ADHD: Latest Neuropsychological Findings

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Attention Deficit Hyperactivity Disorder (ADHD) is characterized by a combination of overactivity, distractibility and impulsivity. Traditionally, this disorder has been considered to appear only in children. However, longitudinal studies have shown that the half of the children who have ADHD, remain in one or more ways disturbed in adult life. This has led to a change reconception of ADHD as a chronic disorder with severe psycho-social incapacity in adulthood.

The traditional concept of ADHD was hyperkinesis. Hyperkinesis required that all three domains of disturbance (overactivity, distractibility and impulsivity) be present. With the appearance of DSM IV these three domains could be present in a child to different degrees. This led to research on how these domains appear in subgroups of children with: Hyperactivity-Impulsivity, inattention and as third subgroup children with all three domains. Furthermore, clinicians and researchers began to recognize that some of these subgroups were more and other less associated with aggression, defined as Oppositional Defiant Disorder (ODD) or Conduct Disorder (CD). Follow-up research suggested that children with ADHD and particularly those who also had CD were particularly at risk for alcohol abuse, addictions and criminality. This research led to the question: what are the factors which are associated with each of these different groups and combinations of behavioural disorder.

Neuroscientists in the last 20 years have gathered a considerable body of evidence that ADHD (in its various forms) is associated with dysfunctional brain networks. Animal research showed that the inability to wait for reward was associated with a reward circuit of the brain. Neuropsychological research showed that the ADHD child had a strong tendency to avoid delaying his behaviour which made him look impulsive. Other studies showed that ADHD children were highly variable in the timing of their behaviour, so that they appeared erratic. Further research indicated that both ADHD, ODD and CD children all failed to inhibit their behaviour compared with normal children.

The above findings led to a massive research effort, much of which is still ongoing. The development of neural imaging techniques functional Magnetic Resonance Imaging (fMRI) in particular has shown that ADHD persons have quite different degrees and loci of brain activation when performing tasks associated with executive functioning (controlled inhibition and planning) compared with normal people. It has been recently proposed by Todd & Botteron, (2001) that impulsivity may be related to hypofunctionality of catecholamineprojection pathways to prefrontal cortical areas, resulting in decreased neuronal energy availability. This may be mediated by astrocyte catecholamine receptors which regulate energy availability during neuronal activation. We have proposed that some forms of ADHD may be viewed as cortical, energy-deficit

syndromes (Sergeant, 2000). Interestingly, the effect of pharmacological intervention on ADHD and normal volunteers has been shown to have different activation effects.

Current research suggests that ADHD is not some simply a motivational disorder and that functional deficits of the brain can account for why the behaviour occurs and may in the future be able to predict severity and chronicity of the disorder.