

## **Epilepsy and ADHD**

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Children diagnosed with epilepsy are at increased risk for having problems with attention and behaviour regulation. Often times, these attention and behaviour problems are severe enough to interfere with a child's functioning at home and school and to qualify a child for a diagnosis of Attention Deficit/Hyperactivity Disorder (ADHD). In fact, 25-30% of children diagnosed with epilepsy exhibit symptoms of ADHD. Children with epilepsy are more likely to be diagnosed with ADHD than children with other medical disorders or children in the general population. It is therefore important for children with epilepsy to be screened for ADHD or attention problems as part of standard care and management of epilepsy.

### **What is ADHD?**

Attention Deficit/Hyperactivity Disorder (ADHD) is a neurobehavioural disorder affecting approximately 3-7% of children in the general population. It is characterized by frequent and severe problems with inattention and/or hyperactivity-impulsivity. In order to be diagnosed with ADHD, symptoms must be present in two or more environments (for example, both at home and at school) and be severe enough to impair a child's functioning in these environments. Primary ADHD (ADHD not caused by a medical condition or other factor) runs in families and symptoms are present before a child is 7 years old. There are different subtypes of ADHD: (1) Primarily Inattentive—the problems are mostly in the area of being inattentive (for example, child fails to give close attention to details, has difficulty sustaining attention over time, has difficulty following through or finishing projects) — and there are not as many problems with hyperactivity or impulsive behaviour; (2) Primarily Hyperactive/Impulsive—the problems are mostly related to hyperactivity and behaviour regulation (for example, child is fidgety or squirmy, acts as if “driven by a motor,” has difficulty awaiting turn, interrupts others) — and there are not as many problems with inattention; (3) Combined type—there are significant problems with both inattention and hyperactivity/impulsivity.

ADHD is typically diagnosed by a health care professional. Information is gathered from multiple sources (for example, both parents and teachers) to determine the severity of problems and the environments in which they exist. As part of the diagnostic process, a health care professional may interview parents, teachers, and the child, have parents and teachers complete behaviour rating scales, and/or complete formal assessment of a child's attention and cognitive function.

### **Why are ADHD and attention problems so common in epilepsy?**

There are several reasons why ADHD and attention problems are commonly seen in people with epilepsy. ADHD is a neurobehavioural disorder that results from disruption to frontal-striatal brain networks. Often times, these same brain networks are disrupted by seizures or the structural brain abnormalities that can cause seizures. If a person with epilepsy has disruptions or abnormalities in these brain regions, they may struggle with the same types of thinking or behaviour problems seen in ADHD. In addition, people with an earlier age of seizure onset are at greater risk of having ADHD than people who develop seizures later in life, perhaps because the early onset of seizures may change the way frontal brain networks develop during childhood. The frequency and severity of seizures also seem to be correlated with ADHD symptoms, with higher amounts of ADHD symptoms seen in people with more frequent and/or more severe seizures. In addition, some anti-epileptic drugs (AEDs) can have undesirable side effects that result in inattention or ADHD-like symptoms.

### **Are there differences between Primary ADHD and ADHD related to epilepsy?**

Research on ADHD in epilepsy suggests that children with epilepsy more often exhibit symptoms of the Primarily Inattentive type of ADHD than they do the other subtypes of ADHD. In addition, while Primary

ADHD is more frequently diagnosed in boys than girls in the general population, in epilepsy populations, there are no significant gender differences observed in ADHD diagnoses. Primary ADHD tends to run in families. It is therefore important to consider family history when determining whether ADHD symptoms are primary or related to a child's epilepsy.

There are several types of questionnaires/rating scales that health care providers can use to screen for ADHD symptoms in children with epilepsy. These questionnaires were designed to be used to screen for Primary ADHD, but are also useful for screening for attention and behaviour regulation problems in people with epilepsy. They are usually given to parents and teachers to complete. In Primary ADHD populations, teachers tend to report more severe problems than parents do, probably because there are different standards for behaviour at school than at home. Interestingly, however, a recent study completed at BC Children's Hospital and Alberta Children's Hospital showed that, in epilepsy populations, parents actually endorsed more severe ADHD symptoms than teachers, particularly when rating inattentive behaviour. It is unclear why parent and teacher ratings are different in epilepsy populations than in the general population. It may reflect differences in expectations for behaviour in children with epilepsy or differences in how parents and teachers interpret problem behaviours in the context of epilepsy. Because scores on ADHD rating scales may not accurately capture the severity of symptoms in children with epilepsy, it is important for health care providers to also use other sources of information (clinical interviews, objective testing) when screening for ADHD symptoms in epilepsy populations.

### **How are ADHD symptoms in epilepsy treated?**

There are many well-established treatment options for Primary ADHD that are also appropriate to use when treating ADHD symptoms related to epilepsy. The most effective treatments for ADHD in children are medication and behaviour modification, and many children receive a combination of both. With regards to the medication management of ADHD symptoms, there are several medications proven to be very effective in reducing the severity of ADHD symptoms. Many of these medications are safe to use in people with epilepsy and do not increase the chance of seizures. Behaviour modification is a non-medical treatment that can also be effective in managing ADHD symptoms. Behaviour modification involves the consistent implementation of specific behaviour management techniques and environmental accommodations to help a child learn new ways of interacting with and responding to others. Behaviour interventions are usually implemented at home and school, so close collaboration with parents and teachers is important for success. Medication and behaviour modification treatments should be provided under the supervision of a health care professional experienced in treating ADHD (a family doctor, psychiatrist, or neurologist for medication and a psychologist or mental health/school counsellor for behaviour modification). Research has demonstrated that using both medication and behaviour management techniques together, along with parent/child education about ADHD and appropriate school planning, can be extremely effective in treating the symptoms of ADHD.

If a health care professional determines that the ADHD symptoms may be caused or made worse by anti-epileptic medications or seizure frequency/severity, it may be possible to improve symptoms by making changes to the child's seizure medication. Some medications are known to cause more problems with attention or behaviour regulation and these should be avoided if at all possible in a child exhibiting ADHD symptoms. In addition, adjusting medication doses to optimize seizure control and minimize side effects may relieve some symptoms of ADHD.

### **Summary**

Children with epilepsy are at risk for ADHD. It is important to screen for inattention and other ADHD symptoms as part of standard care and management of epilepsy. The problems with attention/concentration and behaviour regulation that children with epilepsy commonly experience are similar to those seen in Primary ADHD, although the reasons for these problems may be different. Many of the treatments used to treat Primary ADHD can also be effective when treating ADHD symptoms in epilepsy. The gold-standard treatment of ADHD includes medication and behavioural intervention, both of which can be safe and effective for treating ADHD symptoms related to epilepsy. ADHD symptoms related to seizure frequency/severity or medications may be improved by adjustments to the type or dose of seizure medication. It is important to communicate clearly with your child's health care providers about

any concerns you might have about your child's behaviour and to work collaboratively with your child's health care and school teams to reduce symptoms and promote your child's well-being.

**To learn more about ADHD and its treatment, please see:**

Taking Charge of ADHD: The Complete, Authoritative Guide for Parents (Revised Edition) by Russell A. Barkley

Centre for ADHD Awareness Canada website: [www.caddac.ca](http://www.caddac.ca)

Children and Adults with ADHD website: [www.chadd.org](http://www.chadd.org)

**References**

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Sherman, EMS, Brooks, BL, Akdag, S, Connolly, M, & Wiebe, S (2010) Parents report more ADHD symptoms than do teachers in children with epilepsy. *Epilepsy & Behaviour*, 19:428-435.

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