

In vitro fertilization

Second edition

This comprehensively updated and expanded new edition builds on its successful and popular predecessor, retaining the practical features which made the first edition such an essential guide to IVF. The new edition describes the most recent additions to the range of current ART clinical treatments, including the use of testicular and epididymal sperm, blastocyst stage transfer, new perspectives in cryobiology and cryopreservation techniques, and has an additional chapter on preimplantation genetic diagnosis. By incorporating the very latest laboratory techniques and protocols with an even greater emphasis on quality control, it provides an indispensable and practical account. The introductory chapters covering the scientific background that underpins effective laboratory practice have been substantially expanded to include the most recent information available, derived from research in mammalian systems into the molecular biology of oogenesis, oocyte maturation and early embryo metabolism. This new edition distils a wealth of practical and scientific detail for the benefit of all IVF practitioners.

Cambridge University Press
0521778638 - In Vitro Fertilization, Second Edition
Kay Elder and Brian Dale
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SECOND EDITION

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CAMBRIDGE
UNIVERSITY PRESS

Cambridge University Press
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PUBLISHED BY THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE
The Pitt Building, Trumpington Street, Cambridge, United Kingdom

CAMBRIDGE UNIVERSITY PRESS

The Edinburgh Building, Cambridge CB2 2RU, UK <http://www.cup.cam.ac.uk>
40 West 20th Street, New York, NY 10011-4211, USA <http://www.cup.org>
10 Stanford Road, Oakleigh, Melbourne 3166, Australia
Ruiz de Alarcón 13, 28014 Madrid, Spain

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First published 2000

Printed in the United Kingdom at the University Press, Cambridge

Typeface Times 11/14 pt [VN]

A catalogue record for this book is available from the British Library

ISBN 0 521 77863 8 paperback

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To Robbie, Bethany, Daniela, Peter, Roberta, and Rebecca

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Preface

Several hundred thousand IVF children have been born worldwide since the birth of Louise Brown in 1978. Technology in assisted human reproduction is striding ahead, from the first births using frozen embryos in the early 1980s to sex-selection of embryos and the microinjection of spermatozoa for the treatment of male sterility at the beginning of the 1990s. However, research on human gametes and embryos, for various political and ethical reasons, has not followed suit. Although the clinical embryologist must be trained in standard cell culture technology, we believe it is equally important to be aware of the basic biology of these highly specialized cells, the gametes. Most of our information on gametes and early embryos has come from studies on invertebrates, less so from mammals, and therefore we have presented a general overview of gamete biology, followed by more specific descriptions of mammalian and, where possible, human gamete biology.

The first section of this book explores how gametes are produced, how they interact and the first steps of embryo development. The middle section is dedicated to the technologies used in animal ART and advanced laboratory technologies, whilst the latter section of the book describes a compilation of protocols used at Bourn Hall Clinic, Cambridge. The protocols were originally established at Bourn Hall in 1980 by Professor R.G. Edwards and Jean Purdy, following their years of research in the Cambridge University Department of Physiology and Kershaws hospital in Oldham. Over the years these protocols have been revised and adapted by many members of staff, all of whom are represented in the lists of further reading.

K.E.
B.D.

Acknowledgments

Special thanks to Mike Macnamee and Geoff Reeves for encouraging and sponsoring my career as a professional student – and to my children Robbie and Bethany who provided the inspiration, and allowed me the time and the space to continue pursuing my studies.

Kay T. Elder B.Sc.(Hons.), M.B., Ch.B., Ph.D.

I would like to dedicate this book to the late Alberto Monroy, who introduced me to the science of fertilization. Alberto's contributions were many – his strategy of applying molecular biology techniques, while maintaining a comparative approach, was visionary. Many of our present-day concepts in fertilization were conceived in the City of Naples, I hope we may be able to continue this tradition. My thanks to my family and colleagues, past and present, too numerous to mention, who have contributed to our research programme in Naples.

Brian Dale, Ph.D, D.Sc., F.I. Biol.

Sincere and grateful thanks to the colleagues who kindly contributed their expertise to the following chapters: Yves Ménézo on embryo metabolism, Robert Brittain on bovine IVF, John Morris on principles of cryobiology, Terry Leonard on setting up micromanipulators, and Joyce Harper for the chapter on preimplantation genetic diagnosis. We are also grateful to Yves Ménézo, Neal First, and Marijo Kent-First for their help in reviewing some of the material in this second edition.