Regional cortical thinning in children with increased prenatal alcohol exposure

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INTRODUCTION
- Fetal alcohol spectrum disorders (FASD) have been linked to thicker cerebral cortex in frontal and temporal brain regions. This finding has been attributed to a delay or absence of the age-related cortical thinning that occurs in normally developing children.
- However, one recent study has shown thinner cortex in frontal, parietal, temporal, and occipital regions in youth with FASD.
- All previous studies have included subjects spanning a broad age range and none have considered effects of the extent of prenatal alcohol exposure or of different forms of FASD on cortical thickness at different developmental stages.
- This study investigates the relation of in utero alcohol exposure to cortical thickness in FASD children and controls across a narrow age range.

METHODS
Participants
- Participants were 10 children with fetal alcohol syndrome (FAS), 18 with partial FAS, 29 heavily exposed (HE) nonsyndromal children, and 22 controls from the Cape Coloured (mixed ancestry) community (44 male, mean age 10.7 - 0.6 yr.), who are taking part in the Cape Town Longitudinal FASD Study.
- Women were recruited during pregnancy at their first antenatal clinic visit. The mothers of exposed children reported consuming ≥4 drinks/week or ≥5 drinks/occasion during pregnancy. These women consumed 3.1 - 25.2 drinks/occasion (median = 6.8).
- All but one of the mothers of the 21 control children abstained during pregnancy; 1 drank 2 drinks on 3 occasions.
- The amount of alcohol consumed during pregnancy was determined using timeline follow-back interviews conducted at recruitment, during a follow-up antenatal visit, and at 1 month postpartum, and converted to average oz. absolute alcohol (AA) consumed/day and AA/drink ing occasion around time of conception and across pregnancy.

Imaging
- High-resolution motion-corrected multi-echo MPRAGE images7,8 were acquired on a 3T Siemens Allegra scanner.

Analysis
- FreeSurfer 5.1.0 processing streams that include automated segmentation and extraction of pial, gray and white matter surfaces with manual error correction, were used to estimate cortical thickness.
- Thickness maps were smooth with a 10mm FWHM kernel. General linear model analyses across the whole brain were performed with cortical thickness as the dependent variable and diagnostic group and alcohol exposure as independent variables.
- Results were thresholded at p<0.05 and cluster-size correction for multiple comparisons was performed using Monte Carlo simulation.

RESULTS
- No significant differences in cortical thickness were found between diagnostic groups.

CONCLUSIONS
- After multiple comparison correction, there were no significant clusters in analyses relating cortical thickness to alcohol exposure at conception.
- AA/drinking day across pregnancy was inversely related to cortical thickness in 3 regions: right cuneus/pericalcarine/superior parietal lobe, fusiform/lingual gyrus, and supramarginal/postcentral gyrus.

REFERENCES

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