

# 末梢神経自家移植によるラット脳神経の再生

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# 1992 Fiscal Year Final Research Report Summary

## Axonal Regeneration and Remyelination in the Facial Nerve and the Spinal Cord by Peripheral Nerve Autograft in Rats.

Research Project

### Project/Area Number

02807131

### Research Category

Grant-in-Aid for General Scientific Research (C)

### Allocation Type

Single-year Grants

### Research Field

Cerebral neurosurgery

### Research Institution

Kanazawa University

### Principal Investigator

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### Project Period (FY)

1990 – 1992

### Keywords

Nerve regeneration / Transplantation / Axon / Myelin sheath / Node of Ranvier / Ultrastructure / Freeze-Fracture

### Research Abstract



Peripheral nerve autografts were transplanted either to a peripheral nerve or to the spinal cord to study axonal regeneration and remyelination in rats. The sciatic nerve graft was transplanted to the cut ends of the facial nerve in ten rats and the peroneal nerve graft was to the spinal cord in nine rats. The nerve grafts were examined by electron microscopy after one to 24 weeks. Cation staining and freeze-fracture methods were performed as well to know the further information of sodium channels in axon membrane. In thin sections, a lot of lymphocytes and macrophages were seen with Wallerian degeneration in grafts within four weeks. After four weeks, Schwann cells and unmyelinated fibers were increased in number and thin myelin sheaths and short internodes were observed in sciatic grafts. In peroneal grafts, myelinated and unmyelinated fibers were seen only in two rats although four out of nine showed tight adhesion to the spinal cord in gross inspection. These myelin sheaths were of peripheral type surrounded by collagen fibers. In cation staining, performed

only in sciatic nerves, electron-dense patches were seen on the unmyelinated axons and at the node-like areas between short internodes after four weeks. In freeze-fracture replicas, also performed in sciatic nerves, Axolemmal E-face particles were distributed in a concentration of 200/ $\mu\text{m}^2$ , half of which were large ( $>10\text{nm}$ ) and were supposed to be sodium channels. In conclusion, an electron microscopic examination of the peripheral nerve graft both into the peripheral and central nervous system showed a number of regenerated unmyelinated and myelinated fibers of peripheral type. Sodium channels were concentrated at the area between the internodes at the early stage of remyelination. Schwann cells directly surrounded the regenerated axons with or without myelin sheaths.

## Research Products (9 results)

All Other

All Publications (9 results)

- [Publications] Megumi Ueno,Jun Ishise,Junkoh Yamashita: "Blood-Brain Barner in Malignant Gliomas:A Freeze-Fracture Study" Brain Tumor Pathol. 8. 183-185 (1991) 
- [Publications] 長谷川 光広 田口 博基 内山 尚之 他: "半側脊髄損傷ラットに対する自家末梢神経移植II.再生中枢神経に対するastrogliaの反応" 神経組織の成長・再生・移植. 3. 40-41 (1991) 
- [Publications] Jun Ishise,Jack Rosenbluth,Mitsuhiro Hasegawa etal: "Advances in Experimental Neurotrauma Research" My Life Co.Tokyo, 79 (1990) 
- [Publications] Mitsuhiro Hasegawa: "Advances in Experimental Neurotrauma Research" My Life Co.Tokyo, 96 (1990) 
- [Publications] Mitsuhiro Hasegawa,Hiroki Taguchi,Naoyuki Uchiyama.et.al.: "Advances in Neurotrauma Research 3" My Life Co.Tokyo, 94 (1991) 
- [Publications] Megumi Ueno, Jun Ishise, Junko Yamashita: "Blood-Brain Barrier in Malignant Gliomas : A Freeze-Fracture Study" Brain Tumor Pathology. 8. 183-185 (1991) 
- [Publications] Jun Ishise, Jack Rosenbluth, Mitsuhiro Hasegawa, et.al.: "Wallerian degeneration : Ultrastructural Changes of the Axonal Membrane" Advances in Experimental Neurotrauma Research. 1. 66-73 (1990) 
- [Publications] Mitsuhiro Hasegawa: "Short Internodes of Mouse Optic Nerve during early Stage of Wallerian Degeneration" Advances in Experimental Neurotrauma Research. 2. 64-67 (1990) 
- [Publications] Mitsuhiro Hasegawa, Hiroki Taguchi, Naoyuki Uchiyama et al.: "Astroglial response to regenerating CNS neurons after peroneal nerve grafting over the injured spinal cord in rats." Advances in Experimental Neurotrauma Research. 3. 41-44 (1991) 

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