DYNAMICS of the VASCULAR SYSTEM

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Series on Bioengineering & Biomedical Engineering – Vol. 1

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John K-J Li

Rutgers University, USA

World Scientific

NEW JERSEY • LONDON • SINGAPORE • SHANGHAI • HONG KONG • TAIPEI • CHENNAI

Published by

World Scientific Publishing Co. Pte. Ltd.

5 Toh Tuck Link, Singapore 596224

USA office: Suite 202, 1060 Main Street, River Edge, NJ 07661

UK office: 57 Shelton Street, Covent Garden, London WC2H 9HE

British Library Cataloguing-in-Publication Data

A catalogue record for this book is available from the British Library.

DYNAMICS OF VASCULAR SYSTEM

Series on Bioengineering & Biomedical Engineering — Vol. 1

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ISBN 981-02-4907-1

Printed in Singapore by World Scientific Printers (S) Pte Ltd

Author Biography

John K-J. Li received his Ph.D. in bioengineering in 1978 from the University of Pennsylvania. He was Head of Biomedical Engineering at Presbyterian-University of Pennsylvania Medical Center from 1977-1979 prior to joining Rutgers University where he is currently a Professor II (distinguished) of Biomedical Engineering. He has been a Director of Joint Graduate Program of Rutgers and UMDNJ-Robert Wood Johnson Medical School and has supervised more than 60 Ph.D. and M.S. theses projects. Dr. Li is a Fellow of the American Institute for Medical and Biological Engineering, the American College of Cardiology and the American College of Angiology. He is a recipient of IEEE Millennium Medal award and of research grants from the National Institutes of Health, the National Science Foundation, DOD and the American Heart Association on cardiovascular function, computer modeling, controlled drug delivery (with U.S. patents) and biomedical sensors. He has served as a member of NIH special study sections, a reviewer for NSF and the International Science Foundation. He is Editor-in-chief of *Cardiovascular Engineering: an International Journal* and has been an Associate Editor of *IEEE Transactions on Biomedical Engineering* and a number of other biomedical engineering journals. Dr. Li is a frequently invited speaker and scientific session chair on cardiovascular dynamics, biomedical instrumentation and their clinical applications. He has more than 350 publications and *Dynamics of the Vascular System* is his fifth book. Dr. Li is the Editor of World Scientific *Bioengineering and Biomedical Engineering* Book Series.

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Preface

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This book is the first volume of the Bioengineering and Biomedical Engineering Book Series. As the Series Editor, and to set a good example, I have taken the task of writing yet another book on the cardiovascular system.

The contents of this book extends from "*Arterial System Dynamics*", my first book published some fifteen years ago, to distinctly different regimes of the microcirculation and the venous system, as well as the assisted circulation.

The vascular system is indeed so vast, that a binocular vision is often needed to unravel the mystery of the many concurrent interactions occurring at different sites of the vascular tree. This becomes more challenging with the imposition of studying its dynamic phenomena. "*The Dynamics of the Vascular System*" is written employing mathematical techniques to formulate the physical principles involved in the structural and functional correlates of the underlying physiology. The intriguing control and geometric perspectives are also included wherever possible. The book also serves as a companion text to "*The Arterial Circulation: Physical Principles and Clinical Applications*".

Selected topics and references are provided, so that I and the readers are not overwhelmed by the otherwise exhaustive presentations of the many observed phenomena and the subsequent diverse interpretations of their origins and mechanisms.

I hope professionals and students in the field of bioengineering and biomedical engineering, biomathematics, biophysics, cardiovascular physiology and medicine will find this book a relevant source of

reference. Much of the work is the culmination of my three decades of learning, experimenting and investigation. I am aware that there are other works of notable items and newer advances which I have not yet included in this book. I will continue to learn more of them. Finally, I like to thank those who have contributed to the completion of this book, especially Dr. Ying Zhu.

John K-J. Li
New Jersey

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