MICROCIRCULATION

Volume 2

Transport Mechanisms
Disease States

Edited by

J. Grayson and W. Zingg

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John Grayson and Walter Zingg

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Preface

The recognition of the microcirculation as an ideal interdisciplinary meeting place for the life sciences is really a postwar phenomenon. The European and the American Societies more than any other organizations launched the idea, and the success of the European Society's International Meetings gave impetus to a growth of interest from a handful of specialists to the wide interdisciplinary study which microcirculation now represents. The meeting held in Canada in June 1975 was, however, the first truly international meeting devoted to the microcirculation. It, too, was a success from every point of view, and the exchange of knowledge and new ideas was rewarding. It is our present hope that the tradition of European meetings with their characteristic European flavor will continue, but larded by larger, international congresses conceived on a worldwide basis.

For the present conference we were fortunate in the presence of Dr. B. Zweifach. He was once referred to as the "father of the microcirculation." This claim, unfortunately, I cannot accept. That honor probably belongs to Harvey, who by one of the most brilliant strokes of inductive reasoning in medical history inferred the existence of capillaries though he could not see them. Ben Zweifach's role was rather that of the midwife, presiding at the birth rather than the conception. The baby he delivered long years ago has since thriven lustily and its growth is in no small measure due to the continuing zeal of Zweifach and his associates.

The present volumes are a record of the proceedings of our recent meeting. They consist in part of the main symposium presentations with the exception of the platelet symposium held in Hamilton. The rest of the volumes consists of brief reports based on the free communications. Most of these describe new work, and their number and quality are perhaps the best testimony of all to the appeal of microcirculation in current medical and life sciences research.

Toronto

J. Grayson

FIRST WORLD CONGRESS FOR THE MICROCIRCULATION

Toronto, June 1975

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I

Transport Mechanisms in the Microcirculation

1

Capillary Transport and Exchange

1.1. Introduction

J. B. BASSINGTHWAIGHTE

This symposium represents one of several rapidly developing areas of research concerning the microcirculation. The particular topic, "Capillary Transport and Exchange," is certainly not at all new, as can be seen from Professor Crone's fine review (Crone, 1974), written 100 years after August Krogh's birth. At the 1969 Benzon Foundation Symposium (Crone and Lassen, 1970) held at the Royal Danish Academy of Sciences and Letters, much of the groundwork for today's session was laid, and deep discussion of the quantitative aspects of capillary–tissue exchange was the order of the day. Now, in the papers to be presented, we attempt to review the work of the intervening years.

The symposium is focused on two approaches to the estimation of the permeability of capillaries to small hydrophilic solute molecules, the extraction of tracer-labeled solutes and the induction of water shifts by changing of the osmolarity of a perfusate. In theory, both osmotic and tracer techniques should provide the same estimates for the permeability and reflection coefficient of a given solute for a given capillary membrane. The conundrum posed by the published data is that the osmotic techniques have given higher estimates of permeability *and* higher estimates of reflection coefficients, implying smaller pores or slits, than estimates obtained by tracer techniques. Clearly, modifications of the techniques of experimentation or analysis are required to resolve the disparity, and although some explicit attempts have been made using the two techniques

J. B. BASSINGTHWAIGHTE · Department of Physiology and Biophysics, Mayo Graduate School of Medicine, Rochester, Minnesota 55901. Present address: Center for Bioengineering, University of Washington School of Medicine, Seattle, Washington 98105.