Vascular Cognitive Impairment in Clinical Practice
Contents

List of Contributors vii
Preface xi

Section 1: Diagnosis 1

1. Diagnosing vascular cognitive impairment and dementia: concepts and controversies 3
   Timo Erkinjuntti and Serge Gauthier

2. Vascular cognitive impairment: prodrome to VaD? 11
   Adriane Mayda and Charles DeCarli

3. Clinical evaluation: a systematic but user-friendly approach 32
   Oscar L. Lopez and David A. Wolk

4. Cognitive functioning in vascular dementia before and after diagnosis 46
   Erika J. Laukka, Sari Karlsson, Stuart W.S. MacDonald and Lars Bäckman

5. Structural neuroimaging: CT and MRI 58
   Wiesje M. van der Flier, Salka S. Staekenborg, Frederik Barkhof and Philip Scheltens

6. Functional imaging in vascular dementia: clinical practice 70
   Lars-Olof Wahlund and Rimma Axelsson

7. Biomarkers in vascular dementia 77
   Anders Wallin and Tuula Pirttilä
Contents

Section 2: Pathophysiology

8. Physiopathology of large-vessel vascular dementia
   Leonardo Pantoni, Francesca Pescini and Anna Poggesi
   93

9. Small-vessel diseases of the brain
   Raj N. Kalaria and Timo Erkinjuntti
   118

10. White matter changes
    Franz Fazekas, Christian Enzinger, Stefan Ropele and Reinhold Schmidt
    131

11. Hereditary forms of cerebrovascular amyloidosis
    Agueda Rostagno and Jorge Ghiso
    139

12. Role of vascular risk factors in dementia
    Chengxuan Qiu and Laura Fratiglioni
    155

13. Cardiovascular disease, cognitive decline, and dementia
    Angela L. Jefferson and Emelia J. Benjamin
    166

14. Vascular factors in Alzheimer’s disease: from diagnostic dichotomy to integrative etiology
    Miia Kivipelto, Alina Solomon and Tiia Ngandu
    178

Section 3: Treatment

15. Treatment of cognitive changes
    Serge Gauthier and Timo Erkinjuntti
    195

16. Treatment of functional decline
    Lena Borell
    200

17. Treatment of behavioral symptoms in vascular dementia
    Catherine Cole and Alistair Burns
    206

18. Control of vascular risk factors
    Deborah Gustafson and Ingmar Skoog
    220

Index

235

Color plates are found between pp. 84 and 85.
Contributors

Rimma Axelsson, MD, PhD
CLINTEC, Division of Radiology, Karolinska Institutet,
Karolinska University Hospital Huddinge, Stockholm,
Sweden

Lars Bäckman, PhD
Aging Research Center, Department of Neurobiology,
Care Sciences and Society, Karolinska Institutet,
Stockholm, Sweden

Frederik Barkhof, MD, PhD
Professor of Neuroradiology
Alzheimer Center and Department of Diagnostic
Radiology, VU University Medical Center, Amsterdam,
the Netherlands

Emelia J. Benjamin, MD, ScM
National Heart, Lung and Blood Institute’s Framingham
Heart Study, Framingham. Department of Preventive
Medicine and Whitaker Cardiovascular Institute,
School of Medicine, and Department of Epidemiol-
ogy, School of Public Health, Boston University,
Boston, USA

Lena Borell, PhD, OT (reg)
Professor of Occupational Therapy, Department of
Neurobiology, Care Sciences and Society, Karolinska
Institutet, Stockholm, Sweden

Alistair Burns, FRCP, FRCPsych, MD
Professor of Old Age Psychiatry, University of Man-
chester, Wythenshawe Hospital, Manchester, UK
Contributors

**Catherine Cole, MRCPsych**
Specialist Registrar in Old Age Psychiatry, University of Manchester, Wythenshawe Hospital, Manchester, UK

**Charles DeCarli, MD, PhD**
Professor of Neurology and Director, Alzheimer’s Disease Center and Imaging of Dementia and Aging (IDeA) Laboratory, Department of Neurology and Center for Neuroscience, University of California at Davis, Sacramento, USA

**Christian Enzinger, MD**
Department of Neurology and Department of Radiology, Division of Neuroradiology, Medical University, Graz, Austria

**Timo Erkinjuntti, MD, PhD**
Department of Neurology, University of Helsinki, Helsinki, Finland

**Franz Fazekas, MD, PhD**
Department of Neurology, Medical University, Graz, Austria

**Deborah Gustafson, MS, PhD**
Associate Professor, Neuropsychiatric Epidemiology Unit, Institute of Neuroscience and Physiology, Department of Psychiatry and Neurochemistry, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden, Rush University Medical Center, Chicago, USA, Medical College of Wisconsin, Milwaukee, USA

**Angela L. Jefferson, PhD**
Department of Neurology and Alzheimer’s Disease Center, Boston University School of Medicine, Boston, USA

**Raj N. Kalaria, MD, PhD**
Wolfson Research Centre, Institute for Ageing and Health, Newcastle General Hospital, Newcastle upon Tyne, UK

**Sari Karlsson, PhD**
Aging Research Center, Department of Neurobiology, Care Sciences and Society, Karolinska Institutet, and Department of Clinical Neuroscience, Karolinska Institutet, Karolinska Hospital, Stockholm, Sweden

**Miia Kivipelto, MD, PhD**
Aging Research Center, Department of Neurobiology, Caring Sciences and Society (NVS), Karolinska Institutet, Stockholm, Sweden, and Department of Neuroscience and Neurology, University of Kuopio, Finland

**Erika J. Laukka, PhD**
Aging Research Center, Department of Neurobiology, Care Sciences and Society, Karolinska Institutet, Stockholm, Sweden

**Oscar L. Lopez, MD**
Departments of Neurology and Psychiatry, Alzheimer’s Disease Research Center, University of Pittsburgh School of Medicine, Pittsburgh, USA

**Serge Gauthier, MD, PhD**
Alzheimer’s Disease and Related Disorders Research Unit, McGill Centre for Studies on Aging, Douglas Mental Health University Institute, Montreal, Quebec, Canada

**Stuart W. S. MacDonald, PhD**
Aging Research Center, Department of Neurobiology, Care Sciences and Society, Karolinska Institutet, Stockholm, Sweden

**Jorge Ghiso, PhD**
Associate Professor, Departments of Pathology and Psychiatry, NYU School of Medicine, New York, USA
Stockholm, Sweden, and Department of Psychology, University of Victoria, Victoria, Canada

Adriane Mayda, BS
Imaging of Dementia and Aging (IDeA) Laboratory, Center for Neuroscience, University of California at Davis, Sacramento, USA

Tiia Ngandu, PhD
Aging Research Center, Department of Neurobiology, Caring Sciences and Society (NVS), Karolinska Institutet, Stockholm, Sweden, and Department of Neuroscience and Neurology, University of Kuopio, Finland

Leonardo Pantoni, MD, PhD
Department of Neurological and Psychiatric Sciences, University of Florence, Florence, Italy

Francesca Pescini, MD
Department of Neurological and Psychiatric Sciences, University of Florence, Florence, Italy

Tuula Pirttiä, MD, PhD
Neurology Unit, Department of Clinical Science, University of Kuopio, Kuopio, Finland

Anna Poggesi, MD
Department of Neurological and Psychiatric Sciences, University of Florence, Florence, Italy

Chengxuan Qiu, PhD
Aging Research Center, Department of Neurobiology Care Science and Society, Karolinska Institutet, Stockholm, Sweden

Stefan Ropele, PhD
Department of Neurology, Medical University, Graz, Austria

Agueda Rostagno, PhD
Associate Professor, Department of Pathology, NYU School of Medicine, New York, USA

Philip Scheltens, MD, PhD
Professor of Cognitive Neurology, Alzheimer Center and Department of Neurology, VU University Medical Center, Amsterdam, the Netherlands

Reinhold Schmidt, MD, PhD
Department of Neurology and Department of Radiology, Division of Neuroradiology, Medical University, Graz, Austria

Ingmar Skoog, MD, PhD
NeuroPsychiatric Epidemiology Unit, Institute of Neuroscience and Physiology, Section of Psychiatry and Neurochemistry, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden

Alina Solomon
Aging Research Center, Department of Neurobiology, Caring Sciences and Society, Karolinska Institutet, Stockholm, Sweden, and Department of Neuroscience and Neurology, University of Kuopio, Finland

Salka S. Staekenborg, MD
Alzheimer Center and Department of Neurology, VU University Medical Center, Amsterdam, the Netherlands

Lars-Olof Wahlund, MD, PhD
Department of Neurobiology Care Science and Society, Section for Clinical Geriatrics, Karolinska Institutet, Karolinska University Hospital Huddinge, Stockholm

Anders Wallin, MD, PhD
Section of Psychiatry and Neurochemistry, Sahlgrenska Academy, University of Gothenburg, Göteborg, Sweden

David A. Wolk, MD
Assistant Professor, Department of Neurology, University of Pennsylvania, Philadelphia, USA
Preface

The concepts of vascular cognitive impairment and vascular dementia have recently been discussed assiduously both in the clinical and research worlds. Vascular dementia is regarded as being the second most common dementia disease, second only to Alzheimer’s disease. Knowledge of how changes in the blood vessels induce a change in our cognitive capacity and constitute a cause of dementia has increased considerably in recent years.

A discussion is underway as to whether changes in the vascular functions of the brain can, to some extent, form the background to neurodegenerative diseases such as Alzheimer’s. This thinking is reinforced by the increasing amount of data which suggest that the risk factors we link to cardiovascular diseases are also those linked to Alzheimer’s disease.

The purpose of this book is, from a broad clinical perspective, to compile the very latest findings within clinical research on vascular dementia and vascular cognitive impairment. This will create a foundation for the implementation of good clinical dementia care. The book is divided into three parts. The first deals with definitions of vascular dementia and the concept of vascular cognitive impairment, diagnostics by reviewing neuropsychological methods, imaging and neurochemical analysis.

The second part addresses the underlying histopathological and pathophysiological mechanisms influencing the onset of vascular cognitive impairment as well as the cerebral and cardiovascular risk factors. This also includes a section on genetically influenced vascular conditions.
Finally, a section on treatment from a somewhat broader perspective – a review of the pharmacological treatment of cognitive symptoms, the pharmacological treatment and care of secondary symptoms, as well as non-pharmacological measures applied to enhance the daily lives of patients with vascular dementia. Finally, the possibility of primary preventive measures to decrease the risk of falling victim to vascular cognitive impairment is discussed.

The book is intended primarily for those interested in, and clinically active specialists within the sphere of dementia, for example, geriatricians, neurologists, internal medics, and the general practitioner. It proposes to present a profound background to what we today regard as being state-of-the-art within the field of vascular dementia, and clinically applicable facts. In this respect, the book also offers a degree of practical application.

It is written by some of the world’s most prominent researchers within their fields.

We would particularly like to thank Anette Eidehall for her excellent editorial contribution during the writing of the book. Drs Maria Kristoffersen Wiberg and Bertil Leidner are specifically acknowledged for providing the MRI and CT images for the cover.