Abstracts

1. STUDIES ON THE HYPOTHERMIA IN THE SURGERY OF THE CENTRAL NERVOUS SYSTEM : WITH SPECIAL REFERENCE TO THE DETERMINATION OF CRITICAL AND OPTIMAL TEMPERATURES BY SURFACE COOLING AND THE DEVICE OF THE NON-BLEEDING OPERATIONS OF THE CENTRAL NERVOUS SYSTEM UNDER HYPOTHERMIA

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1) The critical temperature of hypothermia induced by the surface cooling used for the operations of the central nervous system was found to be 27°C from the results of the experimental studies on the cerebral metabolism, brain swelling and irritability of the brain.

2) Within this critical temperature, the optimal temperatures were decided upon according to the operated sites and the operative methods of the central nervous system as follows : when the cerebral blood flow was not limited, the optimal temperature for the operations of the cortex and subcortical white substance of the parietal and occipital regions was 30−29°C : that for the frontal and temporal regions was 29−28°C : that for the hypophysis and the surroundings of the 3rd ventricle was 20−27°C : that for the pineal body was 27°C : that for the surroundings of the 4th ventricle was 28−27°C : that for the epidural operations was 33−30°C. On the other hand, when the cerebral blood flow was disturbed for 10−15 minutes by the occlusion of bilateral carotid arteries, the optimal temperatures for the operations of all the regions were 28−27°C. When the unilateral carotid artery was occluded for about 1 hour, the optimal temperatures were 28−27°C.

3) The clinical operated cases of the diseases of the central nervous system were divided into 2 groups : the group operated under hypothermia of the optimal temperature by the surface cooling and the group operated under hypothermia regardless of the optimal temperature. The side effect of hypothermia as well as the incidence of complications during and after operations were compared between the both groups. They were low in the former group and high in the latter.

4) For the purpose of the complete occlusion of cerebral blood flow and performance of non-bleeding operation of the brain, we used the apparatus connecting the artificial heart and lung machine to the heat exchanger, devised the hypothermia by the core cooling and applied it in the surgery of the central nervous system. On this occasion, the cardiac arrest occurred under 17−18°C of the cerebral temperature and the complete non-bleeding state was obtained in the brain by discontinuing the perfusion with the artificial heart and lung machine. It was clarified that this state was completely recovered by the rewarming and there occurred no particular disturbances of the cerebral metabolism during the cooling and the rewarming.

2. STATISTICAL INVESTIGATION OF 155 CASES OF BRAIN OPERATIONS UNDER HYPOTHERMIA

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1) Statistical investigation was made of the results of 155 cases of brain surgery performed under hypothermia in the four institutions, Kanazawa, Niigata and Tohoku Universities, and Tokyo Medical College.

2) The rectal temperatures during the operation ranged between 34 and 26°C, and were between 30 and 28°C in the majority of cases.

3) Hypothermia was employed for brain tumors and brain trauma, most frequently for deep-situated tumors.

4) No case of ventricular fibrillation attributed to hypothermia was recognized.

5) The major cause of fatality was postoperative overheating. The overheating occurred frequently when the rectal temperatures were above 28°C and its frequency showed a tendency of decreasing with the fall of the temperature.

6) The complications of respiratory, circulatory and nervous systems and postoperative overheating caused by hypothermia were discussed.

3. CLINICAL STUDIES IN CHEMOTHERAPY OF TUBERCULOSIS

PART 25. ON THE CASES OF PULMONARY TUBERCULOSIS TREATED WITH ALPHA-ETHYL-THIOISONICOTINAMID

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Alpha-ethyl-thioisonicotinamid has been used in the treatment of severe cases of pulmonary tuberculosis resistant to several tuberculostatics. Disappearance of tubercle bacilli in sputum and improvement general conditions were observed soon after the administration of the drug.

In one case some cavities were reduced in size or completely disappeared after four months, but a small cavity in fibrocaseous lesion remained persistently obserable.

4. GLYCOGENESIS IN THE LIVER OF TUBERCULOUS GUINEA PIGS

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In a previous paper it was reported that the glycogen content of the liver was greatly reduced in tuberculous guinea pigs. This paper presents a study on glycogenesis in the liver of tuberculous guinea-pigs following administration of glucose.

The guinea pigs were inoculated subcutaneously with 0.2mg (semi-moist weight) of a virulent human tubercle bacillus, H_2 strain and employed for experiments about 40 days later. Glucose was administered subcutaneously in doses of 2 gm per kg body weight. An equivalent quantity of saline was given to each control animal. The animal, previously fasting for 18 hours, was locally anesthesized with xylocaine, and a piece of tissue (about 0.1gm) was removed from one lobe of the liver by partial hepatectomy. The glycogen content of the tissue was determined by the method of Good, Kramer and Somogyi. Measurement of liver glycogen was made immediately before the administration of glucose and then three times thereafter at one-hour intervals. Blood was also taken from the heart at the time of hepatectomy and its glucose content was determined by the method of Hagedorn-Jensen.

Although the initial liver glycogen content was much lower in tuberculous guinea pigs than in normal animals, it was observed that a marked increase in liver glycogen occurred in tuberculous as well as normal animals about 1–2 hours after the glucose administration. Concurrent measurements of blood glucose levels also revealed no significant difference between the two groups of animals; thus, the blood glucose reached the highest level in one hour after the glucose injection and then, coinciding with the increase in liver glycogen, returned to the normal level.

5. EFFECT OF PLASMAS ON THE STREPTOLYSIN-S SUSCEPTIBILITY OF TANNED ERYTHROCYTES

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In this paper are presented the observations that plasmas of guinea-pig and rabbit were capable of restoring the reduced susceptibility to streptolysin S of tannic acid-treated erythrocytes.

Washed erythrocytes of guinea-pig pretreated with a 1:10,000 solution of tannic acid in the cold were suspended in a solution of plasma to be tested and allowed to stand at room

temperatures for 20 minutes. At the end of the time, the cells were washed and resuspended in saline in a concentration of one per cent. The erythrocyte suspensions thus prepared were assayed for their susceptibility to streptolysin S by hemolysis test.

It was found that the reduced susceptibility to streptolysin S of the tanned erythrocytes was completely restored by treating them with a 1:200 dilution of the guinea-pig plasma. The plasma exerted recognizable restoring activity upon the tanned cells even in a 1:1,000 dilution. Plasmas of the rabbits were also equally effective. The restoring activity of the plasmas was unaffected by heating at 56°C for 30 minutes. The plasma of tuberculous guinea-pigs did not differ from that of normal animals in its activity of restoring the streptolysin-S susceptibility of tanned red cells.