

Preface



Purpose and Goals

The rationale; why it is being written and for whom?

This book will offer a comprehensive introduction to mammalian reproduction based on the latest scientific evidence.

1. Previously published works review and discuss various steps from folliculogenesis to parturition. Most of the works, like those written by ESE Hafez, McDonald, Richardson and others, attempt to base their review on research conducted primarily on rodents and rabbits. The concepts presented are reviews of research many decades old. It has only been recently, that research has been based on live materials using ultrasonography, laparoscopy. These investigations on live higher mammals were costlier or under the ban of animal welfare legalities. Most of the studies on ovulation, ovarian and follicular dynamics were never sequential or continuous on the same animals or live subjects. The studies required interrupted statistical designs to deduce inferences from varied observations on different animals. The varied biological response was always a limitation to deduce precise curative or diagnostic conclusions.

2. With the advent of reproductive techniques like invisible ultrasonography, electron, scanning, light and contrast microscopy, immunoassays, DNA/RNA recombinant technologies, cloning, and assisted reproductive techniques, a new set of information is available on same and similar individuals.

The continuous observation on gestation through the advent of ultrasound technology has made it possible to have sequential and continuous investigations on same animals over a period of time necessary to correlate theoretical assumptions with factual finds on

follicular and fetal biology. The modern radio-diagnosis, genetics of reproduction, histo pathological, histochemical pathways and signals have made it possible to deepen our understanding of follicular and foetal development explaining many hither to unknown facts. This book is based on that latest and more complete research.

3. The book will make available the new knowledge to clinicians (both veterinarians and medical), biologists, researchers, scholars, future research and pharmaceutical concerns to provide a new evidence based foundation for understanding the intricate mechanisms of follicular and fetal development in more realistic mode than the hypothetical ones in the past. This shall help augmentation and control of fertility
4. Investigation conducted on higher mammals like sheep, goats, cattle and humans is available now. It is the focus of wisdom, displayed in real images. The studies on live and slaughter house materials have supported many intimate relationships between fetus and dams.. It may have more applicability and fewer failures when developed into curative techniques, appliances or pharmaceutical forms.
5. In vitro fertilization, assisted reproductive techniques and genetic engineering technology has made it possible to understand fertility more vividly. The gamete union, biochemical modulators, immunological factors, inhibitors and stimulators have helped to develop alternative fertilization models where nuclear materials have been used to incite fertilization without the sperm and thus Dolly the wonder has been born as sheep followed by many other animals, including camel, buffalo and Pashmina Goat clones by our students. The scientists involved in cloning camel and buffalo calves, using somatic nuclei, were authors students in BVSC and MS level.
6. The factual ideas, methods, results thus carried in this book shall help the biology students, scholars, teachers, researchers, and clinicians as hands on training of difficult procedures and methods. The rich experiences and practical experimentations of the author, for last 34 years make this book a more practical demonstration of events actually snapped and presented.
7. To evolve in-vitro models for the fetal biological facts beyond blastocysts stages make it imperative to have better understanding of fetal fluids and their biochemistry. These topics have been covered adequately. The chapters on uterine dating, ovarian drilling, and nuclear fetal diagnostics make this book more comprehensive than those recently published on the topic or related ones.

8. The fetal age determination, formulas, caruncular and cotyledon developments shall be unique feathure of this book. The zona free embryo cultivation and culture has given new understanding on the embryonic development.
9. The book summarizes recent developments on follicular dynamics, pre-ovulatory follicle recruitment, selection and dominance. The cellular metabolites at nano levels are playing new role in follicular physiology. The new signals and pathways investigated have made us wiser on cellular changes going on in the follicular wall, Lamina propia and basal lamina. These and other recent finds of research in the past few years have been reviewed in this book.
10. Precisely the genetic network involvement both in somatic cells, germ cells during primordial follicle growth, along with oocyte - follicle communication systems, Gap junctions, information on signaling mechanisms, connexin- family patterns are some of the new concepts described in this book which make it a kind of its own.

Coverage & Approach

This book shall revise and put up new concepts on the topic, such as

1. The activation of dormant oocyte, as wakeup call (energy waves) energizing it to undergo mitosis and meiosis. Gametogenesis and genome methylation patterns inciting gene regulation, embryogenesis and gene imprinting have been precisely discussed.
2. New information on Zona pellucida formation and new concepts of zona free blastomeric cultivation and cloning is incorporated.
3. Epidermal growth factors in porcine folliculogenesis have been discussed
4. Ovine ooplasm initiating nucleoli assembly in porcine embryos. Embryo cloning experience from ovine, porcine and bovine cells is reviewed.
5. Reproductive genetic techniques, Amniocentesis, maternal serum screaming, fetal cell examination and diagnosis of fetal abnormalities like, Edwards syndrome, neural tube defects etc have been reviewed.
6. Tobacco and environmental pollutant interferences with DNA binding Zinc (Zn^{2+})- finger motif through substitution of Cd^{2+} for Zn^{2+} has been explained.
7. The GATA transcription, anti-mullein hormone, boron toxic effects on fetal development is discussed. Mitochondrial DNA, fertilization

promoting peptides, bone morphogenetic factors, role of inhibins, activins and follistatin in mammalian reproduction are some of the comparative advantage points reviewed in this project.

8. Role of vitamin A in embryonic development, health of humans and animals after assisted reproductive technique, Intra uterine retardation factors, Nitric acid factors, ovulation as a differential display involving extraction of RNA, conversion of mRNA into CDNA details are some of the recent concepts to be delivered precisely.
9. Pregnant uterus killer cell conversion into non killer cells, mechanisms and its role in early pregnancy establishment, nuclear, estrogen, progesterone receptors and endometrial dating, antagonistic and inverse agonistic factors are some of the chapter ingredients of this work.
10. The new therapeutic models for uterine diseases. The endometrial epithelium secretions, blastocyst elongation and survival factors, present a holistic up to date review on feto-maternal relationships.

We acknowledge the efforts and research of my students and excellent researchers and investigations around the globe, whose reports, extracts, web informations have been incorporated in this book. As said no attempts to assemble a book is complete without climbing on the steps constructed by researchers. We duely thanks them and wish all readers, whose work has been referred or incorporated has to critically evaluate it and inform us for modifications, corrections or revisions. Any legal or academic confusion or harmful effect on use of technologies described shall not be our responsibility. Clinicians and readers are advised to perfect their expertise by acquiring necessary expertise and training from expert or institutions recongnized by MCI, VCI and other world legal authorities.

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