. So just like all cells have a transcriptome and a proteome. They also have something called the secretome. So it's the conjunction of all of the molecules that these cells secrete, and the secretome of a stem cell and the secretome of a neuron will be quite different. And the secretome of a progenitor cell on the way to making neurons would be also quite different. And this is what Morizane and myself and our team are working on now to have this non-invasive method of monitoring the conversion of stem cells into neurons to make sure that they're happening right, that it's going well. We have a lot of molecules that we've identified in the medium that are indicative of a good differentiation or a bad differentiation. So a post-doc in the lab Nicola Drummond will present this at a data blitz at the NECTAR meeting in November.

06:00 Stevie: Oh wow, that's really interesting. I've never heard of the secretome before. Was that collaboration something that happened through NECTAR?

06:13 Tilo: This is a good question. It is a collaboration from a NECTAR because I met Asuka Morizane at a NECTAR meeting. But it's been a really, really fun collaboration. It also involves Mariah Lelos in Cardiff and Mio Iwasaki in Kyoto.

06:30 Stevie: You are hosting this year's NECTAR conference but how did you first get involved?

06:34 Tilo: I had already been working on Parkinson's disease for a number of years. I'd made a number of cell lines from patients with Parkinson's. But then I started working with embryonic stem cell lines in the UK that were clinical grade. So meaning that they could not only be used in the lab, but they could also be used in the clinic and in patients. So it was at this point that I got invited to a NECTAR meeting to give a talk about the work I was doing with these clinical grade cell lines and trying to turn them into neurons. Because part of NECTAR, the goal of NECTAR is to translate a lot of this academic work into patient treatments, into patient benefit.

07:16 Stevie: Excellent, so then what sort of memories do you have from that first meeting? Were there any particular people that you met?

07:23 Tilo: I think my first impression of NECTAR was the sense of community. I was really impressed at how friendly and how much people got along and how much data people shared. There's a lot of unpublished data presented at NECTAR. And the first one I went to was the first time I met Anders Bjorklund and Steve Dunnett. And these two gentlemen have been part of NECTAR since the beginning. And I know they're the subject of the first episode of this podcast, but they've just been phenomenal and also highly supportive of me in my own work. Another unique thing I saw in the first NECTAR was this concept of students and young researchers presenting their data in an oral manner. These are called data blitzes. That was also a really, really nice touch that NECTAR had that I really thought was a unique aspect of this meeting.

08:13 Stevie: From being the new participant, I guess, in the NECTAR meetings to now hosting your own, what are your hopes for NECTAR 2021?

08:23 Tilo: This is a challenging year. Of course, this year it will absolutely be a hybrid meeting. Hopefully the reach is much larger or further than, a regular NECTAR or INTR. We have an amazing line-up of speakers and I have to credit some of the programme committee for helping with that. So great speakers from, from Japan like Jun Takahashi, he'll be speaking about his Parkinson's work. Outstanding speakers from the US, Lorenz Studer, Viviane Tabar, Jeff Kordower. Within the UK, we have a lot of great speakers and from within Edinburgh, so Roger Barker and Catherina Becker. I'm quite excited about the spinal cord injury session. You don't normally see a lot of speakers in spinal cord injury at NECTAR, but this is an important part of NECTAR. And we have Hideyuki Okano from Japan who is going to be speaking about his work on spinal cord injury. This session is hosted by Michael Lane, who has been a real advocate for these meetings and is helping me with this meeting at the moment. It'll be challenging. I'm not going to sugar coat it, but in the end, it'll still have the NECTAR spirit and I think it's going to come off to be a very fantastic meeting.

09:33 Stevie: A huge thank you to Tilo. Also thank you again to our sponsors Guarantors of Brain, CARE: the Campaign for Alzheimer's Research in Europe, Blue Rock Therapeutics, Roslin Cell Therapy, ProteinTech, Cell and Gene Therapy Catapult and Novo Nordisk. Be sure to tune in to future episodes of the NECTAR 2021 podcast.