

### **13. A New Thermoelectric Cold and Heat Brain Probe using Semiconductor**

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One of authors (Miyazaki) has reported on the reversible block of nervous conduction by localized cooling down to  $+5^{\circ}\text{C}\sim+1^{\circ}\text{C}$  or heating up to  $45^{\circ}\text{C}\sim 48^{\circ}\text{C}$  and permanent lesion by freezing below  $0^{\circ}\text{C}$  or heating above  $+50^{\circ}\text{C}$  in 1962 and 1964. Since that the authors had studied to get the most ideal method from these datas and summerized that the reversible lesion should be made by localized cooling which is more controlable and the permanent lesion by heating is preferable method because of reproducibility, sharp delimitation and avascularity.

The perfect thermoelectric system for localized cooling and heating in stereotactic operation with one probe had developed to get to reversible lesion and permanent lesion. The probe consists of two concentric metal tube with thermister attachment and only the tip of the probe is non-insulated. The heat exchanger for ethyl-alcohol are composed of thermoelectric panels, each of which consists of "P" and "N" type semiconductor thermo-junction. Ethyl-alcohol which are heated or cooled by heat exchanger passes to the non-insulated tip, where it heat or cool the adjacent brain tissue. The selected probe temperatures are maintained by the automatic flow system and the actual temperature of tip is measured.

This thermoelectric system merits extensive application for neurophysiologic surgical purpose.

### **14. A Trial of Combined Stereotaxic Approach to Small Arteriovenous Malformation in the Deep Brain Tissue**

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Stereotaxic surgery is particularly appropriate for small vascular malformations deeply located within the brain tissue. Serious functional deficits are easily