Vessel Based Imaging Techniques

Diagnosis, Treatment, and Prevention

Chun Yuan
Thomas S. Hatsukami
Mahmud Mossa-Basha
Editors

Springer

Vessel Based Imaging Techniques

Chun Yuan • Thomas S. Hatsukami
Mahmud Mossa-Basha
Editors

Vessel Based Imaging Techniques

Diagnosis, Treatment, and Prevention

Springer

Editors
Chun Yuan
University of Washington
Seattle, WA
USA

Thomas S. Hatsukami
University of Washington
Seattle, WA
USA

Mahmud Mossa-Basha
University of Washington
Seattle, WA
USA

ISBN 978-3-030-25248-9 ISBN 978-3-030-25249-6 (eBook)
https://doi.org/10.1007/978-3-030-25249-6

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Chun Yuan would like to dedicate this book to many Faculty, Fellows, and Staff who have contributed to the work of the Vascular Imaging Lab at the University of Washington.

Tom Hatsukami would like to also dedicate this book to Drs. D. Eugene Strandness and Alexander Clowes for their mentorship and encouragement, and to the many individuals who volunteered to participate in our clinical research studies.

Mahmud Mossa-Basha would like to dedicate this book to the many mentors, collaborators and educators who have helped him throughout his career at Henry Ford Hospital, Johns Hopkins University and University of Washington, as well as his very supportive wife and family.

Contents

Contributors

Muhannad Aboud Abbasi, MD Department of Radiology, Northwestern Memorial Hospital, Chicago, IL, USA

Niranjan Balu, PhD University of Washington, Department of Radiology, Seattle, WA, USA

Liisa L. Bergmann, MD Cardiovascular Imaging Section, Department of Radiology, University of Wisconsin School of Medicine and Public Health, Madison, WI, USA

Waleed Brinijiki, MD Department of Radiology, Mayo Clinic, Rochester, MN, USA

James Carr, MD Department of Radiology, Northwestern Memorial Hospital, Chicago, IL, USA

Eugene M. Cilento, PhD Department of Pathology, University of Washington, School of Medicine, Seattle, WA, USA

Mat J. A. P. Daemen, MD, PhD Department of Pathology, Amsterdam Cardiovascular Sciences (ACS), Amsterdam UMC, University of Amsterdam, Amsterdam, The Netherlands

J. Kevin DeMarco, MD Department of Radiology, Walter Reed National Military Medical Center, Bethesda, MD, USA

Department of Radiology, Uniformed Services University of the Health Sciences, Bethesda, MD, USA

Damini Dey, PhD Biomedical Imaging Research Institute, Cedars-Sinai Medical Center, Los Angeles, CA, USA

Department of Medicine, University of California, Los Angeles, Los Angeles, CA, USA

Aloke V. Finn, MD CVPath Institute Inc., Gaithersburg, MD, USA

Christopher J. François, MD Cardiovascular Imaging Section, Department of Radiology, University of Wisconsin School of Medicine and Public Health, Madison, WI, USA

Zhongbao Gao, MD, PhD Department of Healthcare, Second Medical Center, Chinese PLA General Hospital, Beijing, China

Thomas S. Hatsukami, MD Department of Surgery, University of Washington, Seattle, WA, USA

John Huston III, MD Department of Radiology, Mayo Clinic, Rochester, MN, USA

Matthijs F. Jansen, MD Department of Medical Biochemistry, Amsterdam Cardiovascular Sciences (ACS), Amsterdam UMC, University of Amsterdam, Amsterdam, The Netherlands

Department of Cardiology, Amsterdam UMC, VU Medical Center, Amsterdam, The Netherlands

Hiroyuki Jinnouchi, MD CVPath Institute Inc., Gaithersburg, MD, USA

William Kerwin, PhD University of Washington Vascular Imaging Laboratory, Department of Radiology, Seattle, WA, USA

Frank D. Kolodgie, PhD CVPath Institute Inc., Gaithersburg, MD, USA

Christopher M. Kramer, MD Division of Cardiovascular Medicine and Department of Radiology and Medical Imaging, University of Virginia Health System, Charlottesville, VA, USA

Debiao Li, PhD Biomedical Imaging Research Institute, Cedars-Sinai Medical Center, Los Angeles, CA, USA

Department of Medicine, University of California, Los Angeles, Los Angeles, CA, USA

Department of Bioengineering, University of California, Los Angeles, Los Angeles, CA, USA

João Augusto Costa Lima, MD Johns Hopkins Hospital, Baltimore, MD, USA

Radiology and Epidemiology at the Johns Hopkins School of Medicine, Baltimore, MD, USA

Adrián I. Löffler, MD Division of Cardiovascular Medicine, University of Virginia Health System, Charlottesville, VA, USA

Esther Lutgens, MD, PhD Department of Medical Biochemistry, Amsterdam Cardiovascular Sciences (ACS), Amsterdam UMC, University of Amsterdam, Amsterdam, The Netherlands

Institute for Cardiovascular Prevention (IPEK), Ludwig Maximilians University, Munich, Germany

Michael Markl, PhD Department of Radiology, Northwestern University, Feinberg School of Medicine, Chicago, IL, USA

Department of Biomedical Engineering, McCormick School of Engineering, Northwestern University, Evanston, IL, USA

Mateus Diniz Marques, MD Federal University of Santa Maria, Santa Maria, Brazil

Mary M. McDermott, MD Northwestern University Feinberg School of Medicine, Chicago, IL, USA

Zach Miller, MFA University of Washington Vascular Imaging Laboratory, Department of Radiology, Seattle, WA, USA

Mahmud Mossa-Basha, MD University of Washington, Seattle, WA, USA

Pim van Ooij, PhD Department of Radiology & Nuclear Medicine, Amsterdam University Medical Centers, location AMC, Amsterdam, The Netherlands

Ashitha Pathrose, MD Department of Radiology, Northwestern Memorial Hospital, Chicago, IL, USA

Krishnan Ravindran, MD Department of Radiology, Mayo Clinic, Rochester, MN, USA

Maria Romero, MD CVPath Institute Inc., Gaithersburg, MD, USA

David Saloner, PhD Department of Radiology and Biomedical Imaging, University of California San Francisco, San Francisco, CA, USA

Ali Mostafa Serhal, MD Department of Radiology, Northwestern Memorial Hospital, Chicago, IL, USA

Tessandra Stewart, PhD Department of Pathology, University of Washington, School of Medicine, Seattle, WA, USA

Jie Sun, MD Department of Radiology, University of Washington, Seattle, WA, USA

Renu Virmani, MD CVPath Institute Inc., Gaithersburg, MD, USA

Justin E. Vranic, MD University of Washington, Department of Radiology, Seattle, WA, USA

Bruce Alan Wasserman, MD Division of Neuroradiology, The Russell H. Morgan Department of Radiology and Radiological Sciences, Johns Hopkins University, Baltimore, MD, USA

Yibin Xie, PhD Biomedical Imaging Research Institute, Cedars-Sinai Medical Center, Los Angeles, CA, USA

Noushin Yahyavi-Firouz-Abadi, MD Division of Neuroradiology, The Russell H. Morgan Department of Radiology and Radiological Sciences, Johns Hopkins University, Baltimore, MD, USA

Chun Yuan, PhD University of Washington, Seattle, WA, USA

Jing Zhang, MD, PhD Department of Pathology, University of Washington, School of Medicine, Seattle, WA, USA

Zechen Zhou, PhD Philips Research North America, Cambridge, MA, USA