BRAIN ANATOMY ACROSS THE LIFE SPAN IN ADHD
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Objectives
Neuroimaging studies in ADHD patients show structural alterations of various brain regions in affected children and adults (1, 2). It is unclear, however, how these differences develop across the lifespan in ADHD. We aim to clarify this by looking at various aspects of the brain in large cohorts to maximize power.

Methods
To study subcortical brain changes in ADHD, an ADHD working group was formed within the ENIGMA consortium (http://enigma.ini.usc.edu/). Within this collaboration, brain imaging data of children and adults with ADHD and healthy subjects is shared across studies. Neuroimaging analysis is conducted using fully-automated and validated neuroimaging segmentation algorithms (FSL FIRST, FreeSurfer), giving us volumetric data of hippocampus, nucleus accumbens, amygdala, caudate nucleus, putamen, pallidum, and thalamus. Meta- as well as mega-analyses are performed to study case-control differences and effects of age. Next to looking at subcortical changes, white matter pathways are studied in the IMpACT-NL study by means of DTI analysis.

Results
The collaboration resulted in 22 cohorts and over 3000 subjects. Preliminary analysis in 452 cases and 405 controls showed small but significant decreased volumes of the nucleus accumbens, left amygdala, right caudate nucleus, and left putamen in cases compared with controls, independent of age. The analysis of white matter pathway showed differences in patients, probably a result of abnormal myelination.

Conclusions:
Our preliminary subcortical analysis in part of the sample shows similar results to the previous meta-analysis with equal sample size. We expect our powerful collaborative analyses to help clarify outstanding issues regarding the effects of age and other factors, such as sex, comorbid disorders, and genetic factors, on the ADHD-brain. ENIGMA recently identified several genes associated with brain volumes. These genes, together with results from our group involving the DRD5 gene, will lead to a further understanding of the molecular mechanisms underlying ADHD.