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The Rewarding Effects of Nicotine are Enhanced in Diabetic Rats Given Extended Access to Intravenous Self-Administration Procedures

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Diabetic patients who use tobacco display higher mortality rates as compared to healthy individuals who also use tobacco. Despite the magnitude of the problem, it is unclear whether diabetic subjects display enhanced rewarding effects that may lead to greater vulnerability to abuse tobacco as compared to healthy controls. To address this question, a rat model was used whereby diabetes is induced via administration of streptozotocin (STZ), a drug that is toxic to insulin-producing beta cells in the pancreas. Following diabetes induction, control or diabetic rats were given access to intravenous self-administration (IVSA) of nicotine in extended 23-hour or limited 1-hour daily sessions. Rats were trained to press a lever that would deliver a 0.1 ml infusion of nicotine at a dose of 0.3 mg/kg. Animals with limited 1-hour sessions were given access to 0.3 and 0.6 mg/kg doses of nicotine followed by a progressive ratio (PR) test where the nicotine was delivered following progressive requirements of lever presses. We hypothesized that diabetic rats would press more for nicotine than control rats. Consistent with our hypothesis, diabetic rats that were given extended access displayed an increase in responding for nicotine as compared to healthy controls. However, diabetic rats given limited access displayed lower nicotine intake as compared to healthy controls, likely due to the older age of the rats and higher diabetic status as compared to the extended access rats. Our extended access findings, suggests that strong rewarding effects of nicotine may contribute to enhanced tobacco abuse in patients with diabetes.