Axon collaterals of medium-sized spiny output neurons establish specific subregional and intercompartmental connections within the nucleus accumbens of rats

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The nucleus accumbens (Acb), a brain region located within the ventral part of the striatum, consists of a shell and core subregion that both exhibit various neurochemically and connectionally different compartments. It has been hypothesized that these compartments represent functionally distinct neuronal ensembles (Pennartz et al., 1994). An important question is whether and how such ensembles interact to support the intricate functions of the Acb. The aim of the present study was to anatomically trace possible direct connections between Acb subregions and compartments. To this aim, two sets of experiments were carried out: 1. small injections of the anterogarde tracer biotinylated dextran amine (BDA), and 2. single-cell juxtacellular injections of neurobiotin, both placed in various parts of the accumbens.
The results indicate that there are specific, direct projections *between* and *within* the shell and core. For example, rostral and caudal parts of the shell are reciprocally interconnected. Furthermore, patch and matrix compartments within the core appear to be interconnected as well. Both BDA and single-cell juxtacellular tracing experiments show that these intra-accumbens projections are, at least in part, established via axon collaterals of medium-sized spiny projection neurons (MSN).
On the basis of our results, it can be concluded that functionally distinct Acb subregions (shell and core) and compartments therein are interconnected in a rather specific way via axon collaterals of GABA-containing output neurons.
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