Books on Cardiac Surgery and Extracorporeal Circulation

“History is neither more nor less than biography on a large scale.”

Alphonse de Lamartine (1790-1869) French author, poet, historian, and statesman

1970s

Barnard C, Pepper CB. One Life. Toronto: Collier-Macmillan, 1970. [This is an autobiography of the ambitious surgeon credited with performing the first human-to-human heart transplantation in December 1967. One major part has details of the case including comments from family members and the surgical team. The book ends with mention of the second proposed transplant patient.]

Johnson SL. The History of Cardiac Surgery 1896-1955. Baltimore: Johns Hopkins Press, 1970. [This masterful and well-illustrated book recounts very early efforts by physiologists and surgeons to operate on the heart and blood vessels and ends with the “modern” era that began in 1955. The Foreword is written by pioneering surgeon Vincent L. Gott. There is a chapter devoted to the development of heart-lung machines used in the laboratory and then clinically to permit widespread adoption of cardiac surgery as a specialty.]

Richardson RG. The Scalpel and the Heart; The History of the Most Dramatic Field of Surgery...the One in Today’s Headlines. New York: Charles Scribner’s Sons, 1970. [The author, an Oxford-trained physician turned editor, notes in the Preface that he is about to tell the story of “some very uncommon men”—namely, those who contributed to the development of cardiac surgery. He relied on more than 600 scientific articles or books for those profiled; they are all listed in alphabetical order in an index (Aesculapius to Zuhdi). There is also a glossary for lay readers. This is a highly readable, well-researched, and nicely illustrated book containing sections not only on early heart operations, development of cardiopulmonary bypass, the intra-aortic balloon pump, and the artificial heart, but also cardiac transplantation.]

Thompson T. Hearts; Of Surgeons and Transplants, Miracles and Disasters Along the Cardiac Frontier. New York: The McCall Publishing Company, 1971. [This is an account of Drs. Denton Cooley and Michael DeBakey, their respective institutions, and how Houston was transformed from an obscure medical post into the finest cardiovascular surgical center in the world. It is amusing, riveting, and informative. Tables summarize heart transplants in the US and around the world as of 1 March 1971, which include the names of the survivors and details of the operations compiled from the Office of Heart Information from the National Heart Institute.]

Norman JC (Ed.). Cardiac Surgery, Second Edition. New York: Appleton-Century-Crofts, 1972. [The content of this second edition reflects all aspects of cardiac surgery written primarily by physician contributors. However, and notably, there is one electrical engineer, one veterinarian, and one clinical perfusionist among the contributors. James P. Dearing, who would figure large in the field

of perfusion, co-wrote a chapter on perfusion techniques with a cardiac surgeon, both from the Ohio State University College of Medicine. The first sentence in their chapter notes techniques for cardiopulmonary bypass are "almost as numerous as the number of different surgeons that employ extracorporeal circulation." They then review cannulation, oxygenators (disc and bubble), pumps, and heat exchangers, complemented with photographs. Two paragraphs address the development of membrane oxygenators, and the authors make a bold prediction that oxygenators currently in use would soon become obsolete in favor of the membrane types. One section deals with preparation of the circuit and primes. Another section discusses conduct with the suggestion the perfusionist should employ "a sort of preflight countdown" before starting perfusion. There are sections on myocardial protection and air and particulate embolism. The last section of the chapter is focused on the perfusionist, and the authors describe the educational program at their institution, which was established in 1967. The Foreword by Dr. Francis D. Moore is a succinct, global view of how cardiac surgery evolved, and there is a superb history chapter that recounts familiar pioneering work by surgeons before the advent of cardiopulmonary bypass and summarizes recent achievements and future promises.]

Nosé Y. Manual on Artificial Organs; Vol. II; The Oxygenator. St. Louis: CV Mosby, 1973. [This book was written when Dr. Nosé was Head of the Department of Artificial Organs at the Cleveland Clinic Foundation. The chapters are liberally illustrated with superb hand-drawn figures, many photos, and cover every aspect of artificial oxygenation. One chapter recounts the history of blood oxygenators beginning in the early 19th century. The appendix has information on animal hematology, testing of membrane oxygenators, and a procedure for protamine reversal of heparin anticoagulation. The reference lists, designated *general* and *specific*, are extensive.]

Minetree H. Cooley; The Career of a Great Heart Surgeon. New York: Harper & Row, Publishers Inc., 1973. [The author, a one-time patient of Dr. Cooley, gives a vivid account of the birth of cardiac surgery. Also discussed is Dr. Cooley's feud with Dr. Michael DeBakey over the implantation of an artificial heart in 1969. A fascinating read about how the great surgeons of the world brought open-heart surgery to the masses.]

Rygg IH. Studies in Extracorporeal Circulation; The Design and Development of a Heart-Lung Machine. Copenhagen: Fadls Forlag, 1973. [This monograph recounts the development of the Rygg-Kyvsgaard heart-lung machine that relied on an unusual roller pump consisting of a large single roller to compress tubing in a pump housing; it was reported to produce better pulsation than the DeBakey-type double-roller pump using two smaller rollers. The bubble oxygenator was a disposable bag, like the widely used Travenol model 6LF. There is a chapter on the history of extracorporeal circulation, and another entitled, "The Ideal Heart-Lung Machine." The reference list is extensive.]

Popovic V, Popovic P. Hypothermia in Biology and in Medicine. New York: Grune & Stratton, 1974. [The authors' stated goal in the book was "to create a reference source to that includes most of the recent literature in the field of hypothermia." The chapters primarily deal with the physiology of

hypothermia and its effects on organ systems. There is a limited section on perfusion hypothermia as used during cardiac surgery. The number of authors cited in the references is extensive.]

Reed CC, Clark DK. Cardiopulmonary Perfusion. Houston: Texas Medical Press, 1975. [This book was authored by two perfusionists at the Texas Heart Institute. It had its genesis as a one-cover resource for perfusion students. It contained hundreds of excellent illustrations on anatomy, cardiovascular pathology, pharmacology, contemporary extracorporeal devices, and the conduct of perfusion. The book became widely used by most clinicians involved in cardiac surgery and for those sitting for their board certification examinations.]

Akutsu T. Artificial Heart; Total Replacement and Partial Support. New York: American Elsevier Publishing Company, 1975. [This elegant book (complete with rigid protective sleeve) is devoted entirely to artificial heart development and future applications. As expected, the text delves heavily into the design and fabrication of heart assist devices, namely the implantable total artificial heart (TAH). The author, a renowned researcher, assisted Dr. Willem J. Kolff in successfully implanting a TAH in a dog in 1957. An entire chapter is devoted to problems such as thrombus formation, blood destruction, and driveline infection. Photos and diagrams are aplenty, including depiction of many of the author's experimental prototypes used to support dogs, sheep, and calves in the laboratory setting.]

Norman JC (Ed.). Coronary Artery Medicine and Surgery: Concepts & Controversies. New York: Appleton-Century-Crofts, 1975. [The efforts of nearly four hundred contributing authors comprise this textbook, which details a comprehensive review of coronary artery disease. Numerous sections offer relevancy to the practicing perfusionist. There are eight chapters, for instance, that strictly examine balloon counterpulsation as a modality for circulatory assistance. Two chapters offer a more direct look at cardiopulmonary bypass techniques. The first, co-authored by professors of surgery at the University of Arkansas School of Medicine, discusses filtration, venting, and myocardial protection. Detailed schematics of the perfusion circuit accompany the content, and the acknowledgement of three perfusionists who assisted in manuscript preparation is a fitting conclusion. Charles C. Reed, an iconic figure in the discipline of perfusion, serves as lead author for the second pertinent chapter. Basic topics such as adequate flow rate, perfusion pressure, and hemodilution are debated. A lengthy paragraph citing the performance characteristics of six different bubble oxygenators used in over a thousand consecutive aortocoronary bypass procedures is marvelous reading. Willem J. Kolff, considered the "Father of Artificial Organs", co-wrote two chapters on the status of total artificial heart implantation. The book's final chapter highlights the futuristic prospect of nuclear-fueled circulatory support systems and contemplates the catastrophic "Chernobyl-like" risk of radioisotope leakage from an implanted device. No longer in print from the publisher, this hardback can be found on eBay or Amazon for $50 – a steal considering its usefulness.]

Ionescu MI, Wooler GH (Eds.) Current Techniques in Extracorporeal Circulation. London: Butterworths, 1976. [This book was intended to describe the techniques as used by many pioneering surgeons and physiologists for cardiopulmonary bypass, intra-aortic balloon pumping, and extracorporeal membrane oxygenation. The first chapter by Drs. Robert H. Bartlett and Alan B. Gazzaniga is an excellent overview of the physiology and pathophysiology of extracorporeal circulation. Three chapters describe commercial oxygenators in detail, including the Kay-Cross rotating disc-type, Bramson membrane lung, and Bentley-Temptrol bubbler. The list of contributors was international in scope, and all chapters were supplemented with many illustrations and references.]

Zapol WM, Qvist J (Eds.) Artificial Lungs for Acute Respiratory Failure; Theory and Practice. New York: Academic Press, 1976. [This book has chapters on state-of-the art practice in the mid-1970s for all aspects of prolonged extracorporeal membrane oxygenation. There is a section devoted to the challenge of blood-material interactions, and another discusses devices, circuits, and vascular connections for extracorporeal pulmonary support. There are seven so-called horizon chapters from leading researchers and practitioners of the day on lessons from the past with their projections for the future.]

Sabiston DC Jr., Spencer FC (Eds.) Gibbon's Surgery of the Chest, Third Edition. Philadelphia: WB Saunders, 1976. [This third volume completes the splendid trilogy of Gibbon's *Surgery of the Chest* textbooks. Notable is the fact that ten contributors, each a distinguished professor of surgery or medicine, wrote chapters for all three editions. Perfusionists in attendance at the AmSECT International Conference in Atlanta in 1976 may recall John Gibbon's wife, Maly, presenting a brand-new copy of this third edition to then-president Michael Dunaway. Readers will appreciate the expanded section on myocardial revascularization – a consequence of the meteoric rise in CABG procedures being performed. Likewise, cutting-edge views on esophageal disorders such as hiatal hernia are newly presented. As in the first edition, John Kirklin was enlisted to summarize whole body perfusion. His detailed description of the pump circuit includes illuminating remarks about the arterial line filter, heat exchanger, and venous line occluder. In their chapter on prolonged extracorporeal circulation, J. Donald Hill and Frank Gerbode highlight the Bramson membrane oxygenator. Incredibly, they credit perfusionists with coining the phrase, *"denaturation of plasma proteins"*. A more thorough discussion of assisted circulation by Eldred Mundth includes historical considerations and numerous masterful drawings. The passing of John Gibbon in 1973 prompted the editors to dedicate this book – a masterpiece of nearly 1,600 pages – to him and Maly.]

Bregman D (Ed.) Mechanical Support of the Failing Heart and Lungs. New York: Appleton-Century-Crofts, 1977. [The basis for this book was a conference held in June 1976. The emphasis was on cardiac assistance and extracorporeal membrane oxygenation. Transcripts of discussions from presenters and attendees are included.]

Berger EC. The Physiology of Adequate Perfusion. St. Louis: CV Mosby, 1979. [The author was a pioneering perfusionist and leader of AmSECT during its formative years. The text was intended to be a guide "for those with a fledgling interest in perfusion—students, equipment and technical representatives, and people in peripheral disciplines." It was the result of his personal notes accumulated over 20 years of clinical practice. There were five major sections: oxygenation; tissue metabolism; hematologic considerations; hemodynamic considerations; and effects of perfusion. There were five useful appendices: bibliography of textbooks and journal articles; glossary; table of normal values; drugs; and monitored physiologic parameters.]

Kaplan JA (Ed.) Cardiac Anesthesia. New York: Grune & Stratton, 1979. [The chapter on cardiopulmonary bypass (CPB) has photos of commonly used bubble oxygenators. There are sections on all aspects of CPB supplemented with several figures and tables, two checklists—one to be used prebypass and one prior to coming off CPB, and algorithms for conditions and treatment of physiological conditions. Another chapter addresses assisted circulation using the intra-aortic balloon pump, a pulsatile assist device, and early ventricular assist pumps.]