Manipulating The Mouse Embryo A Laboratory Manual

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CHEN LUCA

A Laboratory Manual CRC Press
Whilst assisted reproduction techniques (ART) have become increasingly successful and largely standardized, there is still only a partial understanding of what constitutes a 'true' embryo environment. Replicating the varying physiological conditions of the in-vivo environment that the embryo travels through in the in-vitro culture is still a major challenge in ART. This practical volume details how to organize and operate an IVF laboratory in order to mimic these conditions for successful embryo culture. Environments and equipment that are essential for running safe and efficient facilities such as maintaining good air quality and hygiene protocols, and utilizing an effective layout are covered in detail. Other chapters discuss the different consumables needed, optimal handling techniques and parameter monitoring systems, as well as recent advances in the area including artificial intelligence and automation. This is an indispensable guide to understanding the background science of culturing embryos, crucial to successful outcomes in ART.
Epigenetic Reprogramming During Mouse Embryogenesis National Academies Press
This book pulls together the full range of cell culture, biochemical, microscopic, and genetic techniques to study the early mammalian embryo. Until now, there has never been such a comprehensive compendium, though there have been more focused books of protocol, such as Manipulating the Mouse Embryo, from Cold Spring Harbor. This book is intended to appeal to all constituencies, from basic experimental science to clinical and animal science applications.
The Laboratory Mouse National Academies Press
This volume explores the latest techniques used to study and understand chromatin reprogramming in embryos and germ cells. Various culture systems are presented, which consist of invaluable tools to investigate many developmental processes. This book also looks at methods for direct examination of DNA, RNA, and proteins in embryos, along with low-input and single-cell assays for exploring these features at the genome-wide scale. Written in the highly successful Methods in Molecular Biology series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Cutting-edge and thorough, Epigenetics Reprogramming During Mouse Embryogenesis: Methods and Protocols is a valuable resource for any scientist and researcher looking to make new discoveries in this fascinating field of chromatin reprogramming.
A Laboratory Guide Springer Science & Business Media
Animal biotechnology is a broad field including polarities of fundamental and applied research, as well as DNA science, covering key topics of DNA studies and its recent applications. In Introduction to Pharmaceutical Biotechnology, DNA isolation procedures followed by molecular markers and screening methods of the genomic library are explained in detail. Interesting areas such as isolation, sequencing and synthesis of genes, with broader coverage of the latter, are also described. The book begins with an introduction to biotechnology and its main branches, explaining both the basic science and the applications of biotechnology-derived pharmaceuticals, with special emphasis on their clinical use. It then moves on to the historical development and scope of biotechnology with an overall review of early applications that scientists employed long before the field was defined. Additionally, this book offers first-hand accounts of the use of biotechnology tools in the area of genetic engineering and provides comprehensive information related to current developments in the following parameters: plasmids, basic techniques used in gene transfer, and basic principles used in transgenesis. The text also provides the fundamental understanding of stem cell and gene therapy, and offers a short description of current information on these topics as well as their clinical associations and related therapeutic options.
Guidelines for the Care and Use of Mammals in Neuroscience and Behavioral Research Humana Press
Amphibian embryos are supremely valuable in studies of early vertebrate development because they are large, handle easily, and can be obtained at many interesting stages. And of all the amphibians available for study, the most valuable is Xenopus laevis,which is easy to keep and ovulates at any time of year in response to simple hormone injections. Xenopusembryos have been studied for years but this is a particularly exciting time for the field. Techniques have become available very recently that permit a previously impossible degree of manipulation of gene expression in intact embryos, as well as the ability to visualize the results of such manipulation. As a result, a sophisticated new understanding of Xenopusdevelopment has emerged, which ensures the species' continued prominent position among the organisms favored for biological investigation. This manual contains a comprehensive collection of protocols for the study of early development in Xenopusembryos. It is written by several of the field's most prominent investigators in the light of the experience they gained as instructors in an intensive laboratory course taught at Cold Spring Harbor Laboratory since 1991. As a result it contains pointers, hints, and other technical knowledge not readily available elsewhere. This volume is essential reading for all investigators interested in the developmental and cell biology of Xenopusand vertebrates generally. Many of the techniques described here are illustrated in an accompanying set of videotapeswhich are cross-referenced to the appropriate section of the manual.
Antibodies Cambridge University Press
Genetically very similar to the human species, mice play an important role in biomedical research and have served as experimental models for a wide variety of pathologies, including cancer, cardiovascular diseases, and behavioral disorders. In Transgenic Mouse Methods and Protocols, Marten Hofker and Jan

van Deursen have assembled a multidisciplinary collection of readily reproducible methods for working with mice, and particularly for generating mouse models that will enable us to better understand gene function. Described in step-by-step detail by highly experienced investigators, these proven techniques include new methods for conditional, induced knockout, and transgenic mice, as well as for working with mice in such important research areas as immunology, cancer, and atherosclerosis. Such alternative strategies as random mutagenesis and viral gene transduction for studying gene function in the mouse are also presented. Care is taken to make clear the details of the available approaches, as well as their limitations. Up-to-date and highly practical, Transgenic Mouse Methods and Protocols demonstrates clearly for both novice and expert investigators how to make novel transgenic mouse models, and how to use them effectively to understand the role of gene function in human health and disease.

Manipulating the Mouse Embryo Gulf Professional Publishing

Introduction to immunochemistry for molecular biologists and other nonspecialists. Spiral.

Microinjection Springer Science & Business Media

Genome editing is a powerful new tool for making precise alterations to an organism's genetic material. Recent scientific advances have made genome editing more efficient, precise, and flexible than ever before. These advances have spurred an explosion of interest from around the globe in the possible ways in which genome editing can improve human health. The speed at which these technologies are being developed and applied has led many policymakers and stakeholders to express concern about whether appropriate systems are in place to govern these technologies and how and when the public should be engaged in these decisions. Human Genome Editing considers important questions about the human application of genome editing including: balancing potential benefits with unintended risks, governing the use of genome editing, incorporating societal values into clinical applications and policy decisions, and respecting the inevitable differences across nations and cultures that will shape how and whether to use these new technologies. This report proposes criteria for heritable germline editing, provides conclusions on the crucial need for public education and engagement, and presents 7 general principles for the governance of human genome editing.

A Study of the Role of Embryonic and Maternal Genotypes on Prenatal Survival in Two Selected Mouse Lines Using Nonsurgical Embryo Transfer CSHL Press

This book represents a classic compilation of current knowledge about mouse development and its correlates to research in cell biology, molecular biology, genetics, and neuroscience. Emphasis is placed on the research strategy, experimental design, and critical analysis of the data, disguishing this from other books that only focus on protocols for mouse developmental research. Selected chapters are indexed to electronic databases such as GeneBank, GenBank, Electronic Mouse Atlas, and Transgenic/Knockout, further increasing the utility of this book as a reference. *Broad-based overview of mouse development from fundamental to specialist levels *Extensive coverage of a wide range of developmental mutations of the mouse *Excellent benchmark illustrations of brain, craniofacial, gut and heart development *In-depth experiment-based assessment of concepts in mammalian development *Focus on models of specific relevance to human development *Comprehensive reference to key literature and electronic databases related to mouse development *High-quality full-color production

Atlas of Embryonic Development National Academies Press

The generation of mutant mice raises many questions about the best means of phenotypic analysis, breeding, and maintenance. The answers are now available from two experts with a wealth of detailed knowledge never previously assembled in one volume. Informal and highly practical, this handbook provides stepâ€“byâ€“step methods for troubleshooting experiments, from the basics of gene targeting through the analysis of postnatal effects.

Methods and Protocols Oxford University Press

Manipulating the Mouse EmbryoA Laboratory ManualCold Spring Harbor, N.Y. : Cold Spring Harbor Laboratory Press

Transgenic Mouse Manipulating the Mouse EmbryoA Laboratory Manual

Of mouse development -- Setting up a colony for the production of transgenic mice -- Recovery, culture, and transfer of embryos -- Introduction of new genetic information into the developing mouse embryo -- Iolation of pluripotential stem cell lines -- Techhniques for visualizing genes and gene products -- In vitro culture of eggs, embryos, and teratocarcinoma cels -- Chemicals, supplies, and solutions.

A Laboratory Manual Cambridge University Press

This reader-friendly manual provides a practical "hands on" guide to the culture of human embryonic and somatic stem cells. By presenting methods for embryonic and adult lines side-by-side, the authors lay out an elegant and unique path to understanding the science of stem cell practice. The authors begin with a broad-based introduction to the field, and also review legal and regulatory issues and patents. Each experimental strategy is presented with an historical introduction, detailed method, discussion of alternative methods, and common pitfalls. This lab guide for researchers also serves as a textbook for undergraduate and graduate students in laboratory courses. • Offers a comprehensive introduction to stem cell biology and culture for medical and biology researchers investigating diagnostics and treatments for various diseases • Presents a historical introduction, discussion of alternative methods, and common pitfalls for basic and advanced experimental strategies • Includes new chapters devoted to iPS cells and other alternative sources for generating human stem cells written by the scientists who made these breakthroughs

Scientific Frontiers in Developmental Toxicology and Risk Assessment National Academies Press

Provides information and guidelines for developing a mouse colony and conducting experiments, including proper protocols, step-by-step procedures, and analysis strategies.

New Insights into Theriogenology Cold Spring Harbor Laboratory Press

This book is an essential anatomical resource for developmental biologists who need to know about any aspect of mouse developmental anatomy, as well as for geneticists using the mouse embryo as a model. The book is a companion to Kaufman's The Atlas of Mouse Development, and details the developmental anatomy of the early embryo, the transitional tissues, and all the major organ systems. It also provides extensive comparisons with human developmental anatomy, both normal and abnormal. The book has extensive reference indexes detailing developmental stage criteria. The Anatomical Basis of Mouse Development will be a key reference work for anyone who needs to understand developmental anatomy in normal and mutant mice. Key Features * Complements Kaufman's The Atlas of Mouse Development * Gives anatomical descriptions from oogenesis to birth, at a level of detail that goes beyond that found in most literature * Provides detailed explanations for geneticists and molecular biologists with limited anatomical background to help them understand the emergence of all the major structures in the mouse embryo * Contains

comprehensive indexes detailing the appearance of over 1000 organs, tissues, and their components at different stages of mouse embryogenesis * Includes comparisons with normal and abnormal human development * Contains over 100 clear line diagrams showing mouse developmental anatomy as well as lineage relationships for the major organ systems

A Laboratory Guide to the Mammalian Embryo National Academies Press

"A subject collection from Cold Spring Harbor perspectives in biology."

A Laboratory Manual Academic Press

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Methods and Protocols Humana

Because of the recent advances in embryo modeling techniques, and at the request of the Office of Science Policy in the Office of the Director at the National Institutes of Health, the National Academies of Sciences, Engineering, hosted a 1-day public workshop that would explore the state of the science of mammalian embryo model systems. The workshop, which took place on January 17, 2020, featured a combination of presentations, panels, and general discussions, during which panelists and participants offered a broad range of perspectives. Participants considered whether embryo model systems - especially those that use nonhuman primate cells - can be used to predict the function of systems made with human cells. Presentations provided an overview of the current state of the science of in vitro development of human trophoblast. This publication summarizes the presentation and discussion of the workshop.

Methods and Protocols Cold Spring Harbor, N.Y. : Cold Spring Harbor Laboratory Press

Protecting the reproductive potential of young patients undergoing cancer therapy is increasingly important. With modern treatment protocols, 80% of patients can be expected to survive. It has been estimated that up to one in 250 young adults will be a survivor of childhood cancer in the future; infertility, however, may be a consequence. As a wide range of fertility preservation methods are increasingly offered by clinicians, this systematic and comprehensive textbook dealing with the cryobiology, technology and clinical approach to this therapy will be essential reading to infertility specialists, embryologists, oncologists, cryobiologists, ObGyns, andrologists, and urologists with an interest in fertility preservation. Fertility Cryopreservation reviews all the techniques of this increasingly important field within reproductive medicine. It covers the basic principles of pertinent cryobiology, and contains major sections on the different therapies available, written by international specialists combining experience from both academic centers and commercial industries.

Principles of IVF Laboratory Practice Springer Science & Business Media

Developmental biology has been transformed recently by discoveries in the fields of molecular biology, cell biology, and immunology. New ways of manip ulating mammalian development are uncovering control mechanisms and ena bling us to apply them in solving practical problems in animal production and human health. This book outlines some of these new manipulations and how they have contributed to the present state of developmental biology. Chapter 1 describes gene transfer by micro injection of cloned recombinant DNA into zygotes. Although the factors that affect transformation frequencies and integration sites are still unknown, such techniques offer a number of exciting prospects. Research models for human disease coula be artificially created and desirable characteristics in agricultural animals could be - hanced. . The theme of cell-to-cell transfer is continued in Chapters 2 and 3. Chapter 2 describes pronuclear transplantation by Sendai virus-induced fusion of the karyoplast with the enucleated embryo. Using this procedure, it has been dem onstrated that both male and female genomes are essential for normal develop ment, although the reason for this is not yet understood. Chapter 3 describes studies on the fusion of whole oocytes. .