

Fetal alcohol syndrome heart defects may be caused by altered function, not structure

Researchers at Case Western University have recently published a research study examining the embryonic development of quail eggs and how prenatal alcohol exposure affects heart formation during the critical stages of development. Ganga Karunamuni and her colleagues separated the study sample of quails into cases and controls for the purposes of analyzing how alcohol exposure may alter the course of development in embryonic hearts. The first study group contained quails exposed to ethanol through injection into the egg (equivalent to one episode of binge drinking in humans) during the most vulnerable stage of development. The second study group housed quails exposed to an injection of saline (a placebo) during the same vulnerable period. The final study group was comprised of quails without any kind of intervention implemented. The researchers used an advanced form of optical imaging to track the embryonic growth of the heart; specifically targeting the critical period of development when the heart transforms from a tube-shaped tissue formation into a circuit-forming loop.

Aligned with many results of previous studies, the researchers found a significantly higher number of heart defects in the embryos prenatally-exposed to alcohol. Surprisingly, the researchers also found that, in the embryos exposed to alcohol, blood flow reversed direction between each heartbeat far more heavily than in those without the exposure. Also, in the alcohol-exposed embryos, the layering of tissues that later become the valves and chamber walls of the heart were vastly thinner and weaker than in the embryos that received no injection of ethanol.

These findings suggest that the quality of the function, rather than structure, of the heart during prenatal growth may be the primary factor in determining the likelihood of developing heart defects in alcohol-exposed embryos. The practical significance of this conclusion is that, with

appropriate scientific substantiation and technology, it may be possible to eventually redirect the blood flow in alcohol-affected embryos to mimic the flow of blood in embryos not exposed to alcohol. This would, theoretically, be an extremely effective method of preventing significant heart defects in embryos which are at-risk for Fetal Alcohol Syndrome.

References

Karunamuni, G., et al. (2014). "Ethanol exposure alters early cardiac function in the looping heart: a mechanism for congenital heart defects?" *American Journal of Physiology: Heart and Circulatory Physiology* 306(3): H414-421.

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