Acupuncture Therapy for Stroke

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Summary In this chapter, we shall review the clinic application of acupuncture treatment on stroke, and the mechanistic research on animal models of ischemic brain infarction. Acupuncture has been employed to treat patients with stroke in China as well as other oriental countries. Clinical data suggest that patients show better outcome and require less nursing and rehabilitation therapy after acupuncture treatment, although more studies with better control are needed to clarify the efficacy and optimal conditions of acupuncture for the treatment of ischemic brain injury. In contrast to clinical research, considerable experimental results have been obtained from bench work regarding the effect of acupuncture/electro-acupuncture on ischemic injury and the underlying mechanism. The data from our work and those from other researches suggest that acupuncture/electro-acupuncture greatly attenuate the ischemic infarction and neurological defects. Furthermore, we have recently defined the optimal conditions for maximal protection against ischemic injury in the experimental model of stroke. Appropriate stimulation of acupoints may increase the blood flow, upregulate the inherent neuroprotector activity, stabilize the ionic homeostasis, and balance the intracellular survival and death signals in the ischemic brain region. As there is no promising therapy for ischemia injury till date, acupuncture may be a useful option for the treatment of stroke. More research on acupuncture therapy for stroke may significantly improve the clinical outcome after ischemic injury and reduce the devastating effects on the individuals and their families.

Keywords cerebral blood flow, hypoxia, middle cerebral artery occlusion, reperfusion, stroke
9.1 Introduction

Stroke, a type of cerebrovascular accident (CVA), is the result of the lack or insufficient blood supply to the brain resulting from blood-vessel diseases. There are basically two primary types of stroke: occlusive and hemorrhagic. An occlusive stroke is typically caused by embolic, atherosclerotic, or thrombotic occlusion of the cerebral vessels. This is the most common type of stroke at the bedside, comprising approximately 88% of all the patients with stroke. Blood-flow restriction induced by vascular occlusion produces neurological deficits and loss of neurological functions controlled by the affected area. On the other hand, epidural, subdural, and subarachnoid bleeding can cause hemorrhagic stroke. This type of stroke also results from insufficient blood supply to specific brain region. Temporary ischemia may have little or no pathological evidence of tissue damage with no appreciable clinical symptoms, but prolonged ischemia may induce death of the neurons and ultimately, tissue infarction. When brain injury occurs owing to lack of blood flow, the specific neurological functions controlled by the affected brain region are damaged or even lost, and the resulting neurological disabilities are dependent on the ischemic region and severity of infarction (Kandel et al. 2000).

Both the types of stroke may occur at any age owing to various reasons, and several risk factors have been identified to increase stroke occurrence. One of the most critical risk factors is high blood pressure. Nicotine and carbon monoxide in tobacco smoke greatly increase the stroke risk by reducing the amount of blood oxygen and damaging the walls of the blood vessels, thus, increasing the possibility of clot formation. Furthermore, carotid or other artery diseases may also raise the risks of stroke.

Among the most frequent and serious neurological disorders, stroke is the third killer disease, ranking behind heart diseases and cancers, and is a leading cause of severe, long-term disability in the world. Each year, approximately more than 2 million people die of stroke (in Asia), and more than 1.2 million people may experience a new or recurrent stroke (in China). Survivors of stroke often are beset by serious long-term disabilities, including paralysis and disruption of higher cognitive functions, such as speech and memory. Among the survivors of ischemic stroke, one-sided paralysis, inability to walk without some assistance, aphasia (trouble in speaking or understanding the speech of others), and dependent activities of daily living (grooming, eating, bathing, etc.) are the most frequently observed disabilities within 6 months after the onset of stroke. Some of the patients may even have mental disorders such as depressive symptoms. Individuals with such disabilities often require extensive long-term care by health care professionals and family. In 2008, the estimated direct and indirect cost of stroke was about $65.5 billion in the US.

When the neurons are affected owing to ischemia or hypoxia, the ischemic cascade chain-reaction sets off (Fig. 9.1). Following limited oxygen and nutrients