

Helen and De Wet in Paris: cochlear implants in the year 2074

BY HELEN CULLINGTON AND DE WET SWANEPOEL

The World Congress of Audiology (WCA), held in Paris, France, in September 2024, provided a fantastic opportunity to reconnect with colleagues from around the globe. I took the chance to sit outside in the sunshine with De Wet Swanepoel from the University of Pretoria in South Africa. I asked him to imagine the cochlear implant field 50 years into the future. Read on to discover his predictions and wish list.

Helen Cullington (HC): Cochlear implants (CI) obviously work pretty well, but they do have lots of issues, perhaps the main one being very poor market penetration; so many people worldwide who need a CI don't have one. Many factors contribute to this issue, including the lifelong care required, the highly specialised patient pathways, the stigma associated with implants, the intensive involvement of audiologists, the differences from hearing aids (perhaps unnecessarily so), the need for surgery, the high costs and the dependency on both CI clinics and specific CI companies.

I want you to imagine what the CI field could look like in 50 years, even if it's far beyond what's possible today. Where do you see it heading? Feel free to think big and share even the most wild ideas!

De Wet Swanepoel (DWS): I suppose if we say crazy things, we're not going to live long enough to be proven wrong; 50 years is a long time.

HC: But we've learned so much about healthy ageing during the WCA – I think we'll be okay! For example, here's something crazy I think about: maybe the moment anybody's diagnosed with a hearing loss, they should be implanted with a little device, which starts as a hearing aid and becomes a CI – just to avoid this big gap between hearing aids and CIs.

DWS: I think there's obviously a lot of work happening in parallel fields like gene therapies and treatments for hearing loss that could potentially regenerate damaged cells, which might change the landscape of hearing restoration. In terms of the implants themselves, from our perspective as a low- and middle-income country (and the majority of the world's people with hearing loss), the penetration is something we would love to see change over the coming years – hopefully not as many as 50, but



De Wet and Helen in Paris for WCA 2024.

in the next decade or two. We would like the devices to become more accessible, so the costs come down and the surgery can become less invasive. I would like to see easier ways to actually get these implants provided. CIs are already a remarkable breakthrough. We know how they change people's lives but it's a pity so many people don't get access to them.

HC: I think about this a lot – how would it even work? Obviously, it would be great if a lot more people had a hearing screen – perhaps a community-based hearing screen in Africa, for example – but then device-wise, what would happen? Where would the money for hearing aids and CIs come from, and would that be supported by governments?

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DWS: The cost barrier is always a complex matter. We need disruptive technology that can change the cost barrier to the existing devices. But, in terms of the support services including aftercare, there's also a lot of room for innovation. Self-management will hopefully become the norm, maybe with AI chatbots that could guide users through troubleshooting, device tuning, or even optimising their CI settings based on real-time feedback. That frees up a lot of resources. I think that's very feasible in the near future.

HC: True, but it's difficult to get clinicians to be a bit more hands-off. In a way, we have a lot of that technology now in implants, but we don't use it.

DWS: Exactly. But I also think that if the need is big enough, then people won't have a choice. Innovation comes from necessity, and currently, the systems – especially in high-income countries – are well-established to a large degree, so there's no real drive to change the system. However, in markets where there's no services, you can start from the ground up and develop new, innovative ways of delivering care and services.

It would also be amazing if CIs and hearing aids had a dramatic improvement in sound quality: the naturalness of the sound, noise reduction and the ability to use devices in noisy, everyday situations. That is still a challenge, so I think there is a big area for improvement.

HC: There hasn't really been a step gain in sound quality for a long time. In terms of picking speech out from noise, hopefully AI is going to help a lot. I sometimes wonder about eye tracking somehow being incorporated into that for noisy situations, so at least the device knows what you want to hear and what you don't want to hear.

DWS: Did you see that Elon Musk's company, Neuralink, has just got FDA approval for their neural chip for vision? Neuralink's and others' work on neural interfaces for vision restoration is paving the way for potential breakthroughs in

hearing restoration as well. If similar technology is adapted to CI, it could revolutionise how we integrate auditory input with the brain. If the brain can also be involved, that'll be a game changer. The fact that we now have a brain chip that has FDA approval for human trials is something that can definitely translate also into the hearing implant space.

HC: I found myself considering recently that perhaps everybody should just be implanted with something when they're born. Of course, there are lots of issues with that though!

DWS: Yes, I think this interface between our world and our brains, and having something that mediates and maybe augments it, that's becoming a reality, right?

HC: Yes, and plenty of people would volunteer to have a brain implant... including me! Are you going to volunteer?

DWS: No, I don't think so. Maybe in the future, but not at this stage!

HC: Do you envisage a time when a CI recipient won't require a clinician after the first year? Needing lifelong CI care is such a blocker. For me, I think of a CI the same as my iPhone; it's a communication device. Nobody's giving me lifelong care with my iPhone; if I have a problem then I go to the Apple store. Do you think that's feasible? Or do you think that because a CI is a medical device, people will always have to be under the care of a clinician?

DWS: That's a good question. In low-income settings, you cannot provide someone with lifelong care, it's just not feasible. So how can we supplement it with technologies? A lot of this can happen with self-management devices and resources.

HC: Exactly, yes, maybe 80% of people can do self-management, freeing up the clinicians to help the other 20%.

DWS: I think that'll be a next step, that if someone really needs help, then they

get escalated to connect with a clinician. In-person care should always be available, but it should be reserved for the minority of people. And I think that's totally feasible, even in the near future. It's often the profession and the health systems that find it difficult to change.

HC: Yes, definitely. Five years ago, I was saying 'if only we had the technology to do implant tuning remotely, it would be amazing'. And now, we have the technology and not many clinicians use it. I wonder if one issue is that the countries that really need telemedicine are not the countries that are big markets for CI at the moment. In some of the main CI markets, remote care is a preference, isn't it? Not a necessity.

DWS: Yes. Remote care is a luxury or a convenience in some high-income countries, but it's an absolute necessity in other world regions. We need a big step adjustment in terms of the costs and the expertise required to do the implants. Hopefully in the future, some of that could also be automated. Fifty years into the future, hopefully you don't have to have a surgeon that's done hundreds of surgeries already.

HC: Or maybe do it yourself, even? Put an implant into your ear canal, and it slowly crawls its way into your cochlea.

DWS: Exactly.

HC: Amazing! Thank you so much for your time. I can't wait to see how many of your predictions come true over the next few decades! The only thing left is of course a Paris selfie!

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