
Preface

Personalized medicine, clinical imaging, and the medical device industry continue to grow at an incredibly rapid pace. Further, our overall understanding of the molecular basis of diseases steadily increases, as does the number of available therapies to treat specific health problems. This remains particularly true in the field of cardiovascular care. With this rapid growth rate in cardiac medicine, clinicians and biomedical engineers alike have been challenged to either retool or continue to seek out sources of concise information.

The major impetus for this third edition was to update this resource textbook for interested students, residents, clinicians, and/or practicing biomedical engineers. A secondary motivation was to promote the expertise, past and present, in the areas of cardiovascular science at the University of Minnesota. As Director of Education for the Lillehei Heart Institute and Associate Director for Education of the Institute for Engineering in Medicine at the University of Minnesota, I feel that this book also represents a unique outreach opportunity to carry on the legacy of Drs. C. Walton Lillehei, M.D., Ph.D., and Earl Bakken, M.D., Ph.D. (Hon.) through the twenty-first century. Interestingly, the completion of this textbook coincides with two recent important anniversaries in cardiovascular medicine and engineering at the University of Minnesota. First, it was 61 years ago, in 1954, that Dr. C. Walton Lillehei performed the first cross-circulation procedures at the University. One year ago in January, Earl Bakken (the cofounder of Medtronic) turned 90 years old; Dr. Bakken has five implanted Medtronic devices and continues to be an inspiration to those working in this field.

For the past 15 years, the University of Minnesota has presented the week-long short course *Advanced Cardiac Physiology and Anatomy*, which was designed specifically for the biomedical engineer working in the industry; this serves as the course textbook. Thus there was a need to update the textbook to include state-of-the-art information on a variety of topics related to cardiac anatomy, physiology, and devices. For example, six new chapters were added to this third edition, and all other chapters were carefully updated and/or greatly expanded. One last historical note that I feel is interesting to mention once again is that my current laboratory, where isolated heart studies are performed weekly (the Visible Heart[®] laboratory), is the same laboratory in which C. Walton Lillehei and his many esteemed colleagues conducted the majority of their cardiovascular research studies in the late 1950s and early 1960s. It is also the laboratory where Earl Bakken, along with Drs. Vincent Gott and Lillehei, first tested the wearable battery-powered pacemaker on an animal with an induced heart block. After being tested on an animal, the prototype pacemaker was very quickly (later the same day) used by Dr. Lillehei on one of his cardiac surgical patients.

With this new edition, complimentary materials (e.g., movies and images) that will enhance this textbook's utility can be accessed online. Additionally, my laboratory continues to support the online, free access website *The Atlas of Human Cardiac Anatomy* (www.vhlab.umn.edu/atlas) which also contains many tutorials and unique movie clips of functional cardiac anatomy. These images were obtained from human hearts made available via LifeSource (St. Paul, MN, USA), through the generosity of families and individuals who made the final gift of organ donation for research (their hearts were not deemed viable for transplantation).

I would especially like to acknowledge the exceptional efforts of our Lab Coordinator, Monica Mahre, who for a third time (1) assisted me in coordinating the efforts of contributing authors, (2) skillfully incorporated my editorial changes, (3) verified the readability and formatting of each chapter, (4) pursued additions or missing materials for each chapter, (5) contributed as a coauthor, and (6) kept a positive outlook throughout. I would also like to thank Gary Williams for his computer expertise and assistance with numerous figures; Tinen Iles and Charles Soule who made sure the laboratory kept running smoothly while many of us were busy writing or editing; the Chairman of the Department of Surgery, Dr. David Rothenberger, for his support and encouragement; the Institute for Engineering in Medicine at the University of Minnesota, headed by Prof. Bin He, who helped support this project via educational funds; and the Lillehei Heart Institute at the University of Minnesota, headed by Dr. Daniel Garry, who also generously supported educational outreach efforts.

I would like to thank Medtronic, Inc., for their continued support of the Visible Heart® laboratory for the past 18 years, and I especially acknowledge the commitment, partnership, and friendship of Tim Laske, Mark Hjelle, Alex Hill, Michael Eggen, Nick Skadsberg, Mark Borash, Rick McVenes, and Dale Wahlstrom for making our collaborative research possible.

It is also my pleasure to thank the past and present graduate students or residents who have worked in my laboratory and who were contributors to this third edition including Sara Anderson, Michael Bateman, James Coles, Michael Eggen, Kevin Fitzgerald, Alexander Hill, Brian Howard, Stephen Howard, Tinen Iles, Jason Johnson, Ryan Lahm, Timothy Laske, Anna Legreid Dopp, Michael Loushin, Lars Mattison, Jason Quill, Maneesh Shrivastav, Daniel Sigg, Julianne Spencer, Eric Richardson, Nicholas Skadsberg, and Sarah Vieau. I feel extremely fortunate to have the opportunity to work with such a talented group of scientists and engineers, and I continue to learn a great deal from each of them.

Finally, I would like to thank my family and friends for their continued support of my career and their assistance over the years. Specifically, I would like to thank my wife, Marge; my three daughters, Maria, Jenna, and Hanna; my mom Irene; and my sisters Chris and Susan, for always being there for me. On a personal note, it has been a difficult couple of years as both of my brothers passed away, as well as my longtime laboratory scientist Bill Gallagher. Furthermore, I myself dealt with some health issues that provided me with a much greater appreciation for cardiac medicine, medical advances, and what it feels like to be a patient. I am truly inspired by all individuals who dedicate their lives to all aspects of cardiovascular science and technology.

Minneapolis, MN, USA

Paul A. Iaizzo



<http://www.springer.com/978-3-319-19463-9>

Handbook of Cardiac Anatomy, Physiology, and Devices

laizzo, P.A. (Ed.)

2015, XI, 817 p. 599 illus., 374 illus. in color., Hardcover

ISBN: 978-3-319-19463-9