

ATTENTION DEFICIT DISORDER AND DIVING

Attention Deficit Disorder (ADD) or Attention Deficit Hyperactivity Disorder (ADHD) as it is also called, is a relatively common difficulty in children that continues to present problems in 30% - 70% of these children when they are adults. Individuals who suffer from this disorder frequently have symptoms that make it dangerous for them to dive and they often need to take medications that also make diving risky.

Attention Deficit Disorder is very difficult to diagnose accurately. Most of the symptoms are subjective (they can not be observed nor measured) and in adults the symptoms are usually even more subtle than they are in children. Treatment often requires long-term use of highly addictive and/or controlled drugs. To further complicate the issue, a very large number of adults present to their physician believing they have ADD from what they have read in the popular press when in fact they are suffering from one of several other common problems.

The best estimates are that between 2.5% and 5.0% of adults experience difficulties that are most likely a result of ADD. In children ADD is more common in boys but in adults men and women appear to suffer equally.

The cause of ADD is not completely understood but animal studies and the kinds of drugs that seem most effective in humans suggest that the problem results from an imbalance in the metabolism of catecholamines in the cerebral cortex of the brain. Basically, inhibitory dopaminergic activity is decreased while norepinephrine activity is increased. Several genes have been associated with ADD but no clear link has been identified so far.

The diagnosis of ADD in children is primarily based on inattention and hyperactivity/impulsivity. In adults the symptoms are more often poor concentration, distractibility, elevated motor activity, and impulsivity. These symptoms need to be so severe that they

disrupt at least two of school, family or peer relationships. Everyone suffers from these problems to some degree and as a result it is very difficult to decide who really suffers from ADD.

The current diagnostic criteria for ADD also require that symptoms are well established before the age of seven (when these symptoms first present in adults they are usually due to other problems). However, experts suggest the age should be raised to 12 or abolished all together. Substance abuse is common in adults with ADD.

A central feature of ADD is 'disinhibition'. This can be seen as poor self-regulation, inability to prevent immediate responses, difficulty with focused attention and goal-directed thought and action. The hyperactivity in children is often seen as restlessness, difficulty relaxing and feeling chronically 'on edge' in adults. Adults with ADD often appear to be hectic and disorganized. They focus on distractions while failing to complete important tasks. They blurt out inappropriate thoughts that are often rude or insulting. Many adults with ADD have a learning disability. The diagnosis of ADD, especially in adults, should be left to people who have specialized in this disorder.

There are many other problems that can present with symptoms that are almost identical to those of ADD. In the field of psychiatry, depression, substance abuse and most anxiety disorders can appear to be ADD. Diagnosing ADD in someone with substance abuse is so difficult that the person really needs to be drug free for at least three months before the

diagnosis of ADD can be accurately made. The problem is that many adults with ADD also have a substance abuse problem!

Antisocial personality features are found in up to 20% of adults with ADD, learning disorders are common and the majority (87% in one study) of adults diagnosed with ADD had one or more additional psychiatric diagnoses. In addition, hyperthyroidism, petit mal and partial complex seizures, hearing deficits, lead toxicity, sleep apnea, and medication interactions can present with the same symptoms as ADD. Individuals who have suffered a significant head injury can also suffer from problems with attention, concentration and memory.

There is relatively little data available on the treatment of ADD in adults. In children, treatment is primarily drugs. Stimulants are most commonly used in kids but in adults both stimulants and antidepressants (especially those with norepinephrine activity) are used, sometimes in combination. In adults with ADD, the drugs usually need to be taken for life. Stimulants are highly addictive and because many adults with ADD have substance abuse problems, some experts suggest antidepressants be tried first. Cognitive behavioural therapy, counselling, and life skills training are often useful in adults with ADD.

There are many reasons why a person with ADD may be at increased risk if they go scuba diving, both from the disease and from the medications most commonly used to treat the disease.

In adults the symptoms of ADD most commonly include poor concentration, distractibility, and impulsivity. For the diagnosis of ADD to be valid these symptoms have to be relatively severe.

To be able to dive safely, a person has to be able to keep track of several things at the same time. They have to be aware of their depth, time at depth, location, orientation, tank pressure, time required to complete the dive, gas supply required to complete the dive, buoyancy, location of buddy, other divers, boat or shore, etc. Failure to keep track of these variables can easily result in death due to arterial

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gas embolism if you run out of air and panic or drowning. People with ADD often make careless mistakes. In diving they not only put themselves at risk but their actions might result in the death of their dive partner.

Impulsivity is a common feature of ADD. Impulsivity is NOT a good feature in a diver. When you are swimming along an underwater cliff at a depth of 60 feet (18m) as planned, suddenly deciding to descend to 200 feet (60m) is a VERY BAD IDEA!

The diagnosis of ADD in adults is very challenging. Many adults make a self-diagnosis of ADD or are diagnosed with ADD by someone else when in fact they do not have the disorder. At the same time, many adults who do have ADD are never diagnosed. If someone has symptoms that are mild enough that they can function effectively in life they most likely do NOT have ADD. However, if a

person truly has ADD, their symptoms almost by definition are so severe that they should not dive. The severity of symptoms can be assessed by evaluating the person's performance socially, at school, athletically and at work.

Even if the person seems to be a reasonable risk for diving due to ADD, most adults with ADD also have at least one other psychiatric diagnosis and their 'other' problem may make it unsafe for them to dive.

The symptoms of ADD can often be quite well controlled with medication, so is it safe for an adult with ADD whose symptoms are controlled with drugs to dive? The question then becomes one of the safety of diving while taking the medication.

Stimulants are the most common medications used to treat ADD in both children and adults, although there is some evidence that they are less effective in adults. Several different stimulants seems to be equally effective. The most commonly used are methylphenidate (Ritalin), dextroamphetamine and lisdexamfetamine.

Stimulants increase heart rate, blood pressure and can cause cardiac arrhythmias. They are associated with an increased risk of sudden death. Stimulants often cause disturbed sleep, decreased appetite and weight loss (not always a bad thing). Stimulants commonly cause dizziness, drowsiness, headache, nausea, vomiting, abdominal pain, rashes, pruritus, urticaria, fever, arthralgias, and scalp hair loss. They also have many other less common side effects.

Stimulants have a very high abuse potential and adults appear to require higher doses of stimulants than children. Lisdexamfetamine is a prodrug that is converted into the active chemical inside the body. It has less abuse potential because of the slower onset of action.

Stimulants are almost always incompatible with diving.

Antidepressants are often used to treat adults with ADD. Desipramine and nortriptyline are often effective in controlling the symptoms of ADD but they commonly cause a large number of side effects that are incompatible with diving including blurred vision, drowsiness, fatigue, insomnia, sedation, nausea, vomiting, cardiac arrhythmias, etc. Bupropion (Wellbutrin) has fewer side effects but still commonly causes headache, nausea, dizziness, insomnia >

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the Senior Medical Officer at Garrison Support Unit Toronto (1993-1998). He's written a monthly column on diving medicine in Canada's *Diver Magazine* since 1993, has been on the Board of Advisors for the International Association of

Nitrox and Technical Divers (IANTD) since 2000, and is an active cave, trimix and closed circuit rebreather diver/instructor/instructor trainer. David's first love is cave diving exploration and he's been exploring and surveying underwater passages in Canada since 1985. David was responsible for the exploration and mapping of almost 11 kilometres of underwater passages in the Ottawa River Cave System. In 1995, he executed the first successful rescue of a missing trained cave diver. David received the Canadian Star of Courage for this rescue which took place in the chilly Canadian waters of Tobermory, Ontario. He still dives as much as possible, but admits his six year old son Lukas, five year old daughter Emeline and wife (Dr Debbie Pestell) are currently higher priorities than diving!

diving medicine

and others. It also has stimulant effects. Atomoxetine (Strattera) is the only non-controlled drug in the USA approved for the treatment of ADD but it can cause abdominal pain, vomiting, nausea, dyspepsia, sleep disturbance, and others. Clonidine is commonly used in children but does not seem to be effective in adults with ADD. It commonly causes sedation.

For most of these medications, the side effects are incompatible with diving. In addition, many of them cause sedation. Nitrogen narcosis also causes CNS depression and it is highly likely that the sedation caused by any drug will be made much worse by nitrogen narcosis. Most of these drugs also cause CNS stimulation and as a result can be expected to dramatically increase the risk of an oxygen convulsion if a diver is exposed to elevated partial pressures of

oxygen (diving deep on air, nitrox, rebreathers, decompression gases).

The bottom line is that most adults with a legitimate diagnosis of ADD need to take medications to help control the symptoms, for the rest of their lives. They should not dive because of the symptoms of the disease and they should also not dive because virtually all of the medications used to treat ADD are incompatible with diving.

