Principles and Practice of Fertility Preservation

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This book is dedicated to our courageous patients fighting cancer
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Foreword

One of the first and most poignant cases that impressed on me the importance of fertility preservation was that of a young policewoman. She was already engaged to be married when she was diagnosed with non-Hodgkin’s lymphoma. Her eagerness to preserve fertility and avoid premature menopause was so understandable, although in those days the only technology available for her was experimental. Nevertheless, she grasped the straw, saying, "It was worse to hear the treatment would sterilize me than when my doctor told me I had cancer."... She died.

The prospects for survival of young cancer patients are much better now than 20 years ago and continue to improve, but progress has often depended on more aggressive, and hence gonadotoxic, treatment regimens. Recognition of the damaging effects of chemotherapy and pelvic irradiation, and sometimes of the disease process itself, in patients of reproductive age – both women and men as well as children – is now common knowledge and has encouraged innovative technology and surgery, giving hope of preserving the potential for biological parenthood after cancer.

Indeed, although the priority of medical care is to maximize the chances that patients will overcome their disease, to overlook the late effects is now regarded as neglect of a vital duty. The new developments may also help non-cancer patients, including those wishing to forestall ovarian aging, something that ought to be less controversial than often depicted in the media.

Recent growth in the field has been signaled by the launch of an international society for specialists in fertility preservation, biomedical symposia, review articles and a few books, but none as comprehensive as this volume compiled by Professors Jacques Donnez and S. Samuel Kim. The topics authored by foremost researchers and practitioners in the 43 chapters range from biology and oncology to technology and surgery, including bioethics and law. Such a large work confirms that this field has moved beyond the pioneering stage towards maturity, and it will likely be an important reference for some years to come.

Roger G. Gosden
Foreword

Three decades have elapsed since the historic birth of Louise Brown in England. This momentous event, the introduction of human in vitro fertilization (IVF) as an approach to treating infertility, set the stage for hundreds of thousands of infertile couples who were ultimately to benefit from this exciting new technology. As with many medical/scientific breakthroughs, the initial process has evolved significantly from its prototype which involved a natural cycle, less than ideal monitoring and laparoscopic egg recovery. During the 30 years since IVF became a reality, new drugs and techniques have developed for follicle stimulation. Ultrasonography has come of age and is now used for follicle monitoring, egg retrieval, embryo transfer and even detection of early pregnancy. New cryopreservation techniques have enabled embryo, egg and ovarian tissue storage. Further refinements include specialized growth media for embryos, intracytoplasmic sperm injection, transdermal surgical sperm retrieval, pre-implantation genetic diagnosis, egg donation and use of surrogate or gestational carriers. Couples seeking correction of infertility problems have not been the only beneficiaries of our new reproductive technologies.

The term “fertility preservation” refers to a totally new direction for these exciting technological advances. Fertility preservation applies to individuals who have deferred pregnancy for a variety of reasons, such as single women who choose to have their eggs preserved for “fertility insurance” and cancer patients about to embark on extirpative surgery, radiation or chemotherapy to cure their disease. In many instances, these women and men are neither married nor have specific plans for having offspring at the time of their impending cancer therapy. Such individuals now have a variety of options available to them which could be applied to heightening their opportunities for parenthood in the future.

Unintended consequences of our new reproductive technologies encompass profound social and ethical implications. For the cancer victim, awareness of the consequences of treatment on her future fertility must be stimulated by the oncologist during indoctrination to what may lie ahead. For young individuals, under age for providing informed consent, assent is required through guidance by both physician and parents. Requiring an invasive procedure for obtaining gametes to place in storage has its drawbacks, and the long-term storage of gametes becomes even more complex for families of individuals who succumb to their disease.

Professors Donnez and Kim’s book clearly points out that the social and ethical complexities of fertility preservation for cancer patients require the collaboration of oncologists and reproductive endocrine and infertility specialists to provide the best possible information and strategic plan for each patient. The textbook unites multiple disciplines while covering basic reproductive physiology, principles of cancer therapy, age-associated issues and ethical dilemmas. It intertwines the bittersweet combination of passion for procreation and the hazards of advancing age and lethal disease. The substance and structure of this text should advance the missions of both infertility specialist and oncologist.

Edward E. Wallach
Preface

Fertility preservation has become a very prominent area of interest in reproductive medicine and oncology. In the twenty-first century, fertility preservation is no longer a theoretical concept but an essential clinical discipline in medicine. Increased long-term cancer survival has intensified the need for fertility preservation strategies, as fertility is the leading quality of life issue for young cancer survivors. Although the focus of fertility preservation has mainly been limited to cancer patients in their reproductive years, its clinical relevance may well be expanded to non-cancer patients, and much broader clinical applications are expected in the future.

In the past few years, we have witnessed huge scientific and technological advances in fertility preservation methods, as well as accumulation of an enormous amount of related information and knowledge. As pioneers who have actively participated in the development of emerging technologies in fertility preservation, we felt the need to publish a comprehensive book that would reflect all aspects of this exciting new field. This book covers the full range of scientific concepts and emerging techniques, including the latest developments in oocyte cryopreservation, in vitro follicle culture and ovarian cryopreservation and transplantation.

The first section (three chapters) serves as a general introduction to the field of fertility preservation, followed by two sections (nine chapters) dedicated to cancer biology, epidemiology and treatment, as well as reproductive biology and cryobiology. In section four, fertility preservation in the male is discussed (five chapters). The following sections (19 chapters) are devoted to fertility preservation strategies in the female, divided into four categories: medical/surgical; assisted reproductive technology (ART); ovarian cryopreservation and transplantation; and in vitro follicle growth and maturation. The last two sections (seven chapters) address future technologies and ethical, legal, moral and religious issues related to fertility preservation.

We are confident that this book will provide a theoretical and practical guide for scientists, embryologists, nurses and clinicians working in reproductive medicine and oncology. In addition, it will be a valuable resource for anyone wishing to learn more about this field for patient care or research purposes.
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