Increased patch reactivity in rat striatum during expression of amphetamine psychomotor sensitization is not accompanied by stereotypic behavior

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Repeated exposure to amphetamine causes a progressive and long-lasting increase in its psychomotor stimulant effect, a process termed behavioral sensitization. Previous studies in our laboratory have shown that the expression of amphetamine sensitization is accompanied by a preferential increase in c-fos reactivity in the striatal patches (Vanderschuren et al., Eur. J. Neurosci 16:2462-2468, 2002). This pattern of reactivity has been hypothesized to be correlated to stereotypic behavior (stereotypy) (Canales & Graybiel, Nat Neurosci. 3: 377-383, 2000). To test this hypothesis, we measured locomotor activity and stereotypy in rats during expression of amphetamine sensitization. This protocol has been shown in our laboratory to induce high patch:matrix ratios of c-fos reactivity. Rats were pretreated for 5 consecutive days with D-amphetamine (2.5 mg/kg, IP) or saline. After a 3 week drug-free period, rats were challenged with D-amphetamine (1.0 mg/kg, IP) or saline and behavior was videotaped for 90 minutes. Stereotypy was defined as repetitive movements performed without moving to another part of the open field (i.e. head shaking) and scored during five of every 15 minutes. Consistent with our earlier observations, animals pretreated with amphetamine displayed a profoundly sensitized locomotor response to the amphetamine challenge. However, no stereotypy was observed in any of the rats. These results indicate that increased reactivity of striatal patches is not exclusively correlated with stereotypy, but is associated with a broader range of behaviors. Specific sensitization-related activation patterns were also seen in the ventral striatum, where characterization of c-fos in the nucleus accumbens of amphetamine sensitized rats showed activation of the core, but not shell area of the nucleus accumbens. Current studies are aimed at correlation of ventral striatal activation with behavioral data and identification of activated cells in the nucleus accumbens.
Support: NWO grant 903-47-092

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Poster presentation: neuroscience II (Thursday)