A scratch on the surface of a big story

Researchers at Dartmouth have found that chronic exposure to low levels of alcohol can alter fetal brain development.

Even low levels of alcohol can alter fetal brain development.

A fetus’s developing brain is essentially a sea of migrating cells. The cells move to specific locations where they specialize and mature, forming various structures of the brain. Anything that disrupts those migrations can therefore have lasting effects. Alcohol (ethanol) seems to increase the number of certain brain cells—called GABAergic interneurons—in the embryonic brain, Cuzon and Yeh reported in the February 2008 Journal of Neuroscience.

In a mature brain, GABA (gammaaminobutyric acid) “inhibits things,” Cuzon explains. “It kind of keeps the balance of excitatory stuff down to a more manageable level.” But when the brain is developing, “GABA’s really not playing that role,” Cuzon says. “It’s doing a whole bunch of different things. It can stop cells from proliferating and [make them] more mature. It can start them migrating.” It can also modulate where and how fast they migrate.

“Ethanol is one of the very well-established modulators of the GABAergic system,” says Yeh. It causes more GABA to circulate, which, in turn, has a numbing effect. “That’s what happens in the adult brain, when everything is all formed and there are a lot of synaptic connections,” he continues. “But during development, there are no synaptic connections because things are very immature. The cells are still moving around. . . . Yet we think that alcohol can still work through the GABAergic system to affect GABA receptors or the level of GABA” in the early stages of brain development.

Prolonged: Understanding how ethanol causes these changes is the next step for Yeh and Cuzon. For now, the “take-home message,” says Yeh, “is that even a relatively low blood-alcohol level for a prolonged period of time is detrimental to fetal development.”

It’s difficult to say how applicable the findings in mice are to humans. But pregnant women who regularly consume alcohol, even at a low level, are taking a risk, Yeh believes. It will take a while to determine the size of that risk. “All we’ve done, really,” he says, “is scratch the surface of a big, big story.”