

## **Paying Attention**

Some experts estimate that 1-3 percent of early school-aged children have full-blown ADHD, while 5-10 percent have partial ADHD with or without other problems such as depression or anxiety, and 15-20 percent show transient or subclinical symptoms. Four out of five children diagnosed with ADHD are boys.

Ritalin, Cylert, Dexedrine – drugs commonly prescribed for ADD, are paradoxically, stimulants; stimulants so powerful that they are routinely bought, sold and abused by drug addicts as an equivalent to speed. The side effects of Ritalin can be quite serious and include insomnia, a loss of appetite, a delay in growth, stomach aches and headaches, depression, anxiety, irritability, mood swings, and increased heart rate. Widespread use of the drug is so new that the effects of its prolonged use are not known. Some studies indicate that children who use Ritalin are more likely to abuse drugs later in life. Perhaps a few of the reasons it was recently “black labeled” by the FDA.

The physiology of the brain – the cells and blood supply and physical characteristics of the brain – affects how people think and feel, essentially how brain creates mind.

Intelligence, for example, is governed in part by the density of the neuropile, the collection of cells in the brain, he says. Another key factor in intelligence is how quickly the brain can allocate and reallocate blood supply, which activates parts of the brain needed for a specific task. People who are more intelligent can get blood quickly to the part of the brain where it is needed and, just as important, stop the flow quickly and shuttle blood elsewhere.

Though small, the subcallosal cortex, a small, grape sized piece of tissue under the front of the corpus callosum that joins the two hemispheres, it is a key “crossroads” region of the brain, which funnels communication in the form of three key neurotransmitters – dopamine, norepinephrine, and serotonin – from the limbic system, motor cortex, and amygdala to the prefrontal lobes. The prefrontal lobe of the brain is critical to how we act as social beings – the so-called organ of civilization. It governs such things as planning for the future and learning from mistakes. Essentially, the

prefrontal cortex accepts input from the emotional control areas, the sensory and motor areas, and other regions and integrates them all into coherent behavior.

One hypothesis for what is happening in an ADD brain is that with certain subtypes of attention deficits, there is a decreased metabolism and decreased blood flow to the subcallosal cortex. They turn off. That means those areas are not getting enough norepinephrine and other neurotransmitters. As is the case with epilepsy, researchers believe that when the brain is trained with neurofeedback, blood bathes the cells in the frontal cortex and acts as a kind of fertilizer helping cells overcome malformation, due either to genetics or perhaps from cortisol damage caused by emotional stress. Existing connections are strengthened or reorganized, or perhaps they grow new branches. Whatever the case, they make better, more robust connections with adjoining cells, and so the transfer of current and neurochemicals works much faster and more efficiently. They believe that, at a minimum, neurofeedback training brings about a functional reorganization in the brain and makes the connections between cells more robust.

A growing body of research indicates that ADHD kids are far more likely to become criminals and thrill seekers. Because of slower than normal waves in the prefrontal cortex, which governs our planning and social relationships and organizes behavior, the front of the brain cannot communicate effectively with the midbrain and properly regulate emotions in everyday life. Damage to the cortex – from accidents, or drinking by the mother, abuse, genetics, or oxygen deprivation at birth – apparently causes slower than normal waves in the front of the brain and the inability to engage the other systems. With the emotional center of the brain not appropriately engaged in the world, these children and adults are without the usual levels of fear, remorse, and sadness. This can explain why many children with ADHD do not behave well socially. Kids with low arousal seek out and become addicted to stimulation to increase their arousal levels back to normal.