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# **Cerebrovascular Disease: Research and Clinical Management**

## **Volume 1**

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*Edited by*

**H. LECHNER**

**J.S. MEYER**

*and*

**E. OTT**

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*Edited by*

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# Cerebrovascular Disease: Research and Clinical Management

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*Series Editors*

H. LECHNER, J.S. MEYER and E. OTT

*Official Publication of the World Federation of Neurology Research Group on  
Cerebrovascular Disease*

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# Foreword

It is particularly appropriate that the *World Federation of Neurology* take cognizance of the fact that stroke leads the list of causes of neurological disability and death in many nations of our world. Despite its scope, there have been surprisingly little organized efforts to reduce its ravages.

Recent years have seen the discovery of important new means for the prevention and treatment of stroke. In regard to prevention:

- Early recognition and control of hypertension by drug therapy has greatly reduced the incidence of cerebral hemorrhage.
- Epidemiologic studies have clearly demonstrated the role of smoking, diet and exercise in the etiology of thrombosis and embolism. Control of these factors will lead to further significant reduction in the incidence of stroke.

In regard to treatment:

- Computerized tomographic X-ray now makes it possible to distinguish cerebral hemorrhage from cerebral infarction with virtual certainty.
- Drugs are now available that are capable of manipulating clotting, platelet aggregation, blood viscosity, vasospasm and brain edema.
- Refinements of angiography make possible, precise delineation of the nature and location of vascular pathology.
- Surgical techniques permit vascular repair and other vascular manipulations.

Given this armamentarium, a passive approach to the management of stroke is no longer justifiable.

Unfortunately, the facilities, equipment, procedures, and personnel required to insure the optimum management of the patient are expensive. Nevertheless, steps must be taken to improve care for those unfortunates who suffer stroke.

To meet this challenge, the Research Group on Cerebrovascular Disease of the *World Federation of Neurology* is undertaking a program, the purpose of which is to establish standards of care for persons with cerebrovascular disease in different environments. The following report represents an initial step in this process of definition of optimum management of the patient with stroke using the best modern technology. The outline may become a yardstick against which to measure less detailed approaches where only limited resources are available.

This effort by the Research Group on Cerebrovascular Disease initiates a systematic approach to providing guidelines which may be used to measure levels of health care. However, in some places preventive measures and facilities for the management of patients may be advanced, while in others they may be almost nonexistent. Therefore, this report attempts to span these differences.



The Organizing Committee, led by Professor Helmut Lechner, conceived and implemented this new departure in activities for the *World Federation of Neurology*, which might be considered by other Research Groups, as a model for a world-wide effort to reduce the impact of neurological disorders as causes of disability and death.

Richard L. Masland (*President*)

and

James F. Toole

(*Secretary Treasurer General*)

*World Federation of Neurology*

# Preface

Since the biennial Salzburg Conference on Cerebrovascular Disease was first established in 1962 by Professors Bertha, Eichhorn, and Lechner, publication of the Proceedings has received world-wide interest. Cooperation with the Research Group on Cerebrovascular Disease, which became inaugurated in 1965, was established and in 1975 the organization of the Conference was officially assumed by the Research Group on Cerebrovascular Disease of the *World Federation of Neurology* as part of the responsibility of its Executive Committee. Since this time regional educational meetings have been organized and have taken place in Cairo (Egypt), Lima (Peru), and Bombay (India). Numerous meetings concerned with cerebrovascular disease have been held all over the world. It was suggested by the *World Federation of Neurology* that the Research Group on Cerebrovascular Disease, under the sponsorship of the *World Federation of Neurology*, should elaborate guidelines for diagnosis and therapy of this world-wide health problem.

Under the sponsorship of Professors R. Masland, J. Toole, and A. Lowenthal, and with the aid of a generous grant from Boehringer Ingelheim sponsored by Dr. I. Welbers, the first seminar on 'Clinical Value of Diagnostic Testing for Evaluation of Patients with Stroke' was organized and held in Winston-Salem, North Carolina, U.S.A. on May 5-9, 1985. At this meeting a preamble was elaborated. This preamble was then distributed via the Executive Board of the Research Group on Cerebrovascular Disease, the Research Council of the *World Federation of Neurology*, and finally by the Council of Delegates at the XIIIth World Congress on Neurology in Hamburg, and is presented in Chapter 27 of this volume.

To fulfill the aims of the Research Group on Cerebrovascular Disease, a biennial series on 'Cerebrovascular Disease: Research and Clinical Management' was inaugurated and Elsevier, Amsterdam has been kind enough to assume the responsibility of publishing the biennial series through the kindness of Dr. G.V. Lees, who assisted in editing and publishing the first volume. It is hoped that this series will give experts in the field a chance to publish surveys on present state knowledge of their special interest. This first volume contains assigned review articles as well as the lectures presented at the Winston-Salem Conference and the resolution that came out of it. May this first book serve this goal and allow research on cerebrovascular disease to have a scope world-wide and also provide guidelines which may prove helpful in reducing the incidence of these dreaded diseases throughout the world.

November 1985

H. Lechner  
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# **Part I**

## **Review Articles**





## CHAPTER 1

# Clinical value of nuclear magnetic resonance imaging (NMR) for the evaluation of patients with stroke

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## Introduction

CT scanning has had a major impact on neurology. Its contribution to the understanding of cerebrovascular disease has been primarily in its diagnosis and temporal profile. A major function for the neurologist has been to exclude intracerebral hemorrhage or tumor in those patients with a sudden onset of neurological deficits. Nuclear magnetic resonance imaging (NMR) is an entirely different modality and initial observations suggest it is capable of identifying many more pathologic vascular lesions than CT and may shed more insight into the underlying pathophysiology of cerebrovascular disease.

This is a preliminary report on the evaluation of some aspects of non-hemorrhagic cerebrovascular disease over the past 2 and a half years. Poor resolution (low signal to noise) and long scanning times with our NMR hampered early studies. The majority of data to be presented has been done over the past year and a half. To date, 1800 neurological studies have been performed with approximately 300 studies being cerebrovascular disease. The present report is divided into three major categories for presentation although they are not mutually exclusive. (1) TIA and RIND; (2) Bilateral extracranial carotid occlusive disease; (3) Cerebral infarction, evolution, emboli and watershed.

## Methods

All studies were performed on a resistive magnet (Technicare) operating at 0.15 Tesla with multiple software and hardware updates giving images comparable to

