Science:  
A Clue to How Alcohol Damages Brains

Alcohol wrecks havoc on the developing brain, killing cells left and right. Children who were exposed to alcohol in the womb are often developmentally disabled. Now researchers have identified two receptors of chemical messages in the brain that allow alcohol to wipe out neurons.

Despite public health warnings, 20% of women who drink continue to do so while they are pregnant, according to a 1996 report from the Institute of Medicine. As a result, roughly 1 infant in every 1000 born in the United States has fetal alcohol syndrome, characterized by facial abnormalities, stunted growth, and learning and memory problems.

Following up on earlier hints, neuroscientist John Olney of Washington University in St. Louis and pediatric neurologist Chrysanthy Ikonomidou, now at Humboldt University in Berlin, examined the effects of alcohol on two common receptors in the brain that work in different ways. The NMDA receptor responds to an excitatory messenger called glutamate. The GABA receptor, on the other hand, is sensitive to a dampening messenger called GABA.

Working with 2-week-old rats, whose brains are developing analogously to human fetuses in the third trimester of pregnancy, the researchers found that blocking NMDA receptors or activating GABA receptors caused widespread neuron death. Ethanol affected both NMDA and GABA receptors; when the researchers gave the rats ethanol, the pattern of damage resembled a composite of the cell death caused by tweaking the two receptors individually, they report in today's *Science*.

By showing how alcohol disrupts the developing brain, the research provides "the first step to understanding how you might control that damage," says pharmacologist Boris Tabakoff of the University of Colorado Health Sciences Center in Denver. But the work carries an even more important message for the public, says neurobiologist David Lovinger, who studies alcohol's effects on neurons at Vanderbilt University School of Medicine in Nashville, Tennessee. Late-pregnancy drinking "is really unsafe for the brain," he says.

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