

# NEUROLOGY

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Steven C. Karceski

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# Seizure medications and their side effects

Steven C. Karceski, MD

In their article, “Neuropsychological and Neurophysiologic Effects of Carbamazepine and Levetiracetam,” Dr. Meador and his colleagues describe the results of a detailed study designed to look at how antiseizure medications affect a person’s thinking.<sup>1</sup> They looked at two medications, carbamazepine (the trade name is Tegretol or Carbatrol) and levetiracetam (the trade name is Keppra). The reason for the study was simple: to determine which medicine causes fewer problems with memory, attention, clarity of thinking, and speed of thinking.

Dr. Meador asked 28 people to volunteer to take both medications. These were healthy people. In other words, they did not have neurologic or psychological problems that might cause problems with thinking. The volunteers could not be using drugs or prescribed medications that could affect the brain. Because alcohol can cause trouble with thinking clearly or quickly, the volunteers could not drink any kind of alcohol for 3 days before testing.

Each person had memory and cognitive testing (the neuropsychological testing) six times. There were two tests before the person had taken any medication. When they had been on one medicine for 8 weeks, the testing was repeated to see how the person’s scores changed when they were on medication vs off.

The medication was then stopped and allowed to “wash out” of the system. During the 4-week “washout,” memory testing was repeated. After this, the volunteer started the second medication. Again, at the end of 8 weeks of taking the medication, the memory testing was done. The medicine was again allowed to wash out, at which point the testing was done for the final time.

During the study, the medication tablets were all made to look the same. This way, the volunteers did not know which medication they were taking. The same was true for the doctors who were doing the memory testing: they did not know which medication the person was taking at that time. This kind of study is called “double-blind.” It means that neither the doctors nor the volunteers knew which medicine they were taking. The reason to do studies in this

way is to make sure that there are no biases. Biases can influence test results. In short, the “double-blind” makes sure that the results are as accurate as possible.

Dr. Meador and his colleagues carefully examined the test results. Using these results, they compared one medicine to another. They also compared how a person scored off medicine to how they did when they were taking each of the medications.

The results were interesting. When they compared the two drugs, the investigators found that carbamazepine was worse than levetiracetam. The volunteers had worse scores on almost half (44%) of the tests.

Regardless of the medicine they took, the volunteers performed worse while on the drug compared to when they were on no medication. Again, carbamazepine was worse. When the scores “on” carbamazepine were compared to “off,” the group did worse on three-quarters (76%) of their tests. When levetiracetam “on” was compared to “off,” the group scored worse on one-tenth (12%) of their tests. The bottom line is that both antiseizure medications can cause problems with thinking. However, carbamazepine caused more problems than levetiracetam.

**WHY ARE THE FINDINGS IMPORTANT?** The most commonly used treatment for seizures is medication. Medications control seizures in about two-thirds (64%) of people with epilepsy. However, many people are unhappy with their medications. This is usually because of side effects. Often, people with epilepsy will say that the side effects are “worse than the seizures.” Although the seizures have stopped, they may be having side effects every single day.

Medications cause many different side effects. Sleepiness and dizziness are common. With recent research, doctors are beginning to better understand how much these medications can affect the clarity and speed of thinking. Medications can affect attention and concentration. Both of these are critical to the formation of good, solid memories. In other words, antiseizure medications can also affect a person’s memory.

Dr. Meador's current study looked at two medications. In the past, he has evaluated other antiseizure medications. Not surprisingly, he has found that other medicines also affect memory and thinking.

What has been surprising is which ones cause the most problems. It is also interesting to find out how much of a problem each one causes. For a long time, doctors have known that these medications cause problems with memory. Dr. Mea-

dor's research has shown us how much of a problem this is. With further research, doctors will be able to select the "best" medicines for people with epilepsy.

## REFERENCE

1. Meador KJ, Gevins A, Loring DW, et al. Neuropsychological and neurophysiologic effects of carbamazepine and levetiracetam. *Neurology* 2007;69:2076–2084.

Section Editors  
David C. Spencer, MD  
Steven Karceski, MD

# About Epilepsy

**WHAT IS A SEIZURE?** Nerve cells in the brain send electrical and chemical signals (called neurotransmitters) to each other at all times. When an abnormal electrical signal is sent, it sometimes causes other brain cells to send abnormal signals as well. If enough of these signals are sent, it results in a seizure.

**WHAT IS EPILEPSY?** Epilepsy is not one illness. There are many kinds of epilepsy. Epilepsy means having two or more seizures in a lifetime. Just as there are many kinds of epilepsy, there are many kinds of seizures.

One way to think of this is that the brain works like an orchestra. There are different sections in an orchestra, each with its own instruments. Although each instrument plays its own part, it is only when they all play together that complex music is made. While playing, each member of the orchestra has to listen to the other members. When the orchestra works as a team, the best music is made. However, what if one person began playing a different tune? At first, no one would notice. As more members of the orchestra began playing the “different” tune, it would become noticeable. At some point, the “different” tune might become louder than the original music.

This is similar to how a seizure gets started, and keeps going.

**HOW IS EPILEPSY DIAGNOSED?** The doctor will need to know as much as possible about what happened immediately before, during, and after the seizure. How often seizures occur, whether there are any warning signs, and whether the patient remembers anything about the seizure are all important pieces of information. Someone who has witnessed the seizures can provide valuable information that the patient may not know.

Electroencephalography (EEG) is a simple and painless study that records the brain’s electrical activity picked up by tiny wires taped to the head. Specific brain wave patterns may be noted during or between seizures in patients with epilepsy and may help with diagnosis.

Imaging studies to look at the brain may be helpful in locating tumors, scars, or other abnormalities that may be causing seizures. Magnetic resonance imaging (MRI) and computed tomography (CT) scans create pictures of the inside of the brain.

*The section above (How Is Epilepsy Diagnosed?) was adapted from Szabo CA. Risk of fetal death and malformation related to seizure medications. Neurology 2006;67:E6–E7. Patient Page.*

**HOW ARE SEIZURES TREATED?** There are many treatments for seizures. Medicines are tried first. Usually, the physician tries to stop all seizures while causing no side effects. Tell your doctor about the kinds of problems you experience while on a medication, so that together you can make the best choice of treatment.

Studies like the one by Dr. Meador help doctors to better understand the kinds of problems their patients experience. Some problems, like difficulty with balance, might be seen during a routine exam in the doctor’s office. Other problems, like memory difficulties, are not so easily seen. Testing can sometimes identify these problems. By studying these issues and reporting them to other doctors, we are able to define the best treatment options. Ultimately, this helps all people with epilepsy.

## FOR MORE INFORMATION

The Epilepsy Foundation  
<http://www.epilepsyfoundation.org/>

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