Recovery on a Drug Discrimination Learning Task After Brain Transplants: Preliminary Findings

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Brain grafts may improve functional recovery after brain damage. The recovery has been evaluated by morphological and behavioral observations, but such evaluations of recovery have some problems since the demonstration of cellular growth in the graft is different from cellular functionality. For example, the graft may facilitate behavioral expression of related brain areas.

The drug discrimination learning paradigm may be a useful technique to evaluate functional recovery because, in order to perceive and discriminate the drug conditions, the following are required: a) specific pharmacological mechanisms (membrane receptors) at the cellular level; b) specific brain areas on which the receptors, brain pathways and physiological mechanisms are located for the organization of the response, and c) specific behavioral responses which may provide an index of the functionality of receptors as well as of brain areas.

Subjects were male Wistar rats with a body weight of 350-400 g. The animals had free access to food but were deprived of water during 22 h/day. Water was provided in a 30 min session five days a week and 1.5 h of free access. The rats were trained on two operant conditioning chambers, each equipped with two levers on a MULT FR10-FR10 to discriminate between scopolamine (1.8 mg/kg s.c. 20 min before session) and vehicle (saline) on randomly alternated days. Injection volumes were 1.0 ml/kg. Drug condition was the discriminative stimulus for correct lever selection and training was extended until no more than 2 incorrect lever presses were emitted before the first reinforcer (0.3 ml) of the session. After training
since no changes were observed for rate or time to first reinforcer. Results yielded significant differences on the DDI after two-way ANOVA (drug condition vs lesion-transplant) at p<0.01; Duncan tests revealed significant differences between the lesion and training for the DDI on both saline and drug conditions. In the saline condition, the DDI after the transplant differed from lesion but not for the training condition, whereas in the drug condition the DDI differed from lesion but was still different from training condition.

In conclusion, the lesion to the hippocampus did interfere with the drug discrimination task. After fetal homologous transplants the DDIs were similar to the training conditions; however, although the rats did respond correctly, there was a reduction in the response rate. The drug discrimination paradigm may be a useful model to evaluate recovery after brain grafts and may serve to distinguish between motor or motivational factors and cognitive factors.

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REFERENCE
