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0521623758 - Male Fertility and Infertility
Edited by Timothy D. Glover and Christopher L. R. Barratt
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Male **Fertility** & **Infertility**

This contemporary account of male fertility provides a much needed bridge between those seeking to understand the subject from an evolutionary and biological perspective, and those with clinical responsibility for the investigation and treatment of infertility. Accordingly, the first half of the book deals with the evolutionary aspects of male reproduction and sperm competition, sperm production and delivery in man and other animals, spermatogenesis and epididymal function, sperm transport in the female tract, and the apparent decline in human sperm count. The second part of the book puts greater emphasis on clinical problems and opens with a discussion of intracytoplasmic sperm injection (ICSI), its value and limitations. This is followed by a review of modern developments in the genetics of male infertility and proceeds to a further chapter on the role of surgical procedures used in the treatment. Semen analysis is critically reviewed and the molecular techniques now being used in preimplantation diagnosis and in the study of mitochondrial inheritance are fully described.

Taken together, these chapters, written by an international team of authors, illustrate the breadth of vision needed to tackle the problem of male infertility.

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Male **Fertility** & **Infertility**

Edited by TIMOTHY D. GLOVER
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Foreword

The first part of this book is concerned with an account – comprehensive but sufficiently idiosyncratic to grip the reader’s attention – of the evolution, anatomy and physiology underlying male fertility. The complexities of spermatogenesis are clearly explained. Few could fail to be intrigued by the discussion of penis length and its controversial evolutionary significance, or the information that rams can ejaculate thirty or forty times in one day, compared with a maximum of six for the human male.

Yet from the point of view of the book’s editors, all this is mere background to their primary concern. As the second part of the book reveals, it is ICSI, the intracytoplasmic sperm injection procedure, in which they are really interested. Many of us were astonished when it became apparent that a single spermatozoon, selected by the practitioner and possibly malformed and immotile, could through ICSI achieve fertilisation and finally the birth of a healthy baby as readily as conventional IVF. This remains true; but there is now abundant evidence that the genetic defects which may be responsible for the infertility of the ICSI patients may also be transmitted to their sons – hence the need for careful genetic counselling (and perhaps testing) of ICSI patients. Other problems with ICSI, and other challenges and opportunities for andrology in general, are discussed in the later chapters.

There may be a danger that biologists interested in understanding more about sex and male sexual function will wish that the first part of this book had been published as a separate volume, while clinicians concerned with their patients and geneticists specializing in the Y chromosome may harbour similar thoughts about the second part. But biologists today, however pure their field, must surely spare a thought for possible implications for human welfare; while clinicians ignore basic biology at their peril. So I urge evolutionists, reproductive biologists, geneticists, molecular biologists, andrologists, clinicians, and indeed anyone interested in male fertility, to read this book themselves and recommend it to their students.

Anne McLaren

Preface

Intracytoplasmic sperm injection, or ICSI, represents the greatest single technological advance in human-assisted reproduction since the advent of *in vitro* fertilization (IVF). So many problems associated with female infertility were solved with IVF, yet male infertility remained an intractable problem. Today, however, because of the use of ICSI, pregnancies are achievable when even the most severe forms of male infertility are encountered. Moreover, as both Herman Tournaye and Sherman Silber have pointed out in this book, ICSI has provided us with new knowledge of, or potential areas of investigation into, several aspects of molecular genetics that were hitherto unavailable to us.

Yet, as with many new developments in science and technology, there is often a tendency for the interested scientific or clinical community to find these results so exciting that they fail to be sufficiently critical or sufficiently aware of drawbacks and limitations. Frequently, the latter may be obscured from our view in the first instance, but we are dealing with human lives here and so it is surely prudent for us to be extra vigilant. Furthermore, it should be recognized that most couples would prefer to reproduce by conventional means, so disorders of male fertility still need to be diagnosed correctly, treated and rectified if at all possible. This demands further research into testicular function and semen production. It is impossible that any one technique will be a panacea.

The technical finesse that is required for ICSI is to be greatly admired and a new offer of hope for couples with a male problem on their hands is most gratifying. But what are the hidden long-term hazards of these latest developments or is there none? These are questions worth asking and it is our belief that a broad biological perspective is a good starting point. This is why the first half of this book is so titled.

Part 1 opens with a discussion by Jack Cohen on the evolution of male sex. This author has a wide knowledge of his subject and manages to turn some conventional ideas about it on their head. He provides new and interesting angles, which are really worth digesting. Tim Birkhead continues this biological saga by discussing the role of sperm competition in the evolution of male reproductive activity. Then Hector Dott and Tim Glover follow with some of the fundamentals of mammalian male reproduction. They encourage us to jettison some of our shibboleths and question a number of our modern assumptions. They also indicate some of the

lessons about human reproduction that can be learned from work on animals.

In Chapter 4, Kate Loveland and David de Kretser explain the local control of spermatogenesis and discuss aspects of its molecular basis. The intricate character of intratesticular events involved in the production of spermatozoa is revealed. Roy Jones contributes the next chapter, in which he presents a very persuasive case for including the epididymis in our deliberations on male fertility. He gives a clear account of the importance of sperm maturation in the epididymis, including that of man.

Jackson Brown, Steve Publicover and Chris Barratt continue by reminding us how little is known about sperm transport in the human female tract compared with that in many other mammals. They bring us up to date on the problems of oocyte penetration by spermatozoa and focus especially on the part played by calcium ions in the acrosome reaction. They end with brief but useful suggestions about future research in this area.

The problem of a possible decline in sperm numbers in human ejaculates and other changes in human male reproductive health is next debated by Stewart Irvine as a conclusion to this first part of the book.

Part 2 deals with recent technological advances in the field of assisted conception in humans. Herman Tournaye opens the section by giving us the pros and cons of ICSI. He does so with remarkable clarity and his chapter is followed by a most valuable and informative account by Pascuale Patrizio of some of the latest work on the genetics of male infertility. Sherman Silber takes the issue of human male infertility further in Chapter 9, by looking at it from a surgeon's point of view and Chris Ford presents a critical survey of semen analysis as it stands in the light of so much new and emerging knowledge and understanding of the reproductive process.

Ian Findlay and Justin St John bring us fully into the contemporary scientific world by explaining how molecular techniques, especially those involving the polymerase chain reaction (PCR), have contributed to the study of human fertility. They have interesting things to say about mitochondrial inheritance and preimplantation diagnosis. Thus, they provide a good perspective on some of the new developments in reproductive medicine.

Finally, Jim Cummins and Anne Jequier bring it all together and try gazing into the crystal ball. They help us to look into the future and give us clues as to possible developments in the coming century.

Some overlap of subjects may be detected in different chapters, but this has been permitted only in order to allow different viewpoints to be put on some subjects. However, we have made every effort to avoid repetition.

Some conflict of opinion between different authors may also be evident and what each has to say does not necessarily reflect the views of the editors. After all, we are only editors and we must allow our authors a free rein! We

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trust, though, that this book will be seen as a broad narrative rather than as a series of unconnected chapters simply strung together.

We hope too that, as a start to the next millennium, the book will offer some new ideas, some food for thought and a few pointers to the future. If it succeeds in this, it should provide new horizons for the study of male fertility and for the treatment of infertile male patients.

TIM GLOVER
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