This information sheet is provided to help you understand the evidence regarding use of quantitative electroencephalography (QEEG) in diagnosing attention-deficit/hyperactivity disorder (ADHD). The sheet is a service of the American Academy of Neurology (AAN).

The AAN is the world’s largest association of neurologists and neuroscience professionals. Neurologists are doctors who identify and treat diseases of the brain and nervous system. The AAN is dedicated to promoting the highest quality patient-centered neurologic care.

Experts from the AAN carefully reviewed the available scientific studies on use of QEEG in diagnosing ADHD. The following information is based on evidence* from those studies and other key information. The information summarizes the main findings of the 2016 AAN practice advisory on QEEG use in diagnosing ADHD.

To read the full practice advisory, visit AAN.com/guidelines.

**Overview**

QEEG is a method of tracking brain activity. It is sometimes used in ADHD diagnosis. According to the practice advisory, QEEG should not be used to diagnose ADHD.

In addition, QEEG should not be used to confirm an ADHD diagnosis after a clinical examination. This approach to diagnosis should only happen in the context of a research study.

The evidence suggests QEEG can lead to a false ADHD diagnosis too often. Thus, this method should not replace the clinical examination for diagnosing ADHD.

**What is ADHD?**

ADHD is a brain disorder that affects attention and behavior. It is also considered a developmental disorder because it slows or stops normal development. It is seen during childhood but can continue into adulthood. Signs usually show up from age three years to age 12 years.

Signs of ADHD include:

- Difficulty being organized at school or home
- Failing to complete chores or homework
- Fidgeting
- Talking too much
- Trouble listening and responding to directions or details

ADHD has three main subtypes:

- Mainly inattentive—the person struggles to pay attention and stay on task
- Mainly hyperactive/impulsive—the person has trouble staying calm and sitting still, or acts on impulses (urges)
- A combination of inattentive and hyperactive/impulsive—this subtype is the most common

Regardless of subtype, ADHD can be mild, moderate, or severe. The disorder affects about three to five percent of children in the United States. Some children may continue to struggle with ADHD as adults.

**What is QEEG? How is it used in ADHD diagnosis?**

QEEG measures electrical activity in the brain. It can be thought of as “brain mapping.”

QEEG testing involves the following:

- Electrodes are placed on the person’s scalp. Electrodes are small metal plates. They pick up on the brain’s electrical activity.
- The electrodes have wires that connect to a machine. The wires feed signals from the brain’s electrical activity to the machine.
- The machine connects to a computer that records information about the brain activity. The computer monitor (screen) shows patterns of electrical activity in the person’s brain.

In ADHD, a QEEG device is sometimes used in diagnosis. The device measures the ratio of power—or relationship of the strength—between two types of brain activity (or “brain waves”): theta and beta. The goal is to see which type is more powerful (stronger). The device also measures the amount of beta power at the front of the brain. This is where higher-level brain processes happen, such as thinking.

Clinicians then analyze the results. They look for:

- Unusually high theta activity in the front of the brain
- Higher theta activity than beta activity

If either occurs, it may suggest the person is unable to pay attention or focus. Some experts think that this suggests the person may have ADHD.
What does the research show about using QEEG in ADHD diagnosis?
Currently, a clinical examination is a common way ADHD is evaluated and diagnosed. Experts studied QEEG findings in ADHD diagnosed with a clinical examination. They focused on the relationship in the power of theta and beta brain activity. It is not known if such QEEG testing can confirm an ADHD diagnosis because the evidence* is very low.

Is the QEEG device safe to use?
There are no known harmful effects on the body from use of a QEEG device. However, when used in ADHD diagnosis, the device can potentially be harmful. Use of QEEG was studied in people thought to have ADHD. These people had not been given a definite diagnosis. The experts looked at:
- The relationship in the power of theta and beta brain activity
- Beta power in the front part of the brain
In this research, nearly six percent to 15 percent of people were given a false ADHD diagnosis. This rate is higher than what is considered acceptable in the United States.¹

What should parents do if they think their child may have ADHD?
ADHD is a serious concern for health and development. However, much can be done to confirm a diagnosis and get the help the child needs. It is important to talk with a doctor or another clinician about evaluation and testing for ADHD.

Reference

*After the experts review all of the published research studies, they describe the strength of the evidence supporting each recommendation:
- Strong evidence = Future studies very unlikely to change the conclusion
- Moderate evidence = Future studies unlikely to change the conclusion
- Low evidence = Future studies likely to change the conclusion
- Very low evidence = Future studies very likely to change the conclusion

This statement is provided as an educational service of the American Academy of Neurology. It is based on an assessment of current scientific and clinical information. It is not intended to include all possible proper methods of care for a particular neurologic problem or all legitimate criteria for choosing to use a specific procedure. Neither is it intended to exclude any reasonable alternative methodologies. The AAN recognizes that specific patient care decisions are the prerogative of the patient and the physician caring for the patient, based on all of the circumstances involved.

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