B4. Pedunculotomy for the Parkinsonian Tremor.

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For these several years, the surgical treatments of the Parkinsonian tremor and rigidity seems mostly to consist of stereotactic operations of the pallidum, a portion of the thalamus, and the pallidofugal fibers. However, there might not be any authors who are sure to abolish the parkinsonian tremor, besides the rigidity, permanently by these operations for a long postoperative period of observation.

The pyramidal tract (cortico-spinal tract) has been considered to be the pathway of impulses of the tremor since James Parkinson's early experience. Moreover, Bucy believes, at present, that Parkinsonian tremor can not be controlled by any procedure other than the section of the pyramidal tract.

We performed the pedunculotomy in two cases of parkinsonism in 1954 and 1955 respectively. In these cases, the parkinsonian tremor subsided but were replaced inevitably by hemiparesis after the procedure.

Besides, we experienced that the pedunculotomy aggravated the tremor of the extremities ipsilateral to the side of the operation transientry for a period following the operation, in spite of abolition of the one on the contralateral side.

Walker and Bucy reported the long-lasting abolition of parkinsonian tremor by the pedunculotomy, even after the recovery of voluntary movements. These data above-mentioned show that the abolition of the tremor is not necessarily associated with paresis. It might be considered that the appearence of parkinsonian tremor would be not only by way of the pyramidal tract (α-system) but also of more widely spreading neural mechanism (γ-system). These two systems might be considered to be a co-working entity and not to be independent neural mechanisms separated from each other.

B5. Application of High Intensity Focused Ultrasound to the Stereotaxic Brain Operation.

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To make an accurate small lesion well localized in the desired site without any deleterious lesions of surrounding tissues is most important for the stereotaxic brain operation.

The focused ultrasound is certainly useful for the above mentioned thesis. Experimental results on the focused ultrasound during several years reveal in brain tissues that strong destructive effects constantly occur in the focal area of

a sound lens or a reflector, as the peak intensity reaches up to over 2000 w/sqcm., and the induced lesion can be varied by the ultrasonic frequency used on its shape and size, i.e., single ultrasonic shot results a lesion of about 0.2 ml., by 1460 KC., whereas about 0.4 ml. by 970 KC. of frequency, and plural shots can produce a lesion of certain volume larger than a single shot. The focal length may be chosen by the depth of tissues to be destroyed from the surface, and 9-10 cm. of length is now in use.

The stereotaxic device and the focused ultrasonic generator of high power was made and is working on for the selective localized destruction of globus pallidus, the white matter of the prefrontal lobe and other basal ganglia in an attempt similar to that of stereotaxic operations now in use.

One of four patients whose globus pallidus were ultrasonically operated on about a year ago is presented in clinical details, showing that the stereotaxic procedure by the high intensity focused ultrasound was exactly performed with the disappearance of the rigidity of extremities and improvements of epileptic attacks and so far.

Ultrasonic thalamectomy and hypophysectomy may be done effectively with very little risk, as studies of the author indicate functions of motor fibers within the internal capsule to reveal a little more resistant than those of motor ganglion cells to the focused ultrasonic irradiation, and that precise examinations of hypophyseal functions showed deeply disturbed hypophyseal control to adrenal cortical functions by the ACTH-test and well defined destructions located in the hypophysis with hypertrophic adrenal glands.

Ultrasonic surgery in the neurosurgical field will be a promising method as the stereotaxic procedure.

B6 Experimental Studies on the Stereotaxic Destruction of Basal Ganglia using Colloidal Radioactive Isotopes.

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It is now well established method to treat Parkinsonian syndrome or allied involuntary movements by stereotaxic destruction of various nuclei in the brain stem. As the destructive agents, alcohol, celloidin-alcohol, corrosive sublimate, oil-wax, electric coagulation, collective ultrasonic wave, etc. have been used. Recently Mullau pointed out that the implantation of radioactive isotope was more effective than alcohol injection.

In recent years our research group has developed studies on the treatment of cancer by local use of radioactive isotopes combined with colloidal ion exchange resin. It is the purpose of this study to examine if the radioactive isotopes com-