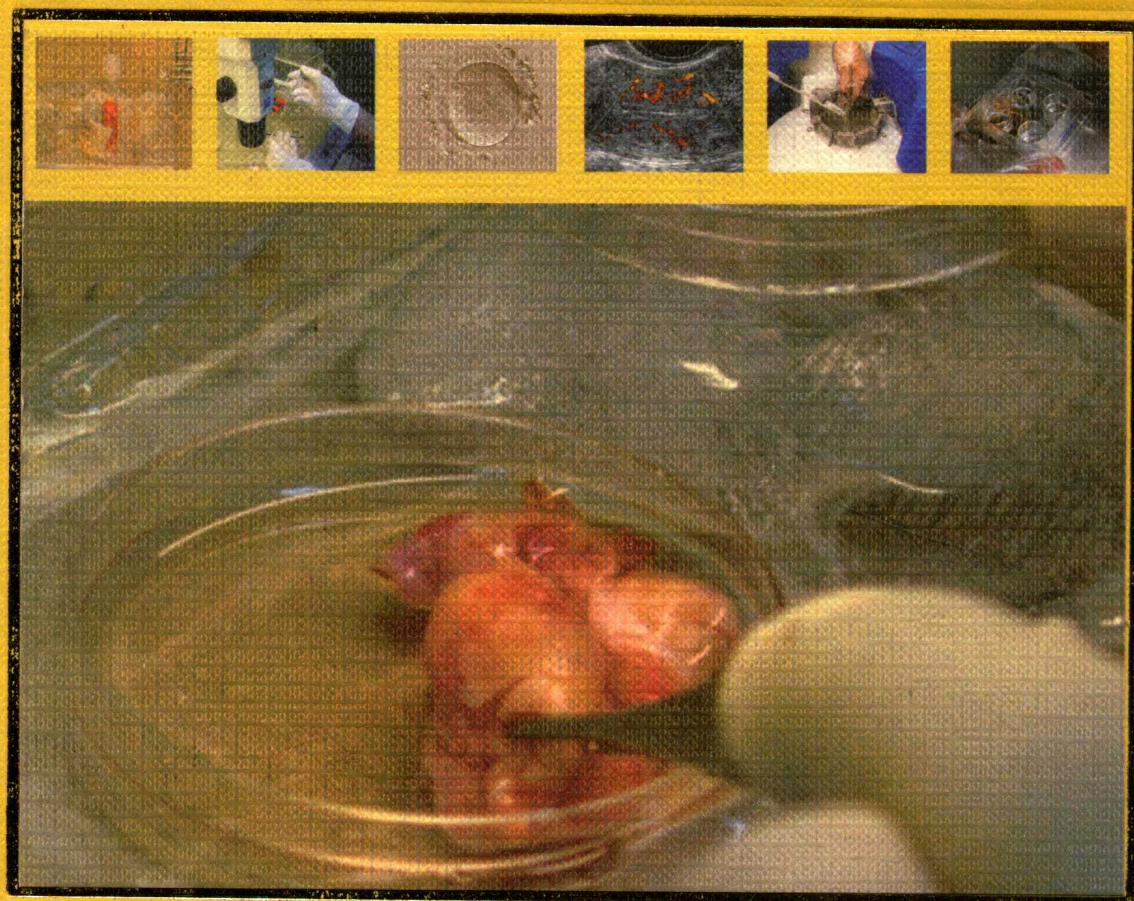




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# MANUAL OF ASSISTED REPRODUCTIVE TECHNOLOGIES & CLINICAL EMBRYOLOGY



**Lt Col Pankaj Talwar VSM**

*Forewords*

**Ashok Agarwal  
RK Sharma**

**JAYPEE**



# Manual of Assisted Reproductive Technologies and Clinical Embryology

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# Manual of Assisted Reproductive Technologies and Clinical Embryology



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### ***Dedication***

*I thank my father Mr Mohinder Pal Talwar and my mother Mrs Madhu Talwar, such monumental work would not have been possible without their blessings and constant support.*

*I give most sincere thanks to my wife Dr (Mrs) Neetu Talwar and sons Pratik and Arjun for giving me unfailing support and encouragement during compilation of the book. It was their constant motivation which made me move ahead in trying times, which I faced during scripting of this manual.*

*I dedicate this book to all my patients who visited me for treatment with utmost faith and gave me this opportunity to learn from their illness.*

*Finally I would like to thank Mata Vaishno Devi who does everything at our center and lets, we, lower mortals, take all the credits.*

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# Foreword

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The past few decades have witnessed momentous advances in the field of assisted human reproduction. Along with improvements in the areas of ovarian stimulation, embryo culture, and cryobiology, we have seen the implementation of micromanipulation, genetic analysis of polar bodies and blastomeres and oncology ART in our daily practice. I am very pleased to write the Foreword for the book *Manual of Assisted Reproductive Technologies and Clinical Embryology*, which aims to highlight the ongoing and potential future research and laboratory technology.

The chapters have been planned on assertion that basic science is the driving force for clinical research. This text also offers much practical information with which one can readily translate theory into clinical practice. All the chapters have been written by acknowledged pioneers and experts in each respective area. While no single volume can adequately cover the enormity of this diverse field of reproductive medicine, this book will be of value to clinicians, cryobiologists, scientists and the students of reproductive sciences.

The editor, Dr Pankaj Talwar, must be congratulated for producing a book that covers the laboratory work step by step at length in the fourth section of the book. All the techniques and protocols pertaining to embryo-culture are extensively covered in this book. The protocols have been well elucidated and deliberated. This will reduce the learning curve of the embryologists and the clinicians. The protocols encompass the techniques being followed at Army Hospital (Research and Referral), New Delhi, India.

This textbook comes with highly useful DVD containing videos of gamete, embryo, blastocyst culture and freezing. This makes the understanding of the laboratory work easier. The manual will serve as a compendium to all health workers who work in the field of reproductive biology.

I applaud the editor for bringing so many researchers, clinicians and reproductive biologists together and compiling this textbook. I am sure this book will help immensely all those who are working in the field of Assisted Reproductive Technologies and related specialties to gain a better understanding of this field. The readers can learn and master the large number of sophisticated techniques which form the backbone of the fascinating and growing field of human assisted reproduction.

Sincerely,



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# Foreword

---

It has been nearly 30 years since the birth of first IVF baby Louise Brown. This was a giant leap for the humanity considering the meager availability of hormones, culture media and infrastructure in that era. Moreover, it was fulfilling of the great desire of humanity, which had suffered in silence from this quite disease since ages. There were kudos and critics, but eventually it opened the doorway to continuing research in this field. Assisted reproductive technologies are an amalgamation of the basic sciences and clinical reproductive medicine.

In the past few years, there has been continuous research in the field of in vitro fertilization. There has been enormous growth in the studies in human gamete behavior and fertilization leading to satisfying increase in the pregnancy rates following IVF. Newer and better infrastructure, and development of sequential media have catapulted the results and take-home baby rate. These developments require a close collaboration between the scientists, clinicians and pharmaceutical industries that work in cohesion with sole aim of improvement in the pregnancy rates.

As this field is evolving at rapid pace and involves handling of gametes, it needs legal binding by the regulatory bodies like ICMR which supervises our work and gives guidelines for such research.

I appreciate efforts of all the contributors and the editor for presenting this compendium of clinical embryology for the beginners and busy clinicians. I am sure that all reproductive biologists and clinicians would be benefitted by this effort of bringing together basic sciences, human embryology, and newer advancements together in this compendium.

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# Preface

---

The field of reproductive medicine and clinical embryology has expanded over the past few years. With the advancements in the field of assisted reproductive technologies, our understanding of the reproductive anatomy and physiology in humans has progressed manifold.

Along with this increase in the knowledge of basic reproductive sciences and pioneering work being done in this field; new and advanced equipment, and culture media have been developed in recent times. Advanced ART laboratories have been created to carry out procedures with sophisticated equipment to treat infertility. The demand for clinicians and embryologists is ever-increasing along with the need of properly trained IVF technicians.

Clinical embryologists and technicians should be well aware of laboratory protocols, laboratory maintenance and standardization.

The aim of the book has been to bring together researchers, clinicians and embryologists on one platform to share their views on various aspects of cryobiology.

In this manual, we have covered essential clinical aspects of ART and common clinical challenges pertaining to this subspecialty. A wealth of information pertaining to basics of cryobiology with newer protocols for vitrification of embryos and oocytes has been thoroughly covered.

Efforts have been made to present to the readers the protocols using lots of pictures so the beginners can closely associate with the techniques and easily assimilate them.

The subject is vast and has been covered over 83 chapters. Some amount of repetition is unavoidable while compiling such monumental work.

The book is accompanied with more than 100 videos which elucidate the various laboratory and cryobiology protocols and thus remove the scare from the minds of reproductive biologists. It was my good fortune to get together a large number of collaborators across the globe for a common cause of knowledge dissemination.

I am aware that no single book can adequately cover the vastness of this diverse field of reproductive medicine; it will definitely be of immense use to clinicians, embryologists, and beginners in this field.

Please feel free to communicate with me if you need any clarifications or have any suggestions.

**Lt Col Pankaj Talwar VSM**



# Acknowledgments

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I would like to thank all my teachers, colleagues for their constant motivation and encouragement.

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I can never forget (Retd) Lt Gen (Mrs) Punita Arora, PVSM, SM; Air Marshal GS Joneja, VM; Surgeon Rear Admiral Sushil Kumar, VSM; and Dr Shashi Sareen who constantly held my hand in this humble spiritual journey and gave me strength to move on in the face of all adversities.

I would like to thank my colleagues Col BS Duggal, Col BK Goyal, VSM, Col Shaktivardhan, Lt Col Tony Jose, Lt Col Bandana Sodhi and Dr Sonia Sharma for their guidance and constant motivation. I am particularly thankful to Lt Col Sandeep K, Maj (Mrs) Nikita Naredi, Maj VDS Jamwal who spent late nights with me for past one year while compiling and editing this manual. The work would not have been possible without their unflinching support .

I am thankful to Mr CM Chhabra for all the help rendered to me in compilation of this book and manuscript editing. This book would not have been in our hands without constant support of my support staff comprising Sub Parikshit Singh and Hav SD Shulka who helped me with the laboratory work and photo editing beyond their call of duty.

I am thankful to Shri Jitendar P Vij (Chairman and Managing Director), Mr Tarun Duneja (Director-Publishing) for their support and guidance also thankful to Mr KK Raman (Production Manager), Mr Sunil Dogra (Production Executive), Mr Subrata Adhikary (Commissioning Editor), Mr Ashutosh Srivastava (Asstt. Editor), Mr Ananda Mohanty (Proofreader), Mr Inder Jeet (Typesetter) and Mr Rajesh Kumar (Graphic Designer) of M/s Jaypee Brothers Medical Publishers (P) Ltd, New Delhi, India. I thank Directors of IMV India Ltd, Intermedics India Ltd, Vitrolife India Ltd (Vision Diagnostics) and Trivector Scientific Pvt Ltd for their valuable support in sourcing and permitting us to use relevant manuals and videos in this scientific endeavor of ours.

I humbly acknowledge that this dream would not have been possible without all the authors rendering to me their unflinching support and motivation. The journey from inception of the book to its publication was rough, but I was always supported by friends and patients.

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