Seizing Life, episode 73
Epilepsy… It's Complicated
Guest: Dr. Charles Marcuccilli
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Kelly Cervantes: 00:00 I'm Kelly Cervantes, and this is Seizing Life, a weekly podcast produced by Citizens United for Research in Epilepsy, CURE.

On today's episode, I am honored to be joined by Dr. Charles Marcuccilli, Division Chief of Pediatric Neurology and Director of Pediatric Epilepsy at Rush University Medical Center. Dr. Marcuccilli received his MD and PhD in neuropharmacology and neurophysiology from the University of Chicago. He is also my daughter Adelaide's doctor. He's here today to talk about helping the general public understand the facts of epilepsy.

Thank you so much for coming to chat with us today, Dr. Marcuccilli. It's nice to see you outside of the hospital.

Marcuccilli: 00:50 Thanks for having me, and it's a pleasure to be here.

Kelly Cervantes: 00:53 Epilepsy is one of the oldest recorded diseases, yet we still know so little about it, and the public knows even less. Why is that? Why has so much time gone by, and we're still so in the dark?

Marcuccilli: 01:09 As you point out, it is a disease that is ancient. It's described as early as 400 BC. Essentially, as soon as a seizure was observed, people have tried to explain it. In ancient times, people thought that patients were being possessed or punished. This was something that was done to them, hence the word seize, which means "to be taken hold of forcibly."

Kelly Cervantes: 01:41 I never put that together before.

Marcuccilli: 01:43 Yes. We talk about 65 million people worldwide having epilepsy, but 80% of those are due to infectious causes. Typically, neurocysticercosis, which is endemic in many parts of the world, particularly developing countries. And if a person had a seizure due to an infection, of course the concern was that, "I could catch this somehow." From that perspective, patients early on, before we understood the pathophysiology of these infections, would tend to stay away from people with epilepsy. We now know that neurocysticercosis is a parasitic infection, a tapeworm infection, that one typically gets nowadays from eating undercooked pork. It seems that we've struggled with defining epilepsy almost from the earliest observations. I think the reason why it's hard for people to understand relates to the wide range of severity, the widely different types of seizures that patients can experience, in terms of the causes as well, the fact that epilepsy is associated with so many comorbid conditions.

Kelly Cervantes: 03:18 Define comorbid.

Marcuccilli: 03:20 These are other disorders or conditions besides the epilepsy, such as attention deficit disorder or anxiety or depression. And finally, I think there is variability in terms of the impact of epilepsy on the individual in the family.

Kelly Cervantes: 03:40 Let's start with the severity that you mentioned first, because that absolutely rings true, and I think we've seen it on the show. I've certainly seen it in my own life. We have Adelaide, who is neurodevelopmentally a newborn essentially. Sometimes she's gotten up to about a four or five month developmental level, but she's spent most of her life there. She's never going to be fully assimilated into our culture. But then you have people like Kurt Eichenwald, who is a best-selling author, and has written these movies and an incredible book. We had him on the show. How can there be an Adelaide and a Kurt with the exact same disease?

Marcuccilli: 04:26 Yeah, that's a interesting question. I like to use as an example absence epilepsy, or staring spells. We like to say that epilepsy is a common phenotype. That means what the condition or disorder looks like with multiple genotypes, meaning different causes. I could have within my clinic three different patients with staring spells. I could have a child who has 20-30 staring spells a day, lasting 20 seconds each, and this child, hypothetically speaking, developed that epilepsy at about three to four years of age. And so this child probably has childhood absence epilepsy.

Contrast this with another child who also have 20-30 staring spells per day, brief but, in contrast to the first kid, this child has generalized tonic-clonic seizures, and developed the seizure much later, nine, 10 years of age. In the first case, that child will probably outgrow that epilepsy by the time she's a teenager and has gone through puberty. In the second case, that child has a lifelong condition that she'll have to deal with.

A third case is a child who comes with a staring spell, perhaps developed the epilepsy at nine years of age, and this child will have longer staring spells. And perhaps they can progress to generalized tonic-clonic seizures. The first two kids probably have a genetic cause, and the third kid may have a genetic cause, but could also have other causes, such as malformations of cortical development.

What the public sees is the staring spells, but each have a different trajectory. The first one will likely outgrow it. The second one will have to deal with this through adulthood. And the third, it may be uncertain. I think that leads me to the severity question. I've taken care, in the past, of a patient, a young man, I won't give too many details here, who essentially had one seizure per year.

He'd have a seizure, come in the clinic. I'd make a medication adjustment. I would then see him in six months. He's doing great. I'm patting myself on the back, and then six months later, he has another seizure. Make another medication adjustment. Six months later, he's doing well, and I think I'm doing well. Six months later, he has another seizure. After about three years, I was beginning to realize I wasn't really helping him much, and that his pattern of seizures was once a year.

And so I frequently ask the residents or my EG technicians, "Could you live with or tolerate one one minute generalized tonic seizure per year?" It's not really a fair question, right? Because they help me with my patients who have epilepsy, and they put on EG leads. The vast majority of them would say, "You know, Dr. Marcuccilli, I think I could do one seizure a year. Doesn't seem so severe."

Kelly Cervantes: 07:55 In comparison with ...

Marcuccilli: 07:57 In comparison.

Kelly Cervantes: 07:57 Sure.

Marcuccilli: 07:58 But what if I said this young man, and let's just say he's 22, for six months out of the year, in most states, he can't drive. Now he can't go to school. He's going to have a difficult time getting or holding a job, and this may affect his relationships. And suddenly, one seizure a year isn't so benign. We have this whole range of comorbidities that we need to consider. It's not just the seizures, but it's also what impact the seizure has on his life.

Kelly Cervantes: 08:41 Right. You have mentioned now, we've gone over a handful of different seizures, the absence, the tonic-clonics. Which, to the general public, that's the grand mal, movie style seizure. Adelaide's are spasms, but she's also had these bizarre atonic seizures, where we patted her on the back and she'd slump. I think that that, in and of itself, adds to the misunderstanding and the complications, just the wide variety of the number of seizures. Help us learn more about that.

Marcuccilli:	09:16	You're absolutely right. In 1987, Gallup performed a poll of United States citizens, and was curious about what the public actually knew about epilepsy and its cause. In that poll, only 50% of the respondents could identify a cause of seizures.
Kelly Cervantes:	09:40	Really?
Marcuccilli:	09:41	It's pretty remarkable, despite the fact that it's so prevalent. There's, again, 65 million people worldwide.
Kelly Cervantes:	09:48	One in 26.
Marcuccilli:	09:50	It's pretty interesting. 19% of those respondents thought it was a brain disorder, and one in six thought it was a mental health issue.
Kelly Cervantes:	10:00	Oh my gosh.
Marcuccilli:	10:01	Let's look at the causes of epilepsy. Epilepsy is a disorder that kind of occurs at the extremes of life. It's a disorder of the young and a disorder of the old.
Kelly Cervantes:	10:12	Now, I'm going to pause you for a minute. You've used the word condition, disorder, disease. Is one more accurate than the other? Are they all correct? What words should we be using?
Marcuccilli:	10:23	I think, in my opinion, they're all relatively correct.
Kelly Cervantes:	10:27	Interchangeable, okay.
Marcuccilli:	10:28	And interchangeable.
Kelly Cervantes:	10:29	Let's go back to where you left off.
Marcuccilli:	10:30	Seizure would be the symptom, and if a patient has two seizures separated by more than 24 hours, then we consider it epilepsy. As I said, epilepsy is a condition that kind of occurs at the extremes of life. It's one that has a higher incidence in the young and a higher incidence in the old. And the causes in these two groups is very different, and so, in the very old, it's relatively easier to understand. It's mostly due to stroke or some tumor. And in the young, 65% of the time, we don't really know the cause. We assume that most of those are probably genetic mutations, but other things it could be. Brain malformations: Developmentally, the brain doesn't develop the way it should,

		and that sometimes predisposed to epilepsy. Tumors: Strokes do happen in the young. They're rare, but they can happen. Autoimmune diseases, traumatic brain injury, and infection. The aging neuron would be something we would see in the elderly, and so ironically, the third most common neurological disorder, Alzheimer's disease, oftentimes patients can have seizures as part of that condition.
Kelly Cervantes:	11:59	You mentioned post-traumatic epilepsy, which is something that CURE is currently part of a large grant with the DoD. This was not something that I was really aware of before CURE took this on, and so I want to take a minute to talk about that, this idea that, okay ... I think we're comfortable with the idea, "Okay, you have epilepsy as a result of brain tumors, with Alzheimer's, a genetic condition," but this idea that you could get it from a brain injury. Explain what post-traumatic epilepsy is, and what that means, and what people should know about that.
Marcuccilli:	12:43	The brain can experience a lot of different forms of trauma. Most of the time, when I use the word post-traumatic, I'm referring to a situation where someone sustained a head injury, perhaps due to a motor vehicle accident or, for those serving in the military, in the course of combat. It's, I think, important to separate those two particular ones, because combat injuries are much more likely to result in epilepsy as a secondary complication. But the truth of the matter is, infection can cause trauma to the brain. So too can autoimmune diseases, all sorts of things in the-
Kelly Cervantes:	12:43	It's all interconnected.
Marcuccilli:	13:27	It's all interconnected. When a brain sustains injury, there are a lot of processes that happen, and so the neuron, the brain cell, can be injured. And it wants to recover, it wants to fix itself and resume its normal function of transmitting electrical signals. There are a number of mechanisms which help the brain do that. Sometimes the brain is successful, and sometimes it's not so successful, and what one gets is aberrant or problems with the wiring or the network itself. About 25% of patients who sustain a traumatic brain injury from a motor vehicle accident will have epilepsy as a secondary complication, and by that I mean, they may recover from the brain injury itself, but several months to later-
Kelly Cervantes:	14:33	The damage is done.

Marcuccilli:	14:33	Several months to years later, yes, the damage has been done. And that person now has to deal with the epilepsy, which is this ability, unfortunately, to seize spontaneously and unpredictably. The greater the injury, of course, the more likely that risk, and I think that's why we tend to see it more frequently in patients who have sustained their brain injury in combat.
Kelly Cervantes:	15:03	I have to bring up and question you, as you are a clinician. We have been inpatient with Adelaide before, and we've had other specialists come in to the room, because ... You know Adelaide very well, and she's a little complicated. It's affecting her brain, but that in turn affects multiple systems within her body, and we will have other specialists come in to the room. They go hands-off, "Oh, she's a neuro kid." They defer to neuro on everything. It's almost as if they're afraid to touch her, or that they're afraid that they're going to do something wrong, or they just don't understand her. How do we change that? How do you get the general public to understand epilepsy if, even within the medical community itself, they're have their hands up and claiming ignorance?
Marcuccilli:	16:00	I think that's a great question. It's surprising to me that it took as long as, I believe, 2014 for epilepsy to become a separate boarded specialty.
Kelly Cervantes:	16:11	It was general neurology, but we didn't have true epileptologists until four or five years ago, five years.
Marcuccilli:	16:20	For me, personally, I recall when I began my training in child neurology. I went through my neurology fellowship, my pediatric neurology fellowship. I went through my epilepsy fellowship, and after about a year or two, I realized that I could read EGs pretty well, but I was perhaps lacking in dealing with a lot of the nuances of epilepsy and all of the comorbidities that we're talking about. Not only treating the child with the seizures, but also all of these other associated conditions.
Kelly Cervantes:	16:59	Treating the entire person and not just the seizures.
Marcuccilli:	17:01	Treating the entire person, and for some of those kids, that means oxygen requirements. As you know, it means dealing with G-tubes. At that point, like many others, I decided that I really needed to train with and work with, I had already finished my training at that point, somebody in the field who really understood epilepsy, and someone who knew how to do epilepsy surgeries, because I was interested in also learning the

surgical management. And that's when I moved my family up to Milwaukee to work with Dr. Mary Zupanc, and I learned a great deal about how to treat this really complex disorder. I've tried to come back and, at each center that I've been in, tried to help other physicians understand what's needed in the treatment.

The other thing I've realized, and I've said this to you before, these children have changed me in very profound ways. Adelaide is my patient, but she has also been my teacher, and I've learned a great deal from her. That knowledge has further enabled me to take better care of other patients, and so I actually embrace the children who are the most complex, because they've been my greatest teachers. I think, for some physicians, these are challenging patients.

My hope is to be able to provide a center or to build a center that comprehensively treats children with epilepsy, and I can't do that alone. I can't. It's just not the epilepsy. I need psychiatrist, and I need pulmonologist, and I need cardiologist, and I need all. I need a specialized Peds ICU. I think that's what's really lacking if we look nationwide, is we need, or patients with epilepsy need access to centers that can provide this comprehensive care.

Kelly Cervantes: 19:29 There's a great need for this, and it's something that we've talked about before, that I don't think that people understand is that there are not enough epileptologists out there. You would love to do more research, but you are so desperately needed in the clinic, helping the patients and finding that balance between treating the kids, but you can't be out there searching for a cure when you're just putting Band-aids for the problem.

Marcuccilli: 20:01 Yeah, yeah. I remember the day well when my focus went more towards clinical and somewhat away from research. It was in 2008. The country was struggling with the economy and all sorts of other issues, and I was sitting in my lab, just doing my research. At that point, I only had one half day of clinic a week. I had a wonderful young nurse working with me, and she came in to the lab frequently to go over the patients and informed me that I had something along the lines of a six month waiting list. I don't remember exactly.

Kelly Cervantes: 20:43 Oh my gosh.

Marcuccilli: 20:44 And that I would probably need to add additional clinics. And I asked her, I said, "How long has this been going on?" She had said, "For quite some time." For me, that was a real moment, because I believed in my heart that was I was doing in the laboratory was going to lead to advances that would help children in the future, but I was coming to the realization that I could probably do more, at least in the short term, by having more clinics and helping them more immediately.

I changed the focus of my lab, and started to do more looking at genetics and pharmacogenetics and some neurocomputation stuff with colleagues across the country, and things that I could still be active in, but also play more of a role in terms of alleviating suffering, which is essentially what I promised to do when I got my MD degree.

Kelly Cervantes: 21:53 While we miss your time in the lab, I can tell you that the Cervantes family is very, very thrilled that you added on those extra clinic hours, because I don't know that Adelaide would be alive without you.

Marcuccilli: 22:07 Thank you.

Kelly Cervantes: 22:08 How can someone who's listening today, how can they help educate their community, their peers, their family? Try and help them to better understand what epilepsy actually is, and that it's not just the movie version. That is part of it too, but the complexities. How can we within the community better engage those outside of it?

Marcuccilli: 22:43 I think programs like this really help, and I like the focus of what you are accomplishing here, trying to raise that awareness and having people share on social media. Since I started training, the world has really changed. I started at a time, really, when the internet was somewhat of a novelty. And now, everyone has a cell phone, and social media is so much more integrated in our lives. I certainly see that in the clinic. I think programs that can reach out through social media are really important.

I think it would be nice to have different kinds of storylines in television and in books. The storylines I'd like to see, certainly I'd be interested in it, is going through this impact. Or maybe a documentary that highlights that, even a single seizure can greatly affect someone's life. But it is tricky, and I think that's one of the reasons why trying to education a population at large has been tricky. I think it's going to be slow going, but I do think that, with the current technologies, and hopefully better studies and more innovative technologies, we can really educate everyone at large.

Kelly Cervantes:	24:23	Thank you so much for chatting with us today. I have learned so much. We always have the most fascinating conversations, so I appreciate you taking time from your very busy day.
Marcuccilli:	24:36	Thank you, and I'd like to thank you and Miguel for all you do for patients with epilepsy. It's been a pleasure working with both of you. I know you both work tirelessly, not only to keep Adelaide as healthy as she can be, but also to help find a cure so that this doesn't happen to other families.
Kelly Cervantes:	25:03	Thank you again, Dr. Marcuccilli, for giving us such great insight into the facts and fictions of epilepsy. It is vital that the public understand how complex this disease truly is, so that we can bring awareness and eventually find a cure.
Disclaimer:	25:35	The opinions expressed in this podcast do not necessarily reflect the views of CURE Epilepsy. The information contained herein is provided for general information only, and does not offer medical advice or recommendations. Individuals should not rely on this information as a substitute for consultations with qualified health care professionals who are familiar with individual medical conditions and needs. CURE Epilepsy strongly recommends that care and treatment decisions related to epilepsy and any other medical condition be made in consultation with the patient's physician or other qualified health care professionals who are familiar with the individual's specific health situation.