Effect of E-Cigarette Aerosol Exposure on Cardiac Development and Cytosine Methylation in Embryonic Danio rerio

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There has been substantial growth in the prevalence and popularity of electronic cigarettes since they were developed in 2004, possibly due to advertisements that market them as a safer alternative to tobacco cigarettes [1][2]. The rapid adoption has raised concerns among many. A recent study has suggested that around 13% of pregnant women use electronic cigarettes either with or without tobacco cigarettes [2]. Considering these statistics, the effect that electronic cigarettes have on the developing fetus has come into question, especially when considering the fact that many women perceive electronic cigarettes as posing little to no hazard [4]. It is imperative to more clearly understand this topic through testing and research to elucidate the implications of using e-cigarettes as a pregnant mother and during development. This project uses embryonic Danio rerio as a model for fetal development when exposed to aerosolized e-cigarette liquid to show the effects it has on embryonic cardiac development and global cytosine methylation to visualize epigenetic changes. ImageJ software was used to take measurements of edemas, and ELISA tests were used to quantify global cytosine methylation. E-cigarette liquid containing 0, 12, or 24 mg/ml nicotine, flavored with either ‘watermelon’ or ‘vanilla custard’ was used to clearly relate the defects or epigenetic changes caused to either nicotine or other constituents present in the e-cigarette liquid. The zebrafish embryos were exposed to the treated media at 4 hpf and 7 hpf to clearly attribute detriments to aerosol exposure before or after cell specification during embryonic development.

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