

Maternal and Paternal Lineage Contributions to Transgenerational Effects of Prenatal Alcohol Exposure

J. D. Madera, D.O. Popoola, N.M. Cameron

Developmental Exposure Alcohol Research Center, Binghamton University, Binghamton, NY

Our research shows that in rats, behavioral consequences of prenatal alcohol exposure (PAE) can be transmitted from *in utero*-exposed F1 generation to their F2 and F3 offspring. This effect is associated with changes in cortical GABA_A receptor expression. Here we investigated the lineage responsible for the transmission of the phenotype. Dams received ethanol (E:1 g/kg of 12.6% ethanol), water (W) or nothing (control: C) during gestational days 17-20. The F1 generation showed an increase in alcohol consumption at PND14 and decreased sensitivity to ethanol-induced hypnosis at PND42. To evaluate the contribution of maternal and paternal lineages, F1 animals were bred to produce nine F2 treatment groups (dam-sire, C-C, C-E, C-W, W-C, W-W, W-E, E-C, E-W, E-E). F2 animals were tested for ethanol consumption in infancy (PND14), two-bottle choice ethanol intake in adolescence (PND28-52) and sensitivity to ethanol effects using loss of righting reflex paradigm (LORR). In PND14 F2 males and females, maternal and paternal lineages significantly influence ethanol intake, as offspring from E-treated fathers or mothers consumed more ethanol than C group. Interestingly, F2 W-treated sire lineage also consumed more ethanol than C group. In adolescent F2 rats, offspring of E-treated dams consumed significantly less ethanol in a 2-bottle choice test compare to C group. Sex and paternal lineage had no effect on ethanol consumption in adolescent rats. Duration of LORR was longer in females across all treatments, and a main effect of maternal lineage was found, as offspring of E prenatally-treated dams had a shorter LORR duration compared to C-group. In males, we also found an interaction of paternal and maternal lineages, as LORR duration in C-E males was longer than most groups except C-C and C-W males. In conclusion, both lineages influence infant ethanol consumption, although adolescent consumption is mostly affected by maternal lineage, as was LORR duration.