

**Seizing Life, episode 103**  
***The Impact of Epilepsy and Seizures on Cognition and Memory***  
**Guest: Dr. Alice Lam**  
**(Transcript)**

Kelly Cervantes: Hi, I'm Kelly Cervantes and this is Seizing Life, a biweekly podcast produced by Cure Epilepsy.

Today on Seizing Life, I'm happy to welcome Dr. Alice Lam to the podcast. Dr. Lam is a neurologist and principal investigator at Massachusetts General Hospital in Boston where her lab explores the interface between epilepsy, neurodegenerative diseases and cognition. She is here today to discuss the potential impacts that epilepsy can have on cognition and memory.

Dr. Lam, thank you so much for joining us today. I'm very excited to have this conversation because I don't know that I have come across anyone who has been touched by epilepsy in one way or another that is not had questions about the impacts on the brain and memory. So I think this is going to be a great conversation. I want to start off though, by just sort of establishing a groundwork for what is happening in the brain when a seizure occurs.

Dr. Alice Lam: Great question, Kelly, and thanks for inviting me to the podcast. It's a real pleasure to be here. All right, so let's start with seizures. The way I explain seizures to patients is think of them like an electrical storm happening in the brain and the electrical storm can be happening in one small place in the brain and it may just stay in that small place, or it could be happening all over the brain all at once.

And the symptoms that people have during seizures are related to where that storm is taking place in the brain. And so those symptoms can certainly affect cognition, which we'll talk about later I'm sure. But even after the storm is done, there's something that we call a postictal state and think about that as sort of the aftermath of the storm, sort of the wreckage that the storm caused and that can also be associated with symptoms and certainly with cognitive symptoms as well.

Kelly Cervantes: Okay. So now that we know what is happening in the brain when a seizure occurs, can you talk to us about the short term impact of seizures on the brain?

So you mentioned it sort of depends on where in the brain the seizure is occurring, but what are those sort of clinical known common and not so common short term impacts of a seizure?

Dr. Alice Lam: Great question. So when I think about the short term impacts of the seizure, it really depends on a few things. As you said, location matters. Also, what kind of seizure it is. Is it a seizure where someone's having a convulsion whole body convulsion and that's going on for a long time or not. So how long the seizure lasts also matters when we think about the short term damage that might be caused.

So we know that when people have long convulsive seizures, those are the seizures that put them at most risk for having brain damage. And when I say brain damage, we're talking about injury to or loss of death of brain cells essentially. And so typically I think of those as happening in these prolonged seizures that last for tens of minutes to hours, things like that. But seizures that last for a much shorter time, seconds, a minute, may not be associated with clear physical damage that we can see at least. That's how I think about the short term impacts of in terms of physical damage.

Now there's also cognitive effects of seizures as well, when the seizure's going on, of course, and seizures can affect normal cognitive processes, almost think of it like a thunderstorm that's going to affect your cell on reception. It's kind of like that.

It can kind of scramble the signals of the brain that would normally be helping you think and remember things. So during a seizure, someone as part of the symptoms of a seizure, people may not be aware of the world around them. So it can look like they're awake, their eyes might be open, but you could call their name, you could wave your hand in front of their face, they would be totally unaware of what's going on around them.

And so if they're unaware of what's going on, basically nothing around the world is getting into their brains. They're not going to be able to remember that afterwards. So people will often say, my memory is really affected during the seizure, because I don't remember anything around the seizure. It's kind of a subtle distinction, I'll say. It's not so much a memory issue at that point, it's more of how much you are actually aware of during that point. Does that make sense?

Kelly Cervantes:

That makes total sense. I love your analogy to the scrambled cell reception. You're not even able... Your brain's not able to receive additional input at that time, which is why you can have that sort of buffer of memory loss certainly during, but the immediate before and after as well. I mean that makes so much sense to me.

I want to focus specifically for a moment on children, on pediatric patients. Clearly a child's brain is still growing, it is still developing. And I think that's one of the reasons that, I mean, epilepsy is scary regardless, but when you're talking about a developing brain, it adds an extra layer of uncertainty and fear to the mix.

You talk about the different seizure types, you talk about the different places in the brain where they're occurring, but there's also the impact of seizures occurring over and over and over again and sort of the compounded effect of that. And so I wonder what traditionally is that long term effect of seizures over the course of time in a developing child's brain?

Dr. Alice Lam:

Everybody's different, every child is different. And the reasons that a child may develop epilepsy can vary wildly in terms of maybe they had an injury, a brain injury at birth, or a malformation of the brain that they were born with that causes their epilepsy or maybe they have a certain type of disease or condition that's a progressive condition that also causes epilepsy as part of it.

So each of these cases is a bit unique in terms of what the kind of expected trajectory is. Is there a single injury that the child is going to be living with that may also be causing seizures over time? Or is there a progressive disease that has its own kind of implications in terms of what might be expected in the future? So all those things differ. If I can generalize, I'll try to generalize here. So seizures can definitely affect brain development and for many different reasons.

And so you can think about, well, let me just talk about some studies that people have done looking at this. So people have looked at kids who have a certain kind of epilepsy called temporal lobe epilepsy, and they've looked at kind of tests of learning and memory over time and how learning and memory performance develops over time essentially.

And they can compare that to kids who don't have epilepsy. So we know that as the brain normally develops, your learning and memory performance gets better and better over time. And it peaks at a certain point. And in kids who have temporal lobe epilepsy, what we know is that their rate of developing these learning and memory skills is slower than in kids who don't have epilepsy. And not only is the rate slower, but these kids with epilepsy may not hit the peak level of memory and learning performance that a child without epilepsy might achieve.

So there are these developmental aspects, but what I'll say is it can be really hard to disentangle seizures, the effects of seizures on these kinds of developmental aspects from other brain abnormalities that are associated with seizures.

So you can imagine why do these kids have temporal of epilepsy? Was there something in their brain, something that related to the connectivity, the way their brain cells were connected? Or was there some sort of anatomical abnormality or a structural abnormality in the brain that led to them having temporal lobe epilepsy?

And so maybe it's not the seizures themselves that are causing this problem, this change in development, but maybe it's this underlying brain abnormality that makes it so that they aren't able to learn as quickly or reach that same level of performance as someone who doesn't have epilepsy. So these things can be in real life, they can be really difficult to disentangle sometimes.

Kelly Cervantes: That's an excellent point. Epilepsy has so many comorbidities that you are working through, it's hard to figure out what is exclusively the cause of seizures versus something else.

Brandon: Hi, this is Brandon from Cure Epilepsy. Did you know that 30% of those diagnosed with epilepsy do not respond to current medications? That is why for over 20 years cure epilepsy has been dedicated to funding patient focused research to find a cure for epilepsy, learn more about our mission and our research by visiting [cure epilepsy.org](http://cureepilepsy.org). Now back to Seizing Life.

Kelly Cervantes: So I sort of wonder, are you able to find more clarity in that conundrum with adults? What do you see in adults where there is a developed brain, where it's easier to compare, you can look at an MRI from now and five years later and there's going to be more consistency as opposed to with a growing and developing brain. What can you see about the impacts of seizures in an adult in terms of cognition and memory?

Dr. Alice Lam: Yeah, so in adults it's obviously, as you said, different because the brain has largely developed and now we're talking about you've reached a certain level of function and we're thinking about is this function going to decline over time due to continued seizures, right?

So what I'll say there is that, again, it's still depends. Everyone's a little different again, and even in adults, there's an underlying cause for many people to be having seizures as adults. So we have to take things like that into account too. I do often counsel my patients in terms of thinking about long term effects of uncontrolled seizures, that these can be associated with longer term kind of decline in cognition and in memory.

I think a good example of that is we take care of a lot of patients who have what we call medication refractory epilepsy. They have continued seizures despite medications, and many of them often think about undergoing epilepsy surgery as a way to treat their seizures.

So one of the things that we'll often do in these patients is what we call neuropsychological testing, it is a very extensive set of tests that test all sorts of domains of cognition from memory to language to how well you're able to plan and organize things. But what we see in these patients, and I'll use temporal lobe epilepsy again as an example here, just because it's a very common kind of epilepsy, so we have more data on it.

In people who have temporal lobe epilepsy, we can definitely see impairments in memory over time, especially in people who have again, refractory seizures. And what's interesting there is that the kinds of impairments in memory actually depend on even what side of the brain the temporal lobe epilepsy is on. So we know that in most people, most people are right-handed and the left side of

their brain, the left hemisphere of the brain is what we call the dominant hemisphere.

It's confusing because the brain left side of the brain controls the right side of the body. So it's a little switch from that standpoint. But most people are what we call left brain dominant. And in that case, what that means is that most of their language and memory function is localized to that left side of their brain.

So in people who have left sided temporal lobe epilepsy, we can often see more severe learning and memory deficits in those patients than if you say had right sided temporal lobe epilepsy where those impairments may not be quite as severe.

So yes, over time I think that continued seizures can definitely cause worsening in cognition, again, I don't want to give the message that everyone who has seizures over time is going to have worse cognition, that's certainly not the case, but it is something that we can see in people who have had long history of uncontrolled seizures.

Kelly Cervantes:

I mean, if someone is having an electrical storm in their brain, it's hard to imagine that there isn't a little bit of scrambling going on over time, right? And to different degrees certainly, and there's aging that is going to impact that. Also, at some point we just begin to become a little less sharp. I guess to that end, Dr. Lam, I wonder is there a way that we can determine in someone who is aging, who has had epilepsy for years, are they going to be able to tell when they sense that their cognition is dulling? Is there a way that they can tell whether that's as a result of seizures or if it's a result of just general aging?

Dr. Alice Lam:

Yeah, that is a fantastic question. A lot of my older adult patients will wonder that. And what I'll say is that we know that there are normal processes that happen as people age. There's just normal changes where people do lose some brain cells over time. We lose some of the connections between our brain cells over time. And so these kinds of brain structure changes will affect thinking as we get older.

But generally normal aging shouldn't affect your function, your daily function that much. You might notice things like I'm a little slower at doing this than I used to be, maybe it takes me a little longer to put together a complicated recipe in the kitchen than it used to. I'm not as good as multitasking as I used to be, things like that, where there are these subtle things that people will notice over time. But in general we wouldn't expect it to be something that's so severe that all of a sudden I am not able to pay my bills or I have trouble navigating and I really can't drive anymore.

Those are not normal changes in aging. And so how do you differentiate that from epilepsy changes? Again, it can be complicated, but I think what can be helpful is, I mentioned neuropsychological evaluation earlier on, and sometimes

in an older adult patient who's had epilepsy for a while, even if they're maybe not necessarily saying, I have definitely had noticing change in my memory or change in my thinking, I might even suggest that we get what we call a baseline neuropsychological evaluation just to get a snapshot in time. Here you are, this is your normal function, where are you?

And that kind of gives you a bar in the future if maybe 10 years down the line you start to say, oh, I feel like something's not quite right or something's changing, what's going on? You can then repeat that neuropsychological evaluation and you have a sense of where you were 10 years ago, and if you see a significant decline, then that's not something that we would necessarily expect over time.

So again, there's different reasons for why that decline might happen, of course. But again, especially when we're talking about subtle changes that can take years, that can span years to develop. Sometimes having some of these little baseline markers over time can just be helpful in teasing out what's going on and what the causes might be.

Kelly Cervantes: So a couple questions here. Is that something that you would recommend for children and adults? And then also when do you recommend that you do that?

Is that something that should be done immediately at when that diagnosis is received? Or is that something that you recommend having done later on down the road?

Dr. Alice Lam: Yeah, so again, it depends on the individual. I think in kids, and again, disclosure, I don't actually see kids in my clinic, but obviously it's a time, as we talked about earlier, of rapid development, brain development. And so in a child who has active epilepsy and there's concerns about whether they're developing appropriately and things like that, I think that getting neuropsychological evaluations in kids certainly makes sense.

And again, to assess shorter and longer term impacts of seizures and medications and things like that. And also to help with guiding what kinds of resources and supports the child could benefit from in terms of school and these IEPs that we talked about. So certainly having that evaluation can provide a lot of information to make sure children have the right supports and resources that they need to continue to develop to their full potential.

In adults, again, it's a little different because the brain's developed and we have to think about what we might expect. So I think about things like what the underlying cause of seizures is in adults. So would I necessarily get neuropsychological testing on someone who's just been diagnosed with epilepsy? I don't typically, unless the patient is noting real concerns about their thinking or their memory, then we might talk about that.

I tend to do it in patients, if there's someone who's definitely noticing who had been fine and starting to notice or starting to worry about their memory, then it might be something where I refer them, just to get a sense of what's going on, how serious the problem is, and what things might be leading to that problem, what are all the things that can contribute to that issue? And that can be helpful in terms of figuring out how to treat those things and to help them get better from that standpoint.

And then I'll often do, as people get older, either people who develop seizures later in life as older adults or people who develop seizures early in life and are growing older and now are older adults, I do think it's important to assess those patients, especially as we know that, again, people can have cognitive decline around those ages that are possibly due to seizures, but also due to other things that we worry about as we get older. Things like Alzheimer's disease or other neurodegenerative conditions like that. So I will often do an assessment in older adults, definitely if they're noticing memory issues, but sometimes just as a baseline, even if they feel like things are going well, just to have that, just to have that baseline for comparison.

Kelly Cervantes: So if it can be determined that cognitive or memory loss is the result of seizures, is there anything that can be done? Can that damage be repaired or new pathways be trained?

Dr. Alice Lam: It kind of depends. Is the damage already done? And then when I say that, I mean is it related to loss of brain cells over time and you're not going to get those brain cells back, or is the damage ongoing? Meaning are you continuing to have seizures frequently? And there might be something there you could do to try to stop those seizures.

And we talked about people who have medication refractory seizures or epilepsy and how we might think about surgical treatments to try to get their seizures under better control. And sometimes what we can see is that if we can treat someone with an epilepsy surgery and if that can significantly reduce the frequency of seizures they have, sometimes we actually do see that their memory improves after the surgery over time.

So not everything is irreversible, not everything is reversible. But again, I think doing what we can to treat seizures, I think can definitely change the trajectory of things.

Kelly Cervantes: Are there therapies or other recommendations that you make to patients who are concerned about cognitive or memory decline?

Dr. Alice Lam: Yeah, definitely. So there's many things to consider when someone comes to me and says, my memory's just not as good as it was. So obviously seizures are something that's going to be on the top of everybody's mind. Are they continuing to have seizures that can be affecting cognition?

But think about a lot of other things like medication side effects, both short and long term medication side effects. Think about things like sleep. Sleep is very important for cognition and if you're not sleeping well for different reasons, maybe again, it could be related to epilepsy or not related to epilepsy, that can also have important effects on your thinking from day to day.

And then mood is another one that can have effects from day to day. So someone who has profound depression or anxiety, and we know that people with epilepsy are more likely to have depression and anxiety than the general public. Those can certainly affect your thinking as well.

And sometimes people say really, your mood can affect your thinking? But I have some patients who come in thinking they have Alzheimer's disease and actually it's not Alzheimer's disease, it's depression, really, refractory depression. These are all things that you can work on and try to optimize to improve cognitive function, you as a whole. So there's many roads to take.

If we want to just focus on the cognitive part, what are the things you can do? People say, should I play, should I do Sudoku? Should I do all sorts of crossword puzzles and things like that? So I had mentioned earlier, cognitive therapy is something that I'll often refer people to. And so what is that? Think about it kind of like physical therapy. So if you, let's say injured your back, you threw out your back or something like that, your doctor might refer you to have physical therapy.

And the idea there would be to kind of help you recover, but also strengthen the different muscles you need, the core muscles so that you don't injure your back again, or at least so that you can manage and get what you need to do done despite this back pain.

So cognitive therapy is sort of like that from the standpoint of let's say you have some cognitive impairments that are related to seizures. It may not be a very specific kind of cognitive impairment, maybe it's just memory. So there are things that you could do that can help compensate for those memory problems.

So writing lists, having calendars, checklists, things like that. And so cognitive therapists can be very helpful in terms of assessing where the problem is and then helping you come up with strategies or even exercises to strengthen other areas that can be strengthened to help you function better overall. So that's cognitive therapy. Now there are other programs that are available. So one of them is called Hopscotch.

Kelly Cervantes: Yes. We did an episode recently on the Hopscotch program. Refresh our memories about that one.

Dr. Alice Lam: I was going to say, I was just going to refer people to that episode. So basically, this is a program, my understanding of it is that it's like a self-management

program. It's run out of Dartmouth Hitchcock Medical Center, but they have this kind of remote thing where they can help people.

But the idea is that there are these personalized sessions that you have with a cognitive coach basically, that kind of helps you, and it's focused on cognitive impairments and how you can deal with those impairments and still improve your quality of life, essentially.

So they've actually done studies, they published studies looking at how effective this program is and have shown that it can improve quality of life in people who do have cognitive impairments related to epilepsy. That's a great program. And hopefully it can be expanded or there can be other programs like it in the future that can be resources for people. Now that's mainly for adults and possibly adolescents.

Thinking about resources for kids, and again, I'm not a pediatric specialist, but with kids, if parents are concerned about cognitive issues, memory problems, or thinking problems in their kids and whether they're developing appropriate or not, this is something that you could absolutely talk with your pediatrician, with your neurologist about.

And also it's really important to involve your school, your child's school early on because you can work with teachers at the school to develop what's called an IEP, right? Individualized Education Plan, I believe, where essentially, you can work with them to set goals in terms of learning for your child and to make sure that your child has the right resources and supports in place to be able to learn effectively at school, right?

Kelly Cervantes: Absolutely. I think that those are all incredible programs and great advice. Now I want to go back a little bit earlier to something that you said regarding epilepsy surgery. And I know that epilepsy surgery is becoming much more mainstream in large part because it can be done significantly less invasively than it was even 5, 10 years ago. But I think it's still kind of scary for some people, right?

Dr. Alice Lam: It's definitely scary. Brain surgery.

Kelly Cervantes: Brain surgery, right? So the idea is hopefully to prevent these cognition of memory issues, you want to stop the seizures, which are potentially making this worse, so you do the surgery, but can the surgery have its own cognitive and memory side effects? Or are those rare? Or are you exchanging one set of issues for another or not?

Dr. Alice Lam: Yeah, it's complicated and it's scary for sure for a lot of patients. And I have a lot of patients where I bring up the idea and many of them are like, nope, don't touch my brain. And everyone has kind of a different approach to it and different just feeling about it.

What I'll say is it's a very individualized thing. Epilepsy surgery, you really can't talk in generalities because it's highly individualized. It depends on what kind of seizures you have, where they come from in the brain, and again, where they're located because that really has a big impact in terms of the effect a surgery might have.

So these are things that I would definitely, if you're thinking about them or worried about them, definitely bring these up with your epileptologist, with a neurosurgeon that you're working with because it's important for them to know what's important to you.

Some people say, I do not want to have an epilepsy surgery, if there's any chance it's going to affect my ability to remember things or interact with the world. We don't want to lose that. And as your physicians, I certainly would never wish that upon one of my patients.

So there's a lot of testing and evaluations that we do in working someone up to see what kind of surgery might help them without hurting them. And so what your expectations are, or what your hopes are from a surgery outcome is really important. It's a really important discussion to have with your neurologist and your neurosurgeon to understand those changes.

Kelly Cervantes: I think the most common treatment for seizures, the first treatment for seizures is medications and they can have drastic side effects. And I wonder, you sort of touched on this a little bit earlier, but what are the short term effects for some of these medications? And also do some of these have long term side effects that patients need to be aware of generally, but certainly in terms of cognition and memory?

Dr. Alice Lam: Yeah, that's another complicated question. So medications can definitely affect cognition. A lot of patients of mine will say, that medicine caused me to be really loopy or really spacey or I couldn't have a conversation on that medicine.

Those are short term side effects, meaning if you were to stop taking that medication, I would expect those symptoms to go away, to clear up basically as the medication comes out of your system. So there are some medicines that tend to cause those kinds of problems more than other medications, but what I'll say is that it also can vary a lot from person to person.

So do I have some patients who are like, wow, I'm on a huge dose of this medication, I can't even tell it's in my system. And then other patients who are on the exact same medicine at a tiny dose and they're like, my brain is foggy and I can't think.

So again, there's not a one size fits all unfortunately. But if you think that you've started a new medicine and since starting the medicine, you're like, something's

not right with my thinking or I'm feeling cloudy, that's definitely something you should talk with your doctor about.

There are some medicines that can cause longer term effects in terms of worsening thinking down the line or over what we think about as decades of time being on these medications, these tend to be a lot of the older generation medications that we think about. They're used a lot less commonly now. And now there's a lot, there are more medications that I'll say are thought to have more benign or sort not as harmful long term side effects. So those tend to be used a lot more now than the older medications.

Kelly Cervantes: Dr. Lam, this has been so informative and as it typically is with epilepsy, it is so individualized. Any recommendations or the ideas of how seizures and epilepsy are going to affect the brain short term or long term. But I think that this conversation gives our listeners a good general idea, the questions that they should be asking their epileptologist, things they should be looking out for, and perhaps how they can differentiate between cognitive decline that is the result of seizures or medications or aging, and how to balance all of that in their head and what the importance is of any of those aspects. So I thank you so much for your time, for your expertise and your insight and for the research and commitment that you have to our epilepsy community.

Dr. Alice Lam: Thanks, Kelly. This was really fun.

Kelly Cervantes: Thank you Dr. Lam, for explaining the potential impacts of epilepsy on cognitive functioning and memory. And thank you for the research that your lab continues to do in this area. As Dr. Lam made clear, both seizures and the medications prescribed for people with epilepsy can impact cognition and memory.

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