Genome Engineering Using The Crispr Cas9 System Mit

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Reprogramming the Genome: Applications of CRISPR-Cas in non-mammalian systems part A John Wiley & Sons

Heritable human genome editing - making changes to the genetic material of eggs, sperm, or any cells that lead to their development, including the cells of early embryos, and establishing a pregnancy - raises not only scientific and medical considerations but also a host of ethical, moral, and societal issues. Human embryos whose genomes have been edited should not be used to create a pregnancy until it is established that precise genomic changes can be made reliably and without introducing undesired changes - criteria that have not yet been met, says Heritable Human Genome Editing. From an international commission of the U.S. National Academy of Medicine, U.S. National Academy of Sciences, and the U.K.'s Royal Society, the report considers potential benefits, harms, and uncertainties associated with genome editing technologies and defines a translational pathway from rigorous preclinical research to initial clinical uses, should a country decide to permit such uses. The report specifies stringent preclinical and clinical requirements for establishing safety and efficacy, and for undertaking long-term monitoring of outcomes. Extensive national and international dialogue is needed before any country decides whether to permit clinical use of this technology, according to the report, which identifies essential elements of national and international scientific governance and oversight.

CRISPR and RNAi Systems Elsevier

Genome Engineering via CRISPR-Cas9 Systems presents a compilation of chapters from eminent scientists from across the globe who have established expertise in working with CRISPR-Cas9 systems. Currently, targeted genome engineering is a key technology for basic science, biomedical and industrial applications due to the relative simplicity to which they can be designed, used and applied. However, it is not easy to find relevant information gathered in a single source. The book contains a wide range of applications of CRISPR in research of bacteria, virus, algae, plant and mammalian and also discusses the modeling of drosophila, zebra fish and protozoan, among others. Other topics covered include diagnosis, sensor and therapeutic applications, as well as ethical and regulatory issues. This book is a valuable source not only for beginners in genome engineering, but also researchers, clinicians, stakeholders, policy makers, and practitioners interested in the potential of CRISPR-Cas9 in several fields.

CRISPR-Cas in Agriculture: Opportunities and Challenges Academic Press

This book presents descriptive overviews of gene editing strategies across multiple species while also offering in-depth insight on complex cases of application in the field of tissue engineering and regenerative medicine. Chapters feature contributions from leaders in stem cell therapy and biology, providing a comprehensive view of the application of gene therapy in numerous fields with an emphasis on ophthalmology, stem cells, and agriculture. The book also highlights recent major technological advances, including ZFN, TALEN, and CRISPR. Precision Medicine, CRISPR, and Genome Engineering is part of the highly successful Advances in Experimental Medicine and Biology series. It is an indispensable resource for researchers and students in genetics as well as clinicians.

Genome Editing CRC Press

Reprogramming the Genome: Applications of CRISPR-Cas in Non-mammalian Systems Part B, represents the collation of chapters written by eminent scientists worldwide. CRISPR-Cas9 system is an RNA-mediated immune system of bacteria and archaea that protects from bacteriophage infections. It is one of the revolutionized technologies to uplift biology to the next stages. It is a simple, rapid, precise, and cost-effective tool for genome editing and regulation of a wide range of organisms. It has gained scientific and public attention worldwide. This volume mainly covers insect cell line, protozoans, zebrafish, drosophila, CRISPRi, patents as well as technology transfer, and many more. This book is a key source of information available in a single volume. This book will be useful for not only beginners in genome engineering, but also students, researchers, scientists, policymakers, and stakeholders interested in harnessing the potential of reprogramming of the genomes in several areas. Offers basic understanding and a clear picture of genome editing CRISPR-Cas systems in different organisms Explains how to create an animal model for disease diagnosis/research and reprogram CRISPR for insect cell line, protozoans, zebrafish, drosophila, and many more Discusses the advances, patents, applications, challenges and opportunities in CRISPR-Cas9 systems in basic sciences, biomedicine, molecular biology and many more

Genome Engineering via CRISPR-Cas9 System John Wiley & Sons

This book discusses CRISPR/Cas- one of the most powerful tools available to scientists for genome editing. CRISPR/Cas is not only a genome editing tool, but researchers have also engineered it for gene regulation, genome imaging, base editing and epigenome regulations. This book describes the entire toolkit for CRISPR/Cas. The opening section gives an introduction to the technique and compares it with other genome editing tools. Further section gives a historical perspective of the tool, along with its detailed classification. The next chapters describe bioinformatic tools in CRISPR/Cas, and delivery methods for CRISPR/Cas. The book also discusses about the applications of CRISPR/Cas beyond genome editing and use of CRISPR for rewriting genetic codes. The book dedicates a section to the use of CRISPR in plants. The book culminates with a chapter on the current status, challenges and shortcomings of the CRISPR/Cas genome editing tool. The book would be highly

interesting to students and researchers in molecular biology, biochemistry, biotechnology, food science, agriculture and plant sciences.

Modern Prometheus Academic Press

Crop Genome Editing Using CRISPR/Cas9: Theory and Practice is a highly useful reference for implementing genome engineering technologies, particularly CRISPR related projects in agricultural crops and other plants. This book provides an introduction to CRISPR's basic science and applied aspects, along with detailed protocols. It presents a detailed workflow, beginning with genome sequence retrieval and then mutation analysis in genome edited events using sequencing tools. The book helps those in the field methodically plan, design and conduct experiments. This practical guide will dramatically help researchers in accelerating conventional plant breeding programs. Offers a detailed review of literature on genome editing tools, with special emphasis paid to CRISPR/Cas9 and its advancements Contains step-by-step guidelines for single guide RNA design, CRISPR vector construction, protoplast transformation, mutation analysis and Agrobacterium-based regeneration of mutant plants Includes detailed troubleshooting tips during various steps

Crop Genome Editing Using CRISPR/Cas9 CRC Press

Targeted Genome Engineering via CRISPR/Cas9 in Plants provides in-depth insights into the use of the emerging “CRISPR/Cas9” technology for precise genome editing. This technology has revolutionized plant science research particularly for crop improvement owing to its simplicity and efficiency. Targeted Genome Engineering via CRISPR/Cas9 in Plants provides a wide range of CRISPR/Cas9 gene editing techniques for numerous varieties of plants. Chapters include the latest applications of CRISPR/Cas9 system in connection with abiotic stress, biotic stress, biofortification, yield improvement, disease modelling and prognosis and molecular diagnosis. This book also evaluates various regulatory and ethical aspects that must be considered when implementing the CRISPR/Cas9 approach. This book is a valuable resource for professionals and researchers, as it provides effective CRISPR/Cas9-based strategies for sustainable agriculture and treatment of infectious and non-infectious diseases.

Reprogramming the Genome: Applications of CRISPR-Cas in non-mammalian systems part B Springer

BY THE WINNER OF THE 2020 NOBEL PRIZE IN CHEMISTRY | Finalist for the Los Angeles Times Book Prize “A powerful mix of science and ethics . . . This book is required reading for every concerned citizen—the material it covers should be discussed in schools, colleges, and universities throughout the country.” — New York Review of Books Not since the atomic bomb has a technology so alarmed its inventors that they warned the world about its use. That is, until 2015, when biologist Jennifer Doudna called for a worldwide moratorium on the use of the gene-editing tool CRISPR—a revolutionary new technology that she helped create—to make heritable changes in human embryos. The cheapest, simplest, most effective way of manipulating DNA ever known, CRISPR may well give us the cure to HIV, genetic diseases, and some cancers. Yet even the tiniest changes to DNA could have myriad, unforeseeable consequences, to say nothing of the ethical and societal repercussions of intentionally mutating embryos to create “better” humans. Writing with fellow researcher Sam Sternberg, Doudna—who has since won the Nobel Prize for her CRISPR research—shares the thrilling story of her discovery and describes the enormous responsibility that comes with the power to rewrite the code of life. “The future is in our hands as never before, and this book explains the stakes like no other.” — George Lucas “An invaluable account . . . We owe Doudna several times over.” — Guardian

The Use of CRISPR/cas9, ZFNs, TALENs in Generating Site-Specific Genome Alterations Gale, Cengage Learning

Would you change your genes if you could? As we confront the 'industrial revolution of the genome', the recent discoveries of Crispr-Cas9 technologies are offering, for the first time, cheap and effective methods for editing the human genome. This opens up startling new opportunities as well as significant ethical uncertainty. Tracing events across a fifty-year period, from the first gene splicing techniques to the present day, this is the story of gene editing - the science, the impact and the potential. Kozubek weaves together the fascinating stories of many of the scientists involved in the development of gene editing technology. Along the way, he demystifies how the technology really works and provides vivid and thought-provoking reflections on the continuing ethical debate. Ultimately, Kozubek places the debate in its historical and scientific context to consider both what drives scientific discovery and the implications of the 'commodification' of life.

Genome Engineering via CRISPR-Cas9 System Academic Press

Genome Engineering via CRISPR-Cas9 Systems presents a compilation of chapters from eminent scientists from across the globe who have established expertise in working with CRISPR-Cas9 systems. Currently, targeted genome engineering is a key technology for basic science, biomedical and industrial applications due to the relative simplicity to which they can be designed, used and applied. However, it is not easy to find relevant information gathered in a single source. The book contains a wide range of applications of CRISPR in research of bacteria, virus, algae, plant and mammalian and also discusses the modeling of drosophila, zebra fish and protozoan, among others. Other topics covered include diagnosis, sensor and therapeutic applications, as well as ethical and regulatory issues. This book is a valuable source not only for beginners in genome engineering, but also researchers, clinicians, stakeholders, policy makers, and practitioners interested in the potential of CRISPR-Cas9 in several fields. Provides basic understanding and a clear picture on how to design, use and implement the CRISPR-Cas9 system in different organisms Explains how to create an animal model for disease research and screening purposes using CRISPR Discusses the application of CRISPR-Cas9 systems in basic sciences, biomedicine, virology, bacteriology, molecular biology, neurology, cancer, industry, and many more

A Crack In Creation Springer Nature

This book is open access under a CC BY 4.0 license. CRISPR-Cas9 is a rapid, efficient, versatile and relatively cheap method for dissecting the molecular pathways that are the basis of life, as well as for investigating and potentially rectifying faults in these pathways that result in disease. This book reviews how CRISPR-Cas9 and other genome editing techniques are

advancing our understanding of development and function in the nervous system, uncovering the molecular causes of neurological disorders and providing tools for gene therapy.

The CRISPR/Cas Tool Kit for Genome Editing National Academies Press

Reprogramming the Genome: CRISPR-Cas-based Human Disease Therapy, presents the collation of chapters written by eminent scientists worldwide. CRISPR-Cas9 is a key technology for targeted genome editing and regulation in a number of organisms including mammalian cells. It is a rapid, simple, and cost-effective solution. CRISPR-Cas system has recently gained much scientific and public attention. This volume covers CRISPR-Cas9 based mammalian genome editing, creating disease models, cancer therapy, neurological, heredity, blood disorders, defective gene correction, stem cells therapy, epigenetic modifications, patents, ethics, biosafety and regulatory issues challenges and opportunities. This book is a key source of information on mammalian genome editing available in a single volume. This book will be useful for beginners in mammalian genome editing and also students, researchers, scientists, policymakers, clinicians and stakeholders interested in genome editing in several areas. Offers basic understanding and a clear picture of mammalian genome editing through CRISPR-Cas systems Discusses how to create mammalian disease models, stem cell modification, epigenetic modifications, correction of defective gene in blood disorders, heredity, neurological disorders and many more Discusses the application of CRISPR-Cas9 systems in basic sciences, biomedicine, molecular biology, translational sciences, neurobiology, neurology, cancer, stem cells, and many more

CRISPR-/Cas9 Based Genome Editing for Treating Genetic Disorders and Diseases Academic Press

Reprogramming the Genome: Applications of CRISPR-Cas in Non-mammalian Systems, Part A presents a collation of chapters written by global, eminent scientists. CRISPR-Cas9 system is an RNA-mediated immune system of bacteria and archaea that protects from bacteriophage infections. It is one of the revolutionized technologies to uplift biology to the next stages. Chapters in this release include An Introduction and applications of CRISPR-Cas Systems, History, evolution and classification of CRISPR-Cas associated systems, CRISPR based bacterial genome editing and removal of pathogens, CRISPR based genome editing and removal of human viruses, CRISPR based development of RNA editing and diagnostic platform, and much more. Additional sections cover Genome engineering in insects for control of vector borne diseases, Development of insect cell line using CRISPR technology, CRISPRing protozoan parasites to better understand the biology of diseases, CRISPR based genome editing of Caenorhabditis elegans, and a variety of other important topics. Offers a basic understanding and clear picture of genome editing CRISPR-Cas systems in different organisms Explains how to create an animal model for disease diagnosis/research and reprogram CRISPR for removal of virus, bacteria, fungi, protozoan, and many more Discusses the advances, patents, applications, challenges and opportunities in CRISPR-Cas9 systems in basic sciences, biomedicine, virology, bacteriology, molecular biology, and many more

CRISPR Academic Press

One of the world's leading experts on genetics unravels one of the most important breakthroughs in modern science and medicine. IIf our genes are, to a great extent, our destiny, then what would happen if mankind could engineer and alter the very essence of our DNA coding? Millions might be spared the devastating effects of hereditary disease or the challenges of disability, whether it was the pain of sickle-cell anemia to the ravages of Huntington ' s disease. But this power to " play God " also raises major ethical questions and poses threats for potential misuse. For decades, these questions have lived exclusively in the realm of science fiction, but as Kevin Davies powerfully reveals in his new book, this is all about to change. Engrossing and page-turning, Editing Humanity takes readers inside the fascinating world of a new gene editing technology called CRISPR, a high-powered genetic toolkit that enables scientists to not only engineer but to edit the DNA of any organism down to the individual building blocks of the genetic code. Davies introduces readers to arguably the most profound scientific breakthrough of our time. He tracks the scientists on the front lines of its research to the patients whose powerful stories bring the narrative movingly to human scale. Though the birth of the " CRISPR babies " in China made international news, there is much more to the story of CRISPR than headlines seemingly ripped from science fiction. In Editing Humanity, Davies sheds light on the implications that this new technology can have on our everyday lives and in the lives of generations to come.

Crop Genome Editing Using CRISPR/Cas9 Springer Science & Business Media

The CRISPR-Cas9 genome-editing system is creating a revolution in the science world. In the laboratory, CRISPR-Cas9 can efficiently be used to target specific genes, correct mutations and regulate gene expression of a wide array of cells and organisms, including human cells. CRISPR-/Cas9 Based Genome Editing for Treating Genetic Disorders and Diseases is a unique reading material for college students, academicians, and other health professionals interested in learning about the broad range of applications of CRISPR/Cas9 genetic scissors. Some topics included in this book are: the role of the CRISPR/Cas9 system in neuroscience, gene therapy, epigenome editing, genome mapping, cancer, virus infection control strategies, regulatory challenges and bioethical considerations.

Precision Medicine, CRISPR, and Genome Engineering Simon and Schuster

Would you change your genes if you could? As we confront the 'industrial revolution of the genome', the recent discoveries of Crispr-Cas9 technologies are offering, for the first time, cheap and effective methods for editing the human genome. This opens up startling new opportunities as well as significant ethical uncertainty. Tracing events across a fifty-year period, from the first gene splicing techniques to the present day, this is the story of gene editing - the science, the impact and the potential. Kozubek weaves together the fascinating stories of many of the scientists involved in the development of gene editing technology. Along the way, he demystifies how the technology really works and provides vivid and thought-provoking reflections on the continuing ethical debate. Ultimately, Kozubek places the debate in its historical and scientific context to

consider both what drives scientific discovery and the implications of the 'commodification' of life.

CRISPR Gene Editing Springer

This book offers a comprehensive collection of papers on CRISPR/Cas genome editing in connection with agriculture, climate-smart crops, food security, translational research applications, bioinformatics analysis, practical applications in cereals, floriculture crops, engineering plants for abiotic stress resistance, the intellectual landscape, regulatory framework, and policy decisions. Gathering contributions by internationally respected experts in the field of CRISPR/Cas genome editing, the book offers an essential guide for researchers, students, teachers and scientists in academia; policymakers; and public companies, private companies and cooperatives interested in understanding and/or applying CRISPR/Cas genome editing to develop new agricultural products.

CRISPR People Springer Nature

Recent advances in genome editing tools using endonucleases such as TALENs, ZFNs, and CRISPRs, combined with genomic engineering technologies, have opened up a wide range of opportunities from applications in the basic sciences and disease biology research, to the potential for clinical applications and the development of new diagnostic tools. This complete guide to endonuclease-based genomic engineering gives readers a thorough understanding of this rapidly expanding field. Chapters cover the discovery, basic science, and application of these techniques, focusing particularly on their potential relevance to the treatment of cancer, and cardiovascular and immunological disease. The final section discusses the legal and ethical issues which accompany the technology. Providing authoritative coverage of the potential that genome editing and engineering have, this is an ideal reference for researchers and graduate students and those working in the biotechnology and pharmaceutical industries, as well as in a clinical setting.

CRISPR: Genome Editing and Engineering And Related Issues Cambridge University Press

CRISPR/Cas is a recently described defense system that protects bacteria and archaea against invasion by mobile genetic elements such as viruses and plasmids. A wide spectrum of distinct CRISPR/Cas systems has been identified in at least half of the available prokaryotic genomes. On-going structural and functional analyses have resulted in a far greater insight into the functions and possible applications of these systems, although many secrets remain to be discovered. In this book, experts summarize the state of the art in this exciting field.

Genome Editing and Engineering Springer Nature

The book presents a machine-generated literature review on CRISPR (clustered regularly interspaced short palindromic repeats) from 114 selected papers published by Springer Nature in the last few years, which are then organized by the book editors with a human-written introduction to each chapter. Each chapter presents summaries of predefined themes and provides the reader with a basis for further exploration of the topic. As one of the experimental projects initiated by Springer Nature for AI book content generation, this book shows the latest developments in the CRISPR field. It will be a useful reference for graduate students who are interested in CRISPR-related research and early-career researchers who need an overview of the current development of the field.