C-fos as a marker for neuronal activity in the cortex of nicotine injected mice

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Although many studies report an increased susceptibility of adolescent brains to nicotine, the underlying mechanism of this sensitivity is unknown. The goal of this study is to determine whether c-fos immunohistochemistry can be used to visualize brain areas activated by nicotine exposure. A conditioned place preference paradigm is used with a mouse model to establish place preference with nicotine injections. Animals receive one injection of the assigned treatment of nicotine or saline every drug day for the length of the behavioral training. The first analyzed group consisted of ## animals treated with 0.1mg/kg nicotine, vehicle, or no behavioral training and injections. Animal series 159 included ## animals with treatments of 0.05, 0.2, 0.4 mg/kg nicotine, vehicle, or no behavioral training or injections. Animal series 165 consisted of # PSCA knockout mice and # wildtype, given either an acute 4mg/kg nicotine dose or vehicle. This animal series received no behavioral training. PSCA is a prototoxin thought to modulate nicotinic acetylcholine receptors. After behavioral training or acute injections are completed, animals are euthanized and brains are immersion fixed. C-fos, an immediate early gene and transcription factor, is activated by neuronal activity and cells containing c-fos protein are stained with rabbit anti-c-fos antibody (company) and an avidin-biotin HRP solution (Invitrogen) with diaminobenzidine. Serial sections from every animal are quantified in the prelimbic area of the frontal cortex and the nucleus accumbens using an optical fractionator workflow probe (MBF Bioscience). The stereology estimates of c-fos positive cells showed no significant difference between animals receiving nicotine injections, saline injections, and no injections. In addition, no difference was observed between each nicotine dose. These results may be due to a lack of nicotine susceptibility in the prelimbic area and nucleus accumbens, additional extracellular stimuli, insufficient nicotine dosage, or adaptation to nicotine with prolonged exposure. Currently, animals given a single injection of a high dose of nicotine are being quantified.