Autotransplantation of the Cervical Sympathetic Ganglion into Monkeys With MPTP-Induced Parkinsonism

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To circumvent problems in fetal nigral and autologous adrenal transplants in parkinsonism, we have employed transplantation of the autologous cervical sympathetic ganglion containing noradrenergic and dopaminergic neurons. The synthetic meperidine analogue, MPTP (1-3 mg/kg, i.v.) was injected into ten monkeys (Macaca fuscata, weighing 3 to 6 kg) to produce experimental parkinsonism. Two to three weeks after MPTP injection, autologous superior cervical ganglion (SCG) was transplanted bilaterally into the striatum of 7 monkeys by the stereotactic method. Two monkeys undergoing transplantation of muscle grafts after MPTP administration served as sham-operated animals. One monkey which did not receive transplantation after MPTP administration served as a control. Motor activity, changes in catecholamine content in CSF, and survival of the graft were examined for periods of up to 3 years. Six out of 7 monkeys receiving SCG transplantation revealed a marked increase in motor activity and decreased muscle rigidity 2-4 weeks after transplantation, while the sham and control monkeys failed to show any improvement of parkinsonism (Fig. 1). This amelioration of parkinsonism in the transplanted monkeys continued for long periods (2-3 years). Homovanillic acid (a dopamine metabolite) content in CSF was slightly elevated after transplantation in the 7 monkeys. The transplanted monkeys showed no permanent serious side effects such as seizures or abnormal behavior, though two monkeys revealed transient aggressive behavior 2 weeks after transplantation. Long-term (25 months) survival of the grafted tissue was demonstrated in the striatum of the monkeys under catecholamine histofluorescence. In this graft, norepinephrine- and dopamine-containing neurons were observed, while no fiber outgrowth into the host brain was found. There was no obvious sprouting of the dopamine terminals originating from the host brain.

The present experimental data support the possibility of a clinical application of autotransplantation of the cervical sympathetic ganglion in parkinsonian patients.

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REFERENCE
