3) The passage of $^{32}$P given above the spinal cord transection into the distal cord was obtained through the implanted spinal nerves from above the transecting spinal cord lesion into the distal stump.

### 32. Skull Bone Transplantation by Use of Cathode Ray Irradiated Homografts

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Bone defects of the skull not only make the out-looking ugly, but often cause annoying headaches. Relatively minor external violations such as contusions or stab wounds can sometimes result in severe cerebral damages in these patients. Moreover, some of the patients are nervous and tortured by the continuous pulsations in the head, which they usually believe the most important part of the body. Especially in children, skull defects may cause cranial maldevelopements which result in the remarkable deformity of the head, and might affect the normal development of the brain.

Excellent bony coadunations are attained in autologous transplantations, however, autografts of adequate size and shape are not easily obtainable. Homografts, heterografts, synthetic materials and metals have been used for the cranioplasty.

The purpose of present report is to prove usefullness of the immunologic inhibitory effects of the cathode rays irradiation, experimentally and clinically, to the homologous skull bone transplantation. Bone grafts are prepared as follows: A piece of skull bone was sealed in plastic bags. Then it was irradiated 2 M rads at dry-ice alcohol cold by use of Van de Graaff generator. Bone grafts were kept frozen in the deep freezer at $-25^\circ C$ until ready for use. Both immunologic inhibitory effect and strong sterilization have been appreciated in cathode rays irradiation. Cold-preservation is easy and practical. An increase of the immunological tolerances of the grafts is also anticipated by this procedure. In our previous animal experiments, fresh bones, decalicified bones and irradiated bones were studied for their immunologic inhibitory action and bony renewal following homologous transplantation.

The grafts irradiated with cathode rays revealed superior bone conducting capacities. New bone formation is recognized along the margin of the grafts 3 months after homotransplantation of irradiated dog bones. 12 months after operation, bone replacements spread all over the graft, 25 mm in diameter. By use of irradiated homografts, 4 cranioplastic operations were performed: three bone defects following decompressive craniotomies for acute cerebral injury and one birth injury. In the clinical cases, the grafts were so wide that many small burr holes (ca 6 mm in dia-
meter) were made in the grafts to accept small pieces of iliac autografts in hope of bony renewal from them. Postoperatively they are closely observed for 11 and a half months, for 11 months, for 7 months and for 2 months respectively. Recent X-ray examinations demonstrate secure coadunation of the grafts and the vaults. Active bony regenerations are in progress from the autogenous iliac bone chips packed in the trephine openings of the grafts.

33. Clinicopathological Study on Extracranial Metastases of Glioblastoma Multiforme

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Extracranial metastasis of glioblastoma multiforme has been said to be extremely rare. We experienced a case of glioblastoma multiforme with wide metastases to cervical lymph node, scalp, pericranium, spinal cord and cauda equina. We reported this case, and intended to review the literature of extracranial metastases of glioblastoma multiforme with respect to the frequency in sex and age, pathway and preference for sites of metastases, and the other clinicopathological pictures.

A 18 year-old female of right handed was admitted to our clinic with complaints of headache, vomiting and visual disturbance. Selective arterial-infusion of 5-FU and Mitomycin-C and irradiation were followed. Seven months after craniectomy left cervical lymph nodes enlarged to the size of pigeon-egg, biopsy of which revealed a malignant neurogenic neoplasm. The tumor extensively infiltrated through the scalp and pericranium to the left lateral neck, and subtotal removal of the tumor was performed, including the three fourth of the intracranial tumor mass, which weighed 788g. Immediate postoperative course was uneventful, but 10 days later, suddenly she went into coma after severe vomiting, and Froin’s syndrome was noted by spinal tap. She expired 17 days after operation. At autopsy, the primary tumor was found in the left parieto-occipital region and metastasized widely to the left cervical lymph nodes, scalp, pericranium, dura mater, spinal subarachnoid space and cauda equina. Microscopical examination revealed that the tumor was glioblastoma multiforme. Such an extensive metastasis of glioblastoma multiforme as this seems very extremely rare. This case suggested some immunological aspects of glioma through CSF, considering the extremely rapid growing of the larger part of the primary tumor and its extracranial cervical extension.

Fifty-two cases of extracranial metastasis of glioblastoma multiforme were collected from the literatures. Of the total of 53 cases including our case, 42 (80%)