

## **2003 Mihara Prize Awardee's Summary**

### **PATHOGENESIS AND SURGICAL TREATMENT OF CEREBROVASCULAR DISEASES**

Nobuo Hashimoto, M.D., Ph.D.

Department of Neurosurgery, Kyoto University Medical School, Kyoto, Japan

The author has first established an animal model to induce saccular cerebral aneurysms in rats, and later in monkeys by making animals hypertensive and ligating one carotid artery in the neck and feeding a lathyrogen, beta-aminopropionitrile. Induced aneurysms are very similar to human cases morphologically, histopathologically and in natural course. Using this animal model, the author has been studying the mechanism of the development of cerebral aneurysms. By studying contribution of hemodynamic stress on the pathogenesis of the lesion, he has shown that disturbed healing process of the arterial wall is a unique phenomenon at the site of the development of an aneurysm. The author and his collaborators have elucidated molecular mechanisms involved in the development of cerebral aneurysms. They also extend their project by using different approaches, such as induction of aneurysms in knockout mice and analysis of genetic abnormalities in cases with familial aneurysms. The goal of his project is to find a high-risk population, future non-invasive treatments and prevention of this lethal disease.

Microneurosurgery is one of the most important treatment modalities in the modern neurosurgery. But already-established microneurosurgery is neither the end nor the goal of microneurosurgery. The author has contributed on the advancement of surgical treatment of cerebrovascular diseases. One of the examples is on the treatment of cerebral arteriovenous malformations (AVMs). The biggest problem of this surgery is the occurrence of unexpected bleeding troubles during and after surgery and there have been no reliable explanations of this phenomenon. This has been the major cause for vascular neurosurgeons to hesitate surgical treatment of AVMs. The author has revealed the exact angioarchitecture of the AVM and has shown that the uncontrollable bleeding is caused by unintentional damage of intranidal drainage system by conventional surgical procedure. Based on these findings, he has developed a concept and technique

to extirpate AVMs more safely and effectively.