

Whole brain connectivity in childhood apraxia of speech and the effects of intervention.

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**Abstract:**

**Background:** Neuroimaging studies of Childhood Apraxia of Speech (CAS) have not revealed any systematic macrostructural abnormalities. Further, no studies have investigated connectivity of sensory-motor circuitries subserving speech and their possible changes after intervention in children with CAS. The first aim of this preliminary study was to identify possible altered neural networks in children with CAS. The second aim was to explore changes in brain-behaviour relationship as a function of intervention type using Diffusion Tensor Imaging (DTI).

**Methods:** We studied altered network connectivity and cortical thickness in 32 CAS for aim one and a subset of 10 children for aim two. These 10 CAS children were randomly allocated to either Motor-Speech intervention (*MS-treated*; these children received PROMPTs for Restructuring Oral Muscular Phonetic Targets program) or Language & Oral Motor treatment (*L&OM-treatment*). Both groups received 30 treatment sessions.

**Results and discussion:** Connectivity anomalies in children with CAS involved three subnetworks including left frontal areas, precentral and postcentral areas and right temporal-parietal and occipital areas. These alterations correlated with different measures of speech motor planning and programming. Connectivity changes in the *MS-treated* group was specific to set of networks subserving oral motor control, while *L&OM-treated* group demonstrated a more diffuse set of connections.