

## CHICAGO BEHAVIOR CONSULTANTS, INC.

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### Research on Brain Differences in People with Down Syndrome

- Characteristic reduction in the size of the cerebellum results in poor muscle tone (hypotonia), deficiencies in motor sequencing and memory related to movement. *This can result in transition problems, motor planning, and all activities related to movement and balance.*
- Immaturity in brain formation of the frontal and temporal lobes of the brain are responsible for significant memory deficits and impairment in spatial representation and temporal sequencing skills. The frontal lobe also governs organization of information. *This has further impact on transitioning, memory, organization of learned information, generalization and discrimination of learning.*
- Frontal lobe disturbances result in fluctuating performance on learning tasks. *This results in performance inconsistencies rendering outcome criteria difficult to achieve.*
- Malfunction in the mitochondria of individuals with Down Syndrome results in cellular energy loss. The extra copy of chromosome 21 leads to over-expression of certain proteins in the brain (amyloid beta). The protein is locked in the cell, forming lumps, likened to a traffic jam. Mitochondria are less energetic; there is a change in how the amyloid protein is processed in the neurons of the brain in individuals with DS. *This may have profound effects in transitioning, learning, and generalizing information.*
- Studies have demonstrated that children with Down Syndrome do not provide satisfactory matches for themselves in study comparisons. The quality of their responses on identical, closely spaced tests shows great fluctuations. They may fail at questions they responded to correctly, then respond correctly again later.