A Commentary on the Book: “Expecting Better: Why the Conventional Pregnancy Wisdom is Wrong and What You Really Need to Know” by Emily Oster, Ph.D.  Associate Professor of Economics, University of Chicago.

Multiple health authorities, including The United States Surgeon General, the American College of Obstetricians and Gynecologists, the Canadian Society of Obstetricians and Gynecologists, and the Public Health Agency of Canada, all advise that pregnant women and women who may become pregnant should abstain from alcohol consumption. In her recent book, Dr. Oster challenges these health authorities and this recommendation, arguing that moderate drinking during pregnancy is safe (for example, a glass of wine per day). Although the definition of moderate drinking varies by country, consumption of 1 standard drink/day (containing approximately 0.5 fl oz of pure ethanol in the U.S.) is generally considered moderate drinking for non-pregnant women (Dufour, 1999). Dr. Oster’s book suggests that the available scientific evidence does not support the recommendation to abstain from alcohol use during pregnancy. This is not the case, as the current scientific evidence strongly indicates that even light drinking during pregnancy can have long-lasting negative impact on brain function in children that persists into adulthood. Below is a summary of key scientific studies that have demonstrated significant adverse effects of alcohol at levels that can be achieved during light drinking. We will begin with a review of studies that have been conducted with humans.

1. In a population cohort with low socio-economic status and mixed ethnicity (46% Caucasian and 54% African-American) moderate alcohol exposure during the first trimester of pregnancy was associated with significant deficits in verbal learning during adolescence (Willford et al., 2004).

2. Other studies with different human populations have demonstrated a link between light drinking and behavioral and cognitive problems during childhood and/or adolescence, including alterations in working memory, attention and social interactions (Burden et al., 2005, Coles et al., 1991, O'Leary et al., 2010, Sayal et al., 2007, Sood et al., 2001).

3. A recent study demonstrated that five variants of genes involved in alcohol metabolism in children and their mothers were associated with cognitive ability at 8 years of age in children born to mothers that reported drinking alcohol in moderation (1-6 drinks/week) during pregnancy. This finding indicates that certain pregnant women may be more susceptible to the effects of light drinking and that this may be related to genetic factors that regulate their ability to metabolize alcohol (Lewis et al., 2012).

4. In a landmark longitudinal cohort study, Day and collaborators (Day et al., 2013) demonstrated that low-moderate prenatal alcohol causes significant behavioral problems (for example, attention deficits) that persist into adulthood (22 years of age).

5. A recent brain imaging study demonstrated that low-moderate ethanol exposure during fetal development was associated with reductions in gray matter volume in several brain regions at approximately 20 years of age (Eckstrand et al., 2012).

6. A recent analysis of several separate studies (i.e., a meta-analysis) found a significant detrimental effect of light-moderate prenatal alcohol exposure on child behavior (Flak et al., 2013). The problem behaviors identified in exposed children include increased need for attention, deficient interactive play skills, and behavioral modulation alterations.

7. A study with humans found that newborns of mothers that consumed light amounts of alcohol during pregnancy had a higher frequency of facial malformations and alterations in umbilical cord artery contractility (Iveli et al., 2007).

Studies with laboratory animals support the findings of these human studies, demonstrating persistent effects of light-moderate alcohol exposure on the brain (Valenzuela et al., 2012). The importance of
animal studies is that other risk factors (for example, nutrition, genetics, environmental influences) are controlled for and, therefore, the effects of alcohol exposure can be quantified.

1. Adult offspring of pregnant rats who consumed low levels of alcohol displayed deficits in behavioral tests of learning and memory (Savage et al., 2002, Savage et al., 2010). Alterations in the strength of transmission of information between neurons were identified as a potential factor responsible for these deficits in learning and memory (Varaschin et al., 2010).

2. In addition, it was discovered that moderate alcohol exposure affects the generation of new neurons in brain regions important for learning and memory, and this could also contribute to the deficits observed in the exposed offspring (Choi et al., 2005, Uban et al., 2010, Akers et al., 2011, Roitbak et al., 2011).

3. Exposure of pregnant macaque monkeys to moderate alcohol levels has also been shown to impair motor coordination and delayed response speed in infant offspring (reviewed in (Schneider et al., 2011)).

4. Long-lasting alterations in social behavior were recently demonstrated in adult offspring of rats exposed to moderate alcohol levels during pregnancy (Hamilton et al., 2010).

5. Moderate alcohol exposure increased preference and consumption of alcohol-containing solutions in adult offspring; adult rats from the ethanol group also exhibited increased cocaine and amphetamine consumption after cocaine exposure (Barbier et al., 2009, Barbier et al., 2008). This moderate prenatal alcohol exposure may increase the risk of developing alcoholism and other addiction-related disorders.

6. A study with primates showed a reduction in aversive responses to repetitive tactile stimulation in young adult monkeys exposed to low levels of alcohol throughout gestation that could result in impaired control of sensory input (Schneider et al., 2008, Schneider et al., 2011).

In conclusion, the collective evidence from human and animal studies strongly suggests that even light drinking during pregnancy can produce significant long-lasting alterations in the brain, adversely affecting behavior, cognition, and social skills. Given the current state of the scientific evidence, the safest course of action is to advise pregnant women and women who may become pregnant to avoid drinking alcohol, even at low levels, during any stage of pregnancy.

References


