ESSENTIAL IVF

Basic Research and Clinical Applications
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PREFACE

There is no clearer testament to the importance and efficacy of in vitro fertilization in the treatment of the infertile patient than the fact that over one million babies have been born since its clinical introduction in 1978. The success of this worldwide endeavor has evolved to treat some of the formerly most intractable forms of infertility and requires individuals with different skills and insights whose activities are often compartmentalized into clinical, laboratory and research functions. The intent of Essential IVF is to present current issues in clinical IVF that encompass the varied activities of those engaged in this enterprise. By integrating clinical, basic research and laboratory-related aspects of human reproduction, readers with diverse interests should obtain a more complete understanding of the impact, importance and inter-relatedness of each in the progress of infertility treatment, and an appreciation of whether emerging technologies will or should contribute to this progress in the near future. The topics selected for this volume include research that has begun to explain the origins of differential follicular, gamete, embryo and uterine competence, and specific laboratory procedures and protocols that may have important clinical implications for the generation of developmentally viable embryos.

Human embryo research over the past 25 years has not only confirmed that the developmental potential of each embryo is unique, but more importantly, demonstrated how genetic and nongenetic factors for sperm and oocyte determine embryo competence well before fertilization. Several chapters deal with the origins of normal and compromised gametes and how those with high competence can be identified and isolated for fertilization. While the generation of high competence embryos is an essential aspect of infertility treatment with IVF, so also is the current emphasis on the avoidance of higher order gestations by limiting the number of embryos transferred. Here, chapters that discuss criteria used for progressive noninvasive evaluations of embryo development provide a current indication of the utility of morphology in competence assessment, and present outcome based results that indicate patient- and cycle-specific characteristics in which the transfer of one or two embryos should be considered. Several chapters describe research and clinical efforts on follicle and preantral oocyte culture and cryopreservation to preserve the fertility of certain patients, while others discuss whether invasive manipulations such as ooplasmic transfer and assisted hatching have merit in the treatment of the infertile patient.

The imperative to constantly improve outcome is the engine that drives this field of reproductive medicine, an engine fueled by the frequent introduction of major changes in clinical and laboratory protocols, often before their presumed benefits have been fully validated or a solid biological foundation established. In the same respect, whether current practices remain valid years after their introduction is not often addressed and in many IVF
programs, certain practices persist long after their actual efficacy has been questioned. For chapters that describe current practices in the laboratory management of embryos, the authors critically review the rationale, design and validity of studies that have been reported to improve outcome. These reviews should be of particular relevance to clinicians and laboratory personnel as they question whether existing protocols and suggested changes are currently warranted and if so, whether they should be applied universally or on a selected basis.

Through the efforts of the contributors, this volume provides both historical and current perspectives on practices common in human IVF. While no specific consensus leading to a ‘standardization’ of clinical and laboratory protocols was intended or is evident, owing to the unique and different experiences of each author, the chapters do provide guidance with which existing and newer protocols of gamete and embryo selection, culture, and competence assessment can be evaluated. The basic research on follicular, embryonic and uterine biology provides a glimpse of ongoing efforts directed at the identification of cellular, biochemical and physiological determinants suggested to be associated with normal gamete and embryo developmental potential and to be predictive of outcome. The possibility of rescuing developmentally compromised oocytes and embryos, as well as the cryopreservation and culture of small follicles and their corresponding oocytes is at an experimental stage. However, it is clear from the descriptions of current research efforts that technical and biological foundations for future clinical application are being established.

While it is apparent that basic and clinical studies described in this book come from very different directions and perspectives, they have two common goals, improving outcome for the infertile patient and the generation of healthy children. In this context, all involved in clinical IVF are cognizant of the fact that the patients being treated are both the infertile couple and the intended offspring, and it is to the achievement of these dual goals that the information presented in this book is intended.

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