胎児期のアルコール曝露は脳構造に影響する（Abstract＃VSPD11-05）

母親が妊娠中に飲酒した子供の中枢神経系に対するアルコールの影響に関する新たな知見がMRIにより得られた

MRI provides insights into effects of alcohol on the central nervous systems of children whose mothers drank during pregnancy

胎児成長期にアルコールに曝露された小児は様々な画像技術により明らかな脳構造および代謝の変化を示すとのスタディ結果が2012年Radiological Society of North America学会で発表された。スタディグループには胎児期にアルコールに曝露された小児200人と、母親が妊娠中および授乳中に飲酒をしなかった子供30人とが組み入れられた。研究者らはMRIを用いてこれら2グループの脳梁の大きさおよび形状を評価した。胎児期のアルコールへの曝露は脳梁の発達障害または完全な欠損の大きな原因である。MRIの結果から、アルコールに曝露された小児の脳梁は対照群と比較し有意に薄かった。研究者らはまた拡散強調画像（DWI）を用いて小児の中枢神経系の6領域を調査した。DWIは水の拡散過程をマッピングし、組織異常を検出するのに従来のMRIよりもより感受性の高い方法となり得る。アルコール曝露群の小児は他の群と比較し、DWIにおける拡散が統計学的に有意に多かった。さらに、プロトン磁気共鳴分光法（HMRS）の結果、代謝の変化の複合集積が認められた。

Full Text

Children exposed to alcohol during fetal development exhibit changes in brain structure and metabolism that are visible using various imaging techniques, according to a new study being presented at the annual meeting of the Radiological Society of North America (RSNA).

Alcohol use by expectant mothers can lead to problems with the mental and physical development of their children—a condition known as fetal alcohol syndrome. Research suggests an incidence of 0.2 to 1.5 per 1,000 live births, according to the Centers for Disease Control and Prevention. Costs for care of individuals affected by fetal alcohol syndrome in the U.S. have been estimated at $4 billion annually.

Advancements in magnetic resonance imaging (MRI) are affording unprecedented insights into the effects of alcohol on the central nervous systems of children whose mothers drank alcohol during their pregnancy. Recently, researchers in Poland used three different MRI techniques to better define these effects.

The study group included 200 children who were exposed to alcohol during their fetal stage and 30 children whose mothers did not drink while pregnant or during lactation. Researchers used MRI to evaluate the size and shape of the corpus callosum, the bundle of nerve fibers that forms the major communication link between the right and left halves of the brain, in the two groups. Prenatal alcohol exposure is the major cause of impaired development or complete absence of the corpus callosum.

The MRI results showed statistically significant thinning of the corpus callosum in the children exposed to alcohol compared with the other group.

"These changes are strongly associated with psychological problems in children," said Andrzej Urbanik, M.D., chair of the Department of Radiology at Jagiellonian University in Krakow, Poland.

Dr. Urbanik and colleagues also used diffusion weighted imaging (DWI) to study six areas of the central nervous system in the children. DWI maps the diffusion process of water and can be a more sensitive means than traditional MRI for detecting tissue abnormalities.

Children in the alcohol group exhibited statistically significant increases in diffusion on DWI compared with the other children.

"The increase of diffusion indicates neurological disorders or damage to the brain tissue," Dr. Urbanik said.

To noninvasively study metabolism in the brains of the children, the researchers used proton (hydrogen) magnetic resonance spectroscopy (HMRS), a common adjunct to structural MRI studies. HMRS results showed a complex collection of metabolic changes.

"In individual cases, we found a high degree of metabolic changes that were specific for particular locations within the brain," Dr. Urbanik said.

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