Physiology of Cardiac Surgery: Hypothermia, extracorporeal circulation, and extracorporeal cooling, Frank Gollan, M.D. Springfield, Ill., Charles C Thomas, 1959, x + 95 pages, illustrated. $4.50.

This monograph considers some of the facets of hypothermia and extracorporeal circulation in a provocative rather than an inclusive manner. The author’s intent is not to provide answers nor to review series of cases, but to appraise some current techniques, describe some of his own work, and point out certain areas which seem worthy of further investigation.

In the first chapter, concerned with hypothermia, Dr. Gollan points out that, lacking an understanding of the mechanisms which produce and maintain true hibernation, we resort to more artificial means to achieve hypothermia in surgical patients. The widely used technique of surface cooling is considered and its deficiencies outlined. Particular attention is paid to localized capillary perfusion defects and the difficulties encountered during rewarming when one wishes a still-cold heart to perfuse a warming and increasingly rapid metabolizing mass of peripheral tissue. One is led to believe that the surface-cooled patient is not protected, but merely stressed by the procedure. The author rejects the technique of surface cooling as “unphysiological” and suggests that for cardiac surgery it is neither as successful nor as widely applicable as the technique of extracorporeal circulation.

In the second chapter, there is a short consideration of the history of extracorporeal circulation, along with a discussion of flow rates and the criteria of adequate perfusion. This leads Dr. Gollan to his main point: Extracorporeal cooling through a pump-oxygenator reduces the flows needed for adequate perfusion and increases the margin of safety for available flow rates.

In the third and last chapter, the author presents his experience with extracorporeal cooling in animals. Cooling by means of partial cardiopulmonary bypass is started after arterial and venous cutdowns are performed and before major surgery or deep anesthesia is begun. The cooling process is then continued with a pump-oxygenator. It is shown how this technique of extracorporeal cooling bypasses many of the disadvantages of surface cooling and reduces ventricular fibrillation to a harmless and hardly annoying arrhythmia. Elective asystole and drastic reduction of coronary flow are touched upon, as well as the feasibility of profound hypothermia as low as 0°C, if such levels should ever be clinically desirable.

This book is an interesting physiological essay dealing with a new technique, not yet completely evaluated. Indeed, the clinical uses of extracorporeal cooling and profound hypothermia in and outside of cardiac surgery have hardly been explored as yet. The author’s style is lucid, well organized, and interesting, and marred only by a few bizarre figures of speech.


This book is a collection of the papers presented at the Fifth International Conference on the biochemical problems of lipids held in Vienna in the summer of 1958. It consists of 33 short papers and 21 abstracts, of which 31 are in English, 16 in French, and 7 in German. A wide range of topics is covered but, unfortunately, an index has been omitted. The following papers deserve special mention: the work on brain lipid-peptides by LeBaron and Rothleder, the studies on the stereospecificity of lipases by Karnovsky and Wolff, the studies on plasmologens by Anderson et al., and the work on cholesterol biosynthesis by Popjak and his collaborators. This volume will be of assistance to research workers in the field of lipid biochemistry, but it is not recommended for those interested in an integrated picture of the present status of lipid research.


A symposium on the measurement of pH and gas tensions seems appropriate now, not only to permit the exchange of views in a rapidly expanding field, but also to provide a statement of progress at a time when investigators are beginning to extend these measurements from blood to other, less accessible biological fluids and tissues.

In this volume, certain aspects of the determination of pH and of oxygen and carbon dioxide tensions in blood are considered. There are concise
discussions of many important techniques and at least passing mention of a large number of the theoretic and practical problems to be encountered.

Following an introductory chapter by the chairman, there are nine papers and ample discussion periods. Two papers are devoted to pH measurements: one is concerned with electrode systems and precision of measurement, and the other with pH scales. Various other aspects of pH determination are considered in several of the discussions. The determination of carbon dioxide tension is dealt with in six chapters. These include discussions of: the Henderson-Hasselbalch equation; interpolation in the log pCO$_2$=pH plot; a micro method for pH and pCO$_2$ using about 0.1 ml. of capillary blood; rebreathing techniques for the estimation of mixed venous pCO$_2$; end tidal gas sampling; and the CO$_2$ electrode. The O$_2$ electrode is discussed as well, but there is little further consideration of the measurement of oxygen tension. The final paper concerns clinical applications of pH and blood gas measurements, and the use of "arterialized" venous blood.

In the discussion periods, several pertinent problems are considered. One of these is the utility of future pH meters which might discriminate 0.001 or 0.0005 pH units. This question is closely related to the magnitude of the errors introduced in steps other than the electrometric measurements, e.g., in sampling techniques, handling and storage of samples, etc. In relation to the handling of samples, some interesting data are presented on changes in the ionization of the HCO$_3^-$, H$_2$CO$_3$ and hemoglobin systems in whole blood with changes in temperature. It is shown that plasma and hemoglobin solutions behave quite differently as temperature is changed and that the constancy of the pCO$_2$-pH relationship in whole blood over a relatively wide temperature range is only a fortunate coincidence.

Views are expressed on the wisdom of allowing the development of two standards of precision, the clinical and the research; and opinions are exchanged on how best to express the results of pH and blood gas measurements for clinical use. Final agreements are not arrived at, nor can they be expected at this time, though answers to many of the problems considered here will undoubtedly slowly crystallize in the future.

There are a few errors in type setting, but the print is legible, and the diagrams and illustrations clear. References are not extensive but quite pertinent.

This book brings together information previously unavailable in one place. It is important and fascinating reading for those who are measuring pH and blood gas parameters, and it contains much of interest for those who must evaluate these measurements in their patients.

One might have wished for wider representation of the various branches of medicine (over one-third the panelists were anesthesiologists) or for a more international panel (23 of the 25 members were from Great Britain). But one would be chary indeed if he were not to express gratitude for such an interesting and informative panel.
Pathogenesis of "Electrolyte-Steroid-Cardiopathy"

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