

Welcome to Epilepsy iConnect at Home. I'm Dr. Robert Fisher. I head the epilepsy center at Stanford. I'm interested in public education. Obviously people with epilepsy desire information, but it isn't always easy to drive to meetings, so this is a webinar that is endeavoring to provide information on different subjects of interest to some people with epilepsy and their families. We've been running it the second Saturday of every month at 11am PST, which is 2 pm EST. The notion behind it is not just to be a lecture, but to present 15-20 minutes of material in the beginning, followed by questions and comments. I hope there will be interaction among the audience members and not just questions for me.

Here's how the rules go. You would type into your browser the web address indicated. This is good only for this session. Or click on the link send to you by the Epilepsy Foundation. Or you can call in to the provided phone number. This will get you audio, but you won't see the slides. Your microphones will be on mute during the introductory talk. During the talk, please type questions or comments into your chat box. You won't have one if you're on the phone. But if you're online, you'll see a box to type in. After the talk, the hostess by my side, Robin Owen, will organize the questions and comments. We'll call on you and ask you to unmute your microphone/phone to talk. I would hope the audience would share experiences with each other. After all, you are the experts in this condition, not the doctors. We are recording the session for posting on YouTube and elsewhere, so if you wish to remain anonymous, don't use the video and login with a fake name. Please note that just like any medical show on the radio or television, this is an educational program. Although you may choose to report elements of your medical story, I will do my best to refrain from giving medical advice online. This is not a therapeutic session, but an educational session.

The subject today is thinking and memory problems. As a practicing clinic physician, the main issues that people bring into my clinic are problems with fatigue, dizziness, blurry vision, unsteadiness, and memory. These are side effects of the seizure medications, but also other causes besides the medication. Memory problems are very prevalent. In California, besides limitations on driving, memory problems are of the most common problems raised in clinic visits.

The International Bureau for Epilepsy is the parent for the American Epilepsy Society and it is a group of professionals doing research on epilepsy or caring for people with epilepsy. They have done surveys on cognitive function, which means thinking function among Europeans. Among 425 Europeans with epilepsy surveyed, 44% had difficulty learning, 45% had slow thinking, 59% said they get sleepy or tired, and 63% said that medication side effects prevented them from achieving their goals. That's a substantial number of people that believe that they are cognitively impaired.

What are the factors that affect memory in people with Epilepsy? There's a troika that overlaps. One of them is ongoing seizures themselves. Many people find that for quite a while after a seizure, their memory isn't very good. This is part of what we call the post-ictal state or the post-seizure state. Often, people have a complete blank memory during the time they are having seizures. Not everyone knows when seizure activity is going on in the brain. Sometimes there can be subclinical seizures that are affecting the memory and the person is not aware they are having seizures. The second of the three circles are medication side-effects. I will come back to that in more detail in a few minutes. The third one is a little harder to understand. Something caused the epilepsy. Half of the time we can't figure out what that something is, but it's some form of brain injury or a genetic predisposition. That injury in itself may have affected the memory. So you get this triple whammy: seizures, medication side effects, and the underlying injury to the brain. All of which can impair thinking and memory.

These are the cognitive abilities (cognitive means thinking) that are most likely to be affected by anti-epileptic drugs. One is processing speed, which people with epilepsy would perceive as being slowed down or not reacting as quickly to things. Second is complex or sustained attention, which you use when you need to focus. Third is dual processing. Think of someone who has a phone on each ear in a sales job, two people talking to them at once. They need to think of more than one thing. It's very hard to do when you're on some of the anti-epileptic medications. You can only concentrate on one thing at a time. Then there's verbal learning. That's remembering the name of the person who just came up and shook your hand. Verbal fluency allows you to quickly come up with the words that you need. Mood is a big issue as well.

There are different types of memory. Scientists divide them up by category and duration. In terms of category or type of memory, there is procedural memory and declarative memory. Procedural memory is the sort of things you tend not to forget (e.g., how to ride a bike or use a fork) unless there is major brain injury. I must say that in movies, TV shows, and novels, amnesia is often misrepresented, where people lose memories that they would never lose and still be able to function. However, declarative memory is often affected. Declarative memory is involved in learning people's names and learning of lists. Another category of memory is by duration – short, medium, and long term. An example of short term memory is remembering a 10-digit phone number with an area code for 5 seconds long enough to dial. An example of medium would be a person who was introduced to you about 10 minutes ago. And long term might be where you went to elementary school or who your second grade teacher was.

Think about what sorts of memory problems – procedural, declarative, short, medium, or long term – that give you problems. What are the sorts of things that give you trouble remembering or thinking about? Feel free to type a comment into the chat box about what kind of memory problems you have. We'll come back to it later in the question and discussion sessions.

Now we come to the medications that we use to treat seizures. Here we have a question: which medications have caused you the most memory problems? Before I go on to tell you the ones that usually cause the most memory problems, let me emphasize that there is no right or wrong answer here. People react differently to the different medicines. Some people may have no problem with a medicine, but other people may feel their memory has been completely wiped out by the medicine.

These are the drugs typically best, medium, and worst for memory. When I say this, please understand the good news that memory implications for these medications are not permanent. It's only an issue of when the drug is circulating in your blood and brain that it's causing a problem because the medication is designed to make the brain cells not fire as quickly. That's good during a seizure when the cells pathologically fire quickly, but it's not good when you're trying to come up with a name for the face of that person you know. Those that we tend to think of as being best for memory, not that any of them make memory better, but at least less deleterious, are levetiracetam (Keppra), lamotrigine (Lamictal), gabapentin (Neurontin), and lacosamide (Vimpat). Then if we skip over to the box on the right, those that are worst for memory in general are phenobarbital (Luminal), topiramate (Topamax), zonisamide (Zonegran), clonazepam (Klonopin), clorazepate (Tranxene), diazepam (Valium), and lorazepam (Ativan).

If you are on any of the medicines in red and having memory problems, I'm not advising you to stop. Do not stop your seizure medication based on this program! But perhaps you should discuss with your medical care team whether an adjustment in those medicines might help the memory. Then you have drugs that sometimes affect memory in different people: phenytoin (Dilantin), carbamazepine (Tegretol), oxcarbazepine (Trileptal), and valproate (Depakote). There are individual variations and there are some drugs, especially the new ones are not tested for memory yet, so we're not sure how they affect the memory.

Mood makes an enormous difference in memory. Depressed people think they are doing much worse than they are on tests of thinking and memory.

Let's talk about the brain structures that are responsible for memory functions. Of course we have the cerebral cortex, which is the mantle of cells on the outside of the brain with all the in-folding. This is what makes us who we are. Thinking happens in the cortex, which is the most advanced part of the brain. The thalamus is the gateway to the cortex. The hippocampus is the most seizure-prone structure in the brain, deep in the temporal lobe. The hippocampus is shaped like a sea horse in cross section, and it means sea horse in Greek. Memories are not stored in the hippocampus, but you need a working hippocampus to get items into memory and out of memory. You can think of the hippocampus as the administrative assistant that files memories into the rest of the brain and retrieves them when necessary.

Here is an MRI of a brain with a damaged hippocampus in a person with epilepsy. It's called mesial temporal sclerosis, or sometimes hippocampal sclerosis. Here on the right side (left in the picture: MRI inverts left and right) you see a normal hippocampus in cross-section. I've enlarged it. On the left side of the brain, it's brighter and flatter. You see here how much smaller the hippocampus is on the left than the right. This hippocampus is damaged. It's scarred. Left side of the brain in right-handers is responsible for speech. Right side of the brain is typically responsible for memory of maps, and pictures or structural relations. A person with a scarred hippocampus on the left like this would be expected to have quite a bit of trouble with word and name memory. And many such people do. When we see this on an MRI, it suggests to us that the seizures are coming from the left side of the brain.

Do seizures harm memory? This is a question that has been debated for many decades. All epilepsy doctors agree that the condition of status epilepticus, which is seizure that goes on for a long time without stopping (for example, 30 minutes), can damage memory. Status epilepticus can harm the brain, leading to further seizures and thinking and memory problems. The picture shows white colored swollen hippocampi on both sides in a patient with status epilepticus. What is less clear and more controversial is whether ordinary seizures harm the brain. There is no definite answer to this and certainly I would encourage you not to worry that every seizure you have is damaging brain cells. I don't think that's the case. But, many of us do believe that if there are frequent seizures over many years, a person's memory becomes worse. The hippocampus, either on one side or both sides, depending on where the seizures are happening, may experience deterioration and thus the memory may decline slowly over time. We are not talking about developing Alzheimer's, but memory problems.

In the early 1950's, it was not known that there would be a devastating side effect of removing both hippocampi. This patient, HM, had surgery to remove both hippocampi in 1953 and never formed a new memory after that time. He remembered everything from before that time: where he went to school, who his parents were, even the evaluation for surgery. But with no hippocampus on either side, when you walked into a room to introduce yourself you'd say hello, your name, walk out, walk back in 5 minutes later, and he would have no memory of having ever met you before. He spent the rest of his life as a psychological test subject. Of course, since 1953, no one has ever again taken out both hippocampi in epilepsy surgery. But there are people who have both hippocampi damaged, and they can have severe memory problems. People whose seizures come from both temporal lobes have more memory problems for this reason than people who only have seizures on one side.

What are the neuropsychological effects of taking out the inner anterior portion of a temporal lobe? On the right side, which is the non-dominant side in right-handers (left-handers can be either dominant on the left or the right) the problems tend to be with visual, spatial or face memories. On the left side, there are problems with word and number memories. So, take a moment to jot into the chat box, what kinds of things you most often forget and we can discuss those later.

The slide shows predictors of having more of a problem after having epilepsy surgery on the temporal lobe, which is the most common place we operate for epilepsy. Problems are more so if we're on the language dominant side, usually the left side of the brain. There are more problems if surgery is done at an older age or if the seizures came on at an older age. There is more to lose if people have a very sharp memory at the start. There is more to lose if the hippocampus does not show that type of atrophy or hippocampal sclerosis that I showed earlier. Conversely, if hippocampus does show that type of scarring, the memory is general not that much worse off when taking it out because it's already pretty damaged and non-functional. Seizures emerging from that hippocampus can spread into the normal brain and affect the function of the normal brain. There is greater cognitive decline if the surgery doesn't work and the seizure control remains poor post-operatively. However, if the seizure surgery does work and it stops the seizures, then it helps the memory. After a year or two, when some can cut down the anti-epileptic drugs, then memory gets even better. Sometimes, memory gets worse for a few months after seizure surgery. After healing and recovery time, the memory may improve or at least stop declining.

These days we're doing many of our temporal lobectomies with a laser fiber, heating up at the tip through a rod placed at the back of the head through the hippocampus. This area showing the white oval is a laser removal of hippocampus. I think this is a better way of doing surgery, in cases where it can be applied, because we don't have to open the skull, except for a very small hole in the back. We don't have to go through healthy brain to get through to the inner hippocampus. Patients can typically go home the next day and can feel pretty well. But it is still brain surgery and you still are losing hippocampus with this surgery.

Medications have a lot of memory side effects – some more than others. Neurostimulation therapies do not have memory side effects. By neurostimulation, I mean the vagus nerve stimulator. The thalamic SANTE stimulation of the anterior nucleus of the thalamus for epilepsy deep brain stimulator is used around the world, but not yet in the United States. Or the responsive neurostimulator by the

company Neuropace that is available in the US. These neurostimulation therapies do not have a deleterious effect on memory.

It's worth mentioning cognitive effects on the fetus if a woman is taking certain anti-epileptic medications during pregnancy. Depakote (valproic acid) and phenobarbital are known to have a negative effect on the cognitive function of children born to mothers who are taking those medications during pregnancy when the child is tested at 3 or 5 years of age.

I've set out the problem in some detail. What can you do about a bad memory? This is a picture from a movie called *Memento* where the main character kept forgetting things, so he would tattoo on his skin notes that he needed to solve his problem. Write into your chat box. You all are experts for what to do with a bad memory. What do you do? What have you tried? How has it worked or not worked for you?

Do these things on the slide help? They've been suggested. Memory medicines, donepezil (Aricept) and memantine (Namenda) are medicines used in Alzheimer's. A bad memory from epilepsy is not, nor does it progress to, Alzheimer's. Some people feel that the medicines that help Alzheimer's can help people with memory and attention problems from epilepsy. It's not so clear that that's the case. Have you tried them? Have they helped you? How about brain exercises, such as crossword puzzles, the system Lumosity, reading, and keeping mentally active. Physical exercise is the only treatment that's been proven to prevent or forestall Alzheimer's and it might be useful as well for memory problems with epilepsy. We don't really know. Two other ideas are writing down strategies and mnemonics, like stage magic tricks to help with memories. Which of these things have you tried? Do they help?

So what can you do about a bad memory? You can try to control the seizures, minimize seizure medicines, avoid medicines that impair memory in your particular case, keep mentally and physically active, treat depression if present (depression amplifies cognitive problems), develop a note-taking strategy by writing things down or dictating into your smart phone, or considering mnemonic tricks. Some of you may have answers of your own.

RF: So that is my part of the presentation. Let's now go to some questions and comments. Robin, what question would you like me to call on?

Robin: A lot of people are talking about music as something that has been helpful to them in terms of mitigating their memory problems or making things more memorable.

Audience 1: I've had a lot of experience. I was born with epilepsy. I had it all my life. It got worse. My whole life, I've had memory problems. It took me 20 years to get my Bachelor's degree. It took a lot of hard work and battling with my teachers. They were doing everything they could to make me give up, but I didn't let it happen. And with my memory problems, I've always written things down, repeated things in my brain all day long to keep my brain focusing. I realized that in college when I let myself go during summer break, I couldn't remember anything from the previous semester and would fail my next class. It wasn't easy and it stressed me out. I had the vagus nerve stimulator implanted in 1995. I was on a study. I stopped going into status. It was still severe, but I was doing so much better. I mean when I woke up from surgery I even felt like a better person. It was amazing. That was at UCLA in 1995. And then my dad took me to Mayo Clinic and they said I'm lucky to be alive. They got me seizure free. March 2000 was my very last seizure until 2008. I have a hormone shot and - wham - everything went out of control.

RF: Some seizures are hormonally sensitive. Your story is inspiring to me and others. You struggled with a bad memory from birth, from seizures that came from birth, but you also got your degree. And I think you also indicated that when you had the stimulator put it, that prevented you from going into status epilepticus, which are very prolonged seizures. Your memory improved as well. So thank you for that. Let's give some other people a chance to talk about their experience with thinking and memory.

Audience 2: I'm in a choir. I won't say it's helped my memory. It helps my mental attitude. I'm on Onfi, which is a benzodiazepine. I've been trying to keep to the ketogenic diet, which is horrible. I'm just afraid to go off that if it's working. In terms of music, it's basically a mood elevator.

RF: Anything that lightens depression is highly likely to improve memory and thinking because people are in such a brain fog when they have low mood. In fact, it may even help seizure control when depression is treated. It's a subject for another session. The last session we did was on psychiatric issues in epilepsy. We may possibly repeat that session at some point. Any other questions or comments?

Audience 3: I had a temporal lobectomy last year. I had seizures my entire life. I had a temporal lobectomy on the right side last year. I've been seizure-free for one year now for the first time in my life. I noticed that after they took out two-thirds of the right temporal lobe there was a disconnect. I'm wondering if that's normal.

RF: Are you right-handed?

Audience 3: I am. I have cerebral palsy. I have paralysis on the left side.

RF: Speech would almost certainly be on the left side of your brain. What sorts of memory problems did you have? What sort of things did you forget?

Audience 3: The best way I can describe it is that everything is just gone after maybe 2 or 3 days. It feels like I've gone into a black fog, like it never happened.

RF: So, for example if you saw a movie a week ago you would not remember it now? That sort of thing?

Audience 3: Yeah, it's like in theory I knew that I went and did something, but someone would have to tell me that I went and did it. And I mean you mentioned that zonisamide is one of the worst medications to be on and Keppra is one of the best (for memory). Well, I'm taking both.

RF: I will refrain from giving medical advice, but I will repeat that if anyone has a bad memory and is on a medicine that might make that memory worse, to discuss with their physicians. I've seen remarkable improvements in memory for people who have gotten off Topamax or Zonegran. These two are excellent seizure medications, but in some people, maybe one out of three, they have that significant memory side effect. That would be my big hope for you: that a lot of your memory fog is due to medication, because that is very treatable. Otherwise, there is a question of whether your left hippocampus, the good one that is left behind, is functioning at 100% to take up the slack when the right is gone. It's not usual for people to have memory problems after a temporal lobectomy, though something unusual happened to you and I won't attempt over the internet to figure out what it is. But with luck some of it is due to zonisamide. So, good luck. Talk to your doctor about it.

Audience 4: I appreciate it. Thank you.

Audience 1: I've been having all types of issues with the (vagus nerve) stimulator. I've been having pain. But we're too scared to take it out of me. And if it's on too strong, even at just 1.2 (milliamps) or something I'm getting pain in my neck and in my shoulder and it goes down my arm. The doctors don't want to confirm that, but I've had that experience of when it goes on too high and we lower it, then the pain is gone.

RF: It's a little off subject, so I'll answer briefly. We recently did a whole session on the vagus nerve and other stimulators. The vagus nerve stimulator in the chest should not hurt. When it does, it's usually a leak of the stimulating current into the surrounding tissue, often because some scar cells have grown into the device and made a little electrical bridge that can leak the current. The answer to that is turning down the stimulating current in order to make it non-painful. Sometimes a surgeon will make a cut in the chest, pull the connecting lead out, scrape them clean, and put it back into the slot in the stimulator and now it's a clean seal that doesn't leak any more. That's a pretty minor surgery. Let's move back to the memory issues.

Robin: One of our audience was talking about moving back and forth between drugs – on and off generic phenytoin or brand name Dilantin. She had a major effect on her memory.

RF: phenytoin (brand name Dilantin) is one of the drugs that's usually in the medium category of affecting memory. Definitely, it can do so in some people. If a difference is noted between brand name Dilantin and generic phenytoin, then I think what's happening is variation of the blood level of the drug. The main problem with generics is that they might not be as bioavailable in the same way as the brand name, so a generic could deliver either more or less drug into your system. If you get less drug, you can have a seizure. If you get more drug, you can have side effects, such as worsening memory problems. This is an issue for the medical team to check. A blood test will show what the levels of the drugs are to see if they are in the range they are supposed to be – the range that would be most beneficial against the seizures without causing side effects.

Robin: A few people are asking about a way to see the slides again. People had trouble accessing the slides again. Can you make them visible or able to download?

RF: We're recording this session. We will post the recording and the slides on the website of the Epilepsy Foundation of Northern California and probably on You Tube and other places. You'll have a great opportunity to view them again. We'll also transcribe the discussion and the lecture part that I gave, although we will anonymize the names.

There's a question – is there always a problem with the hippocampus that affects memory. In other words, can you have memory issues, but a healthy hippocampus. Yes of course. I didn't mean to imply that the hippocampus is the only structure in the brain responsible for memory. It's really just the gateway to memory. There are many other places in the brain that can cause memory problems. Problems with the cortex (which is the main thinking part of the brain), problems with the thalamus, which is the deep gateway to the cortex, problems with the posterior part of the hypothalamus or the brain stem, all can cause problems with memory. We can't always identify a structural problem with any part of the brain.

Here, a participant has indicated her problems are with declarative memory in the short and medium term. And that is in fact what most people with epilepsy have problems with. Most people with epilepsy and epilepsy medicines remember perfectly well where they went to elementary school, but we might have problems with what we call absent-mindedness – they are told something and it is quickly forgotten.

Audience 5: I was walking through my living room and I fell, hit my head, and had a concussion for about 5 weeks. I'm still having trouble. I work in a restaurant. I can't do the dining room – I get confused. I'm concerned about how long this takes. I'm around people and I get confused and I've never been that way before.

RF: I can't say in your case – I would have to examine you, but concussions take much longer to recover from than most people consider. It could take months to recover from a concussion. The good news is if there is no brain damage, but things are just scrambled a bit and you haven't had a blood clot in the brain or the equivalent of a stroke in the brain, then there's a good possibility you will get back to what you were like before. That's not a promise. I'm just saying that most people with a concussion do. But, during the time that people are recovering from concussions, it's very hard to form memory, it's hard to handle things that are complicated or parallel processing coming in at once. There can be a lot of dizziness and foginess. There's also a considerable element of depression, which has to do with neurotransmitters in

the brain. So, I'm sorry you hit your head. The fact that you're still having problems doesn't mean it's going to be like that forever. It can take months. I know someone who took 2 years to recover from a concussion. That's why there's so much discussion on the political scene about football and boxing and such.

Robin: Another question that's come up from a number of different people is do they need to consider if they have issues with ADHD or thyroid medications, basically from other conditions. Do they need to consider this as part of the memory issue?

RF: Of course, if you've got something else going on, it's going to add to the problems of epilepsy. If for example you have hypothyroidism (low thyroid hormone), that's going to give you memory problems. If you have poorly functioning kidneys or liver or substance abuse or drug-withdrawal problems, that's going to give you memory problems. If you have sleep apnea or don't get sleep from another reason, that will add to the memory problems of the epilepsy. Always try to treat the other memory conditions if you can and fix the underlying cause of memory problems.

ADHD, which is Attention Deficit Disorder with Hyperactivity Disorder, is another comorbidity (fellow traveler) of epilepsy in a lot of people, along with depression, memory problems and anxiety. ADHD manifests itself as an inability to function and an inability to focus on one subject for a long period of time. That being the case, you bounce from subject to subject and really don't concentrate enough to remember things well. That too has treatments. There are psychotherapeutic ways of training yourself to be better for that. There are medications that can be safely used to treat ADHD. I put that in the box of another condition that can add to the problem. Fix it if you can. Other questions?

A lot of people are typing in that their memory problems are in the medium-term declarative category. That is normally what people with epilepsy do mention. One of our audience indicated that topiramate is a medication that is particularly troublesome for her memory. That has been a common experience. Topiramate, zonisamide, phenobarbital, and sometimes the whole category of benzodiazepines can be pretty tough on memory.

Here's a question – what about Aptiom? Aptiom is eslicarbazepine, a Tegretol (carbamazepine)-like medication. It's too new to really have full scientific studies about its role in memory. So we tend to consider it similar to carbamazepine and oxcarbazepine (Trileptal), and suspect that it will have medium effects on memory like its sister drugs. However, it might turn out to be better.

There's a question about felbamate. Now, felbamate is not a drug that is used a great deal because it can potentially be risky to the bone marrow and to the liver. But if people have been on it for a few months and haven't had trouble, then it's generally OK. Felbamate is generally pretty good for memory. It's a stimulatory drug and it usually keeps people sharp. The problem with felbamate is that it has a huge number of drug interactions. If you're on felbamate and other drugs, it can throw the levels of the other drugs out of whack and that may make memory problems.

Robin: Besides drugs, an audience member has a question about the types of seizures that are more likely to cause memory issues.

RF: Yes, the two types of seizures that are most likely to cause memory problems are your generalized tonic-clonic seizures, which used to be known as grand mal seizures, with stiffening, falling down, and shaking and the complex partial seizures, which occur in the temporal lobe and involve the hippocampus. Those may start with feelings of déjà vu, heat, flushing or aura (warning of a seizure coming on). There can be confusion, there be forgetting. There's not the physical shaking that there is with the tonic-clonic seizure, but the complex partial seizures can cause memory issues. There the ones that usually most involve the hippocampus.

Audience 6: The best treatment then for that type of seizure for memory problems is to control the seizure itself?

RF: Yes, remember I said there were three factors involved in causing memory problems in people with epilepsy – the seizures, the medications, and the underlying brain injury or problem that caused epilepsy. Two out of three of those are potentially controllable – the seizures and the medications.

Audience 6: I have a follow up question to that. If you're not having clinical seizures, but you have tonic-clonic seizures, are the interictal (between seizure) firings still affecting memory possibly?

RF: A very good question and the answer is yes.

Audience 6: And can that be treated?

RF: Yes. Interictal firing means between seizures, so there's no obvious seizure going on, but if an EEG were being run to measure electrical activity, there would be electrical discharges called spikes in the EEG. An individual EEG spike is typically less than a tenth of a second. In and of itself, it is so brief that it really doesn't do anything measurable against memory, except in the strictest experimental conditions. However, if you have runs of those spikes amounting to subclinical seizures that don't physically show up, they can still affect the function of the hippocampus and your memory. It may be that increasing medications may cut back on the discharges and improve memory. So here we doctors have a therapeutic dilemma. Someone's got a bad memory? Could it be because seizures are going on in the brain and increasing the medicines are going to help or is the problem the medicine, in which case increasing the medicine will make it worse. We don't always know the answer to that. We sometimes need to do a little trial and error to see which way to go. Probably 9 times out of 10 it's the problem with the medicine rather than subclinical subtle seizures causing the memory problems. My first response when someone comes in with memory difficulties is to see if there is a medication that can be lowered.

Audience 6: Three to eight seconds would be a long run for that firing, would it not be?

RF: Yes, it would be. Three to eight seconds of continued abnormal epileptic activity in the EEG would be not a dangerous amount of seizure activity, but I think it would be enough to affect the memory and cause a person to be a little bit inattentive and out of it during that discharge.

Audience 6: And it can also affect mood at the same time?

RF: That is a very interesting question. I can't really answer that. What I can say is that people with uncontrolled seizures are many times more likely to experience depression and mood swings than baseline, but I'm not confident that let's say a five-second-long clinical seizure is going to immediately cause a period of depression right after that discharge. Most of the time it has to be a more chronic issue. It's not like the mood fluctuates with every seizure discharge.

Robin: One of our audience would like to know that if memory problems are more common in teenagers who are undergoing hormone changes?

RF: Usually memory gets worse when you get older. I think many of us experience that. I'm used to hearing how hormone changes in the teenage years make seizures worse because particularly in women, some seizures are hormonally sensitive. Is memory worse at some points in the menstrual cycle? Yes - I understand it is, although I am a male, so I've not experienced it. Usually I think of teenage memories as being pretty good. The problem is with someone who has had lifelong epilepsy and the epilepsy has produced memory problems. Then you get to be 70 years old when your memory is not so good normally and the two of them add together.

Audience 1: What was the name of the pills that you said was like Tegretol?

RF: There are two pills that are like Tegretol. Trileptal is the brand name and oxcarbazepine is the generic. And the newest one that's been out for a few years is Aptiom, generic eslicarbazepine. Those are all in the Tegretol family. And of course there are long acting forms of Tegretol called Carbatrol and Tegretol-XR.

Audience 1: Tegretol has been one of my major pills.

RF: Tegretol is usually not too bad with memory and it's usually not too bad for mood. I've said that depression can make memory worse. Some of the seizure medicines are also more likely to make depression worse. Those are phenobarbital, Keppra, and sometimes the benzodiazepines. In contrast, lamotrigine, which is Lamictal, is known for often being good for the mood. So if memory problems are the result of depression making the memory worse, then a medicine like Keppra may make it even worse and a medicine like Lamictal may make it better. Again, these are general statements for the average person. Whether they are true for an individual would have to be worked out with your medical team.

Audience 1: I've tried Keppra. That affected my mood terribly. Phenobarbital I was on for 18 months when I was 12 years old and that made me mentally ill. I'm on Lamictal, Tegretol, and Vimpat, and Lyrica. Those are all the pills that I'm on. Are those bad for my memory.

RF: That's a combination therapy and when people are on multiple drugs it's tougher on the memory. I'm not going to recommend any specific changes, but perhaps your regimen could be reviewed with your doctor.

That brings us to the end of the hour. Thank you for joining the program.