

Letter To The EDITOR

Double Transplantation In Parkinson's Disease

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TO THE EDITOR

ON January 1993, we publish an article concerning with surgical anatomy of the putamen and its relation with the transinsular approach (7). First, because in many neurosurgical centers of the world, we haven't of modern computed tomography or magnetic resonance imaging stereotactic units. Second, we implant fragments of adrenal medulla into the putamen by a transinsular pathway through a craniotomy.

In situ, the dopamine-producing tissues are normally very vascularized and the cellular groups are separated by numerous capillaries. A neuronal-vascular relationship is evident in these donor tissues.

The L-tyrosine enters the plasma membrane by a concentrating mechanism and within the cytoplasm, the oxidation of L-tyrosine to L-dopa is catalyzed by tyrosine hydroxylase, a mixed-function oxidase that requires molecular oxygen and tetrahydropteridine as co-substrate, as well as, Fe²⁺, NADPH, and dihydropteridine reductase (4). The L-dopa is then decarboxylated to dopamine by a dopa decarboxylase.

Therefore, a rapid and efficient revascularization of the donor tissues into the neostriatum, is an essential prerequisite for graft survival (2,9) and biosynthesis of the catecholamines (4). Thus, through the revascularization the graft receives an increase in blood flow, tyrosine and oxygen.

The omentum, is the best tissue for developing vascular connections with adjacent tissues. Placing omental tissue directly upon the cerebral cortex, development blood vessels that grow from the omentum, cross the omental-cerebral interface, and penetrate vertically and deeply into the underlying brain (3,8). Omental tissue promotes the formation of new blood vessels after 6 hours (1).

To date we have performed 232 omental transplantation to the central nervous system due to late sequelae (8). Thereby, in the treatment of Parkinson's disease (PD), we used an innovative method (8,9): Transplantation of adrenal medulla into the putamen by a transinsular pathway and transplantation of the omentum in the insular and frontoparietotemporal cortex.

Briefly, a frontotemporal craniotomy and laparotomy were performed simultaneously by neurologic-surgery and general-surgery teams, respectively. Six to eight pieces (2x2x2 mm) of medullary tissue were implanted into (or near) the putamen by a transinsular pathway. The grafts were placed through a bayonet forceps and deposited one by one as deep as 12-mm from the insular cortex (7).

An-end-to-end anastomosis by invagination (6) between the superficial temporal vessels and the gastroepiploic vessels of the omentum, were performed. A portion of the omental segment was introduced to the insular cortex, through the sylvian fissure. Here, the omentum was laid on the insular cortex, limen insulae and lateral part of the anterior perforated substance. The residual omentum, was spread over the frontoparietotemporal cortex.

In a previous report (9), we demonstrated that adrenal medulla implants into the putamen ameliorate PD and postoperative improvement coincided with the efficacy of the transplanted omentum. We believe that these results are due to revascularization of the grafts since not many hours after surgery (1,3) and subsequently, through vascular anastomosis between the host blood vessels and the capillaries from graft(5).

In summary, implantation of any dopamine-producing tissue (including genetically modified cells) into the neostriatum, must be revascularized for improve function and prolong survival of the graft.

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REFERENCES

1. Ellis H. The aetiology of postoperative abdominal adhesions. *Br J Surg* 50:10-16, 1962.
2. Fisher LJ, Gage FH. Grafting in the mammalian central nervous system. *Physiol Rev* 73:583-616, 1993.
2. Goldsmith HS(ed). *The omentum: research and clinical applications*. New York: Springer-Verlag, 1990.
4. Kirshner N. Biosynthesis of the catecholamines. In: Greep RO and Astwood EB (eds.) *Handbook of Physiology. Section 7:Endocrinology. Volume VI: Adrenal medulla*. Washington: Am Phys Soc 1975:341-355.
5. Krum JM, Rosenstein JM. Patterns of angiogenesis in neural transplant models: II. Fetal neocortical transplants. *J Comp Neurol* 271:331-345, 1988.
6. Lauritzen C.A. new and easier way to anastomose microvessels. An experimental study in rats. *Scand J Plast Reconstr Surg* 12:291-294, 1978.
7. Rafael H, Polo G, Moromizato P. Surgical anatomy of the putamen. *Turk Neurosurg* 3:11-14, 1993.
8. Rafael H, Moromizato P, Espinoza M. Omental transplantation to the central nervous system. Presented at the International X Congress of Neurological surgery. Acapulco, Mexico, October 17-22, 1993:155-156.
9. Rafael H, Moromizato P, Lara R. Surgery for Parkinson's disease. *Neurology* 43:2154, 1993 (letter).