Effects of prenatal alcohol consumption on cognitive development and ADHD-related behavior in primary-school age: a multilevel study based on meconium ethyl glucuronide

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Abstract

Background
Alcohol intake during pregnancy is considered to be a risk factor for child development. Child biomarkers of intrauterine alcohol exposure have been rarely studied. We investigated whether a meconium alcohol metabolite (ethyl glucuronide, EtG) was associated with cognitive development, ADHD-related behavior and neurophysiological markers of attention and executive control of children at primary-school age.

Methods
Mothers provided self-report on prenatal alcohol consumption during their 3rd trimester. Meconium samples were collected at birth. A total of 44 children with a meconium EtG above the detection limit (≥10 ng/g) and 44 nonexposed matched controls were compared. A second threshold (≥154 ng/g) was applied to study the dose effects. When children reached primary-school age, mothers rated ADHD-related behavior, child cognitive development was measured using an IQ test battery, and event-related potentials were recorded during a cued go/nogo task.

Results
Children in both EtG-positive groups allocated fewer attentional resources than controls to the go/nogo task (reduced P3 component in go-trials). Children with a meconium EtG above 154 ng/g were also found to have an IQ that was six points lower than the other groups. Within the EtG ≥ 154 ng/g group, there was a positive correlation between EtG value and ADHD-related behavior. These significant effects were not observed in relation to the maternal self-report data.

Conclusions
Associations between EtG and cognitive deficits, attentional resource capacity and ADHD-related behavior could be documented with effects that were partially dose-dependent. In addition to maternal self-reports, this biomarker of intrauterine alcohol exposure may be considered as a predictor of child development.