

# Preface

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Stroke is a global health problem affecting approximately 750,000 people annually in the United States alone and ranks as the third leading cause of death and the most common cause of disability in most developed countries. Traumatic brain injury (TBI) accounts for an estimated 34% of all injury-related deaths in the United States. Stroke and TBI can produce both focal and widespread damage to the brain, which can yield acute and chronic impairments of sensory, motor, and cognitive functions. Because of their enormous medical and socioeconomic impact, a tremendous research investment is being made in the treatment and prevention of stroke and TBI.

Strategies for reducing adverse neurologic outcomes after ischemic or TBI have led to the development of a wide range of neuroprotective agents. However, despite promising results in animal models of stroke and TBI, and extensive testing in randomized clinical trials, no neuroprotective drug has yet proven effective in humans.

In recent years, there has been a resurgence of interest in mild hypothermia as a method of cerebral protection. Although deep hypothermia (below 30°C) is known to be neuroprotective, clinically the benefit is offset by the risks of cardiac arrhythmias and coagulopathies, and by the extensive resources necessary to achieve deep hypothermia, including cardiopulmonary bypass. Alternatively, small decreases in brain temperature (2–5°C below normal brain temperature) are well-tolerated and confer significant neuroprotection in animal models of cerebral ischemia. Indeed, mild hypothermia is one of the most effective neuroprotective therapies in experimental ischemia models, and the feasibility of using mild hypothermia to treat stroke and TBI patients is currently being evaluated in clinical trials. Recently, two prospective, randomized controlled studies demonstrated improved neurologic outcome with mild hypothermic treatment for patients with cardiac arrest from ventricular fibrillation.

Increased understanding of the mechanisms by which mild hypothermia exerts its neuroprotective effects has allowed basic scientists and clinicians to optimize the use of mild hypothermia as a therapeutic strategy. New technological advances are now facilitating the imple-

mentation of mild hypothermia in the clinical setting. Knowledge and experience gained from clinical trials around the world have helped develop guidelines for the intraoperative and intensive care management of patients undergoing mild hypothermic treatment.

There is also interest in combining hypothermia with other therapeutic strategies. The rationale for this combination approach is that mild hypothermia could prolong the therapeutic window for neuroprotective agents. Using hypothermia in conjunction with other pharmacological agents for the treatment of acute cerebral ischemia is also discussed in this book, along with future directions in both basic and clinical research.

*Hypothermia and Cerebral Ischemia: Mechanisms and Clinical Applications* is intended to provide a comprehensive review of mild hypothermia's therapeutic potential, its limitations, and recent developments in both basic and clinical research. We hope that this volume serves to educate clinicians, other health professionals, and basic scientists, as well as promote interest in the study and implementation of mild hypothermia for the treatment of stroke and TBI.

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