Spinal cord morphometry

- Structural Alterations Associated With Cardiovascular Autonomic Failure in Multiple System Atrophy
- Coupled Aging of Cyto- and Myeloarchitectonic Atlas-Informed Gray and White Matter Structural Properties
- White matter trajectories in Down syndrome and Alzheimer's disease: Insights from diffusion tensor-based morphometry
- Multivariate brain morphological patterns across mood disorders: key roles of frontotemporal and cerebellar areas
- Decoupling working memory impairment from grey matter volume changes in female patients with fibromyalgia: Moderating effect of depression
- Associations among neuropsychological performance, brain structural alterations, and glymphatic function in patients with minimal hepatic encephalopathy
- Altered Morphological Characteristics Associated With Spatial Working Memory Performance in Children With ADHD
- Family history, inflammation, and cerebellum in major depression: a combined VBM and dynamic functional connectivity study

Pediatric spinal cord morphometry has been relatively understudied because of non-optimal image quality due to the difficulty of spine imaging, rarity of post-mortem analysis, motion artifacts, and pediatric MR imaging research focus on understanding spinal injury or spinal pathology. The pediatric brain has been comparatively well-studied with white matter (WM), gray matter (GM), and cerebrospinal fluid (CSF) differences observed with age and gender. Therefore, a greater understanding of pediatric cervical and thoracic spinal cord morphometry would be beneficial for developing clinically relevant cord growth models. We focused on retrospectively characterizing cervical and thoracic spinal cord growth and morphometry changes in a healthy pediatric population. High resolution multi-echo gradient echo (mFFE) images were acquired from pediatric spinal cord scans from 63 patients (mean: 9.24 years, range: 0.83-17.67 years). The mFFE scans were then registered to the template space for uniform viewing and analysis by using a customized semi-automatic processing pipeline involving Spinal Cord Toolbox (SCT). Jacobian control determinants were calculated, and subsequent WM, GM, dorsal column, lateral funiculi, and ventral funiculi scalar averaging was conducted. Random effects models were used to model age-related Jacobian scalar differences. Observing the growth of cord matter by patient age and vertebral level suggests that the upper cervical spinal cord, specifically C2-C3, and mid-thoracic spinal cord, T3-T8, grow faster than other cervical levels and thoracic levels, respectively. This knowledge will facilitate clinical decision making when considering spine interventions and conducting radiological analysis in children with cervical and thoracic spine abnormalities [1].

[1]

Kumar A, Vandekar S, Schilling K, Bhatia A, Landman BA, Smith S. Mapping Pediatric Spinal Cord Development with Age. Proc SPIE Int Soc Opt Eng. 2022 Feb-Mar;12032:1203213. doi: 10.1117/12.2612210. Epub 2022 Apr 4. PMID: 36506260; PMCID: PMC9733418.