

The Impact of Neonatal Methamphetamine on Spatial Learning and Memory of Females in Adulthood

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Abstract : The present study was aimed at evaluation of cognitive changes following scheduled neonatal methamphetamine exposure in combination with long-term exposure in adulthood of female Wistar rats. Pregnant mothers were divided into two groups: group with indirect exposure (methamphetamine in dose 5 mg/ml/kg, saline in dose 1 ml/kg) during early lactation period (postnatal day 1-11) - progeny of these mothers were exposed to the effects of methamphetamine or saline indirectly via the breast milk; and the second group with direct exposure - all mothers were left intact for the entire lactation period, while progeny was treated with methamphetamine (5 mg/ml/kg) by injection or the control group, which was received needle pick (shame, not saline) at the same time each day of period of application (postnatal day 1-11). Learning ability and memory consolidation were tested in the Morris Water Maze, which consisted of three types of tests: 'Place Navigation Test'; 'Probe Test'; and 'Memory Recall Test'. Adult female progeny were injected daily, after completion last trial with saline or methamphetamine (1 mg/ml/kg). We compared the effects of indirect/direct neonatal methamphetamine exposure and adult methamphetamine treatment on cognitive function of female rats. Statistical analyses showed that neonatal methamphetamine exposure worsened spatial learning and ability to remember the position of the platform. The present study demonstrated that direct methamphetamine exposure has more significant impact on process of learning and memory than indirect exposure. Analyses of search strategies (thigmotaxis, scanning) used by females during the Place Navigation Test and Memory Recall Test confirm all these results.

Keywords : methamphetamine, Morris water maze, neonatal exposure, strategies, Wistar rats

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