Drug Dosage
The authors and the publisher have exerted every effort to ensure that drug selection and dosage set forth in this text are in accord with current recommendations and practice at the time of publication. However, in view of ongoing research, changes in government regulations, and the constant flow of information relating to drug therapy and drug reactions, the reader is urged to check the package insert of each drug for any change in indications and dosage and for added warnings and precautions. This is particularly important when the recommended agent is a new and/or infrequently employed drug.

All rights reserved.
No part of this publication may be translated into other languages, reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording, microcopying, or by any information storage and retrieval system, without permission in writing from the publisher.

Copyright 1985 by S. Karger AG, P O. Box, CH-4009 Basel (Switzerland)
Printed in Switzerland by gdz (Genossenschaftsdruckerei Zurich)
ISBN 3-8055-3986-X

Contents

Preface . . . IX

Introduction

Dancis, J.(New York, N.Y.): Why Perfuse the Human Placenta . . . . . . 1

Morphology

Kaufmann, P. (Hamburg): Basic Morphology of the Fetal and Maternal Circuits in the Human Placenta . . . . . . 5
Kaufmann, P. (Hamburg): Influence of Ischemia and Artificial Perfusion on
Placental Ultrastructure and Morphometry . . . . . . 18
Leiser, R. (Bern): Fetal Vasculature of the Human Placenta: Scanning Electron Microscopy of Microvascular Casts . . . . . . 27
Challier, J.-C. (Paris): Criteria for Evaluating Perfusion Experiments and Presentation of Results . . . . . . 32
Schneider, H.; Huch, A. (Zrich): Dual in vitro Perfusion of an Isolated Lobe of Human Placenta: Method and Instrumentation . . . . . . 40

Biochemistry

Hearse, D.J. (London): Detection and Prevention of Tissue Injury during Hypoxia and Ischemia . . . . . . 48
Leichtweiss, H.-P.; Carstensen, M; Schrder, H.; Rachor, D. (Hamburg): Some Physiological Properties of the Isolated Human Placenta . . . . . . 70

Contents VI

Physiology

tulc, J. (Prague): Validity of the Equivalent Pores Model in Placental Physiology . . . . . . 85
Insley, N.P.; Hall, S.; Penfold, P.; Stacey, T.E. (Harrow, Middx.): Diffusional Permeability of the Human Placenta . . . . . . 92
Schneider, H.; Sodha, R.J.; Prgler, M; Young, M.P.A. (Zrich): Permeability of the Human Placenta for Hydrophilic Substances Studied in the Isolated Dually in vitro Perfused Lobe . . . . . . . . . . 98
Discussion of the Two Preceding Articles 104
Schneider, H.; Prgler, M.; Sodha, R.J. (Zrich): Effect of Flow Rate Ratio on the Diffusion of Antipyrine and 32O in the Isolated Dually in vitro Perfused Lobe of the Human Placenta . . . . . . . . . . 114
Discussion of the Two Preceding Articles 124
Wier, P.J.; Miller, R.K. (Rochester, ..): Oxygen Transfer as an Indicator of Perfusion Variability in the Isolated Human Placental Lobule . . . . . . . . . . 127
Panigel, M.(Paris): Past, Present, and Future of Placental Perfusion Experiments . . . . . . . . . . 132

Short Communications
Browne, M.J.; Eaton, B.M.; Contractor, S.F. (London): Effect of Nicotine on ADB Transport in the Perfused Human Placenta . . . . . . . . . . 137
Kuhn, D.C. (Charleston, S.C.); Crawford, M.A.; Stevens, P. (London): Transport and Metabolism of Essential Fatty Acids by the Human Placenta . . . . . . . . . . 139
Schmidt-Sommerfeld, E.; Penn, D. (Giessen); Sodha, R.J.; Prgler, M.; Schneider, H. (Zrich): Transfer and Metabolism of Carnitine and Carnitine Esters in the in vitro Perfused Human Placenta . . . . . . . . . . 141
Challier, J-C.; Hauguel de Mouzon, S.; Desmazires, V. (Paris): Metabolism and Transfer of Radioactive Glucose in the Human Placenta Studied by Dual Perfusion . . . . . . . . . . 144
Brandes, J.M. (Haifa); Berk, P.D. (New York, N.Y.); Urbach, J.; Sideman, S ; Mor, L.(Haifa): Transport of Bilirubin and Glucose by the Isolated Perfused Human Placenta . . . . . . . . . . 147
Eaton, B.M.; Browne, M.J.; Contractor, S.F.(London): Transferrin-Mediated Iron Transport in the Perfused Isolated Human Placental Lobule . . . . . . . . . . 149
Page, K.R.; Abramovich, D.R.; Dacke, C.G.; Henderson, ; Menon, H.; (Aberdeen): Calcium Fluxes Across the Isolated Perfused Human Cotyledon . . . . . . . . . . 151
Mor, L.; Bentel, E.; Lightman, A.; Shachar, H.; Mor, L.A.; Urbach, J.; Sideman, S ; Brandes, J.M. (Haifa): A Theoretical and an in vitro Experimental Model for Estimation of Drug Transfer through the Human Placenta . . . . . . . . . . 155

Contents VII

Maguire, M.H.; Howard, R.B.; Hosokawa, T. (Kansas City, Kans.): Autacoid Receptors in the Human Fetoplacental Vasculature . . . . . . . . . . 170
de Moura, R.S.; Withrington, P.G. (Rio de Janeiro): Vascular Actions of VIP, Substance P and Neurotensin on the Isolated Perfused Human Fetal Placenta . . . . . . . . . . 174
Concluding Remarks . . . . . . . . . . 176
Preface

The `International Workshop on in vitro Perfusion of Human Placental Tissue' was held in March 1984 in Zrich, Switzerland. Major emphasis of this workshop was placed on a critical evaluation of double-sided in vitro perfusion of an isolated area of human placenta. In view of a continuously rising interest in this experimental method it seemed necessary and timely to discuss its potentials as well as limitations. This volume contains a number of presentations directed at the technical aspects of the method and the morphological, biochemical, and physiological criteria for description of a perfusion preparation. Some of the main presentations are followed by a condensed version of general discussion which was prepared by the editors from recordings taped during the workshop. In addition, summaries of free communications are printed which reflect some of the wide spectrum of research topics to be studied by this method. The editors wish to express special gratitude to Professors Albert and Renate Huch from the Department of Obstetrics and the Perinatal Research Group within this Department at the University of Zrich for encouragement and continuous support during preparation and at the workshop itself. Special acknowledgement goes to Beatrix Schneider for never-ending enthusiasm and particular attention to organizational details which was essential for a memorable stay in Zrich of all participants.

Preface X

Finally, our thanks go to a list of sponsors whose generous contributions made this workshop possible: Beecham AG, Boehringer Ingelheim, Chemie Linz AG (Opopharma AG), Cilag AG, Du Pont de Nemours International SA (Opopharma AG), F. Hoffmann-La Roche & Co. AG, ICI Pharma, Interpharma, Janssen Pharmaceutics AG, Merck Sharp & Dohme-Chibret AG, Milupa (FRG) AG, Milupa (Suisse) SA, Nestl Produkte AG, Organon BV (Opopharma AG), Robapharm AG, Sandoz Produkte AG, Schering Zrich AG, Schweiz. Serum- und Impfinstitut Bern, Upjohn SA, Verla-Pharm.

Zrich/New York, August 1984 Henning Schneider
Joseph Dancis