

The use of animal models in rheumatoid arthritis research

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The pathological hallmark of rheumatoid arthritis (RA) is a synovial pannus that comprises proliferating and invasive fibroblast-like synoviocytes, infiltrating inflammatory cells, and an associated neoangiogenic response. Animal models have been established to study these pathological features of human RA. Spontaneous and induced animal models of RA primarily reflect inflammatory aspects of the disease. Among various induced animal models, collagen-induced arthritis (CIA) and collagen antibody-induced arthritis (CAIA) models are widely used to study the pathogenesis of RA. Improved transplantation techniques for severe combined immunodeficiency (SCID) mouse models of RA can be used to evaluate the effectiveness of potential therapeutics in human tissues and cells. This review provides basic information on various animal models of RA, including CIA and CAIA. In addition, we describe a SCID mouse coimplantation model that can measure the long-distance migration of human RA synoviocytes and cartilage destruction induced by these cells.

Keywords: Animal models; Cell movement; Rheumatoid arthritis; Severe combined immunodeficient mice; Synoviocytes

Introduction

Rheumatoid arthritis (RA) is a common autoimmune disorder that affects approximately 1% of the global population. It is characterized by tumor-like expansion of the synovium, angiogenesis, and destruction of the articular cartilage and bone [1]. Despite the advent of anticytokine therapies that ameliorate the inflammatory manifestations of RA, there is no curative treatment and the pathogenesis of the disease is not fully understood. In RA joints, various cell populations, including innate immune cells, adaptive immune cells, endothelial cells, and fibroblast-like synoviocytes (FLSs), are activated [1]. Resident synoviocytes participate in the chronic inflammatory response and joint destruction in RA, and in fact,

these cells represent the major cell population in the invasive pannus [2]. RA-FLSs have the potential to secrete matrix-degrading enzymes (matrix metalloproteinase 3 [MMP3] and MMP9), pro-inflammatory cytokines (interleukin 1 [IL-1] and IL-6), chemokines (IL-8 and C-C motif chemokine ligand 2), and angiogenic factors (vascular endothelial growth factor and placental growth factor) [2]. Moreover, although RA synoviocytes are primary cells, they proliferate abnormally and display resistance to Fas-mediated apoptosis, similar to cancer cells [2,3]. During RA development, the phenotype of RA-FLSs is altered to an invasive and aggressive behavior, with increased migratory ability and reduced attachment-dependent growth, leading to articular cartilage destruction [2,4]. RA-FLSs can spread by migrating from the af-

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Genetic Studies Of Rheumatoid Arthritis Using Animal Models

Ian Pickup



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Genetic Studies of Rheumatoid Arthritis Using Animal Models Niklas Nordquist,2001 Animal Models in Orthopaedic Research Yuehuei H. An,Richard J. Freidman,2020-04-30 Animal Models in Orthopaedic Research is a reference book of the major animal models used in the study of orthopaedic conditions and in the in vivo study of biomaterials Use of animal models provides important knowledge about pathological conditions that can eventually lead to the development of more effective clinical treatment of diseases in bot *Genes and Genetics of Autoimmunity* A. N. Theofilopoulos,1999-07 Autoimmunity is one of the most highly investigated areas of immunologic research The principle of immune system discrimination between self and foreign molecules is fundamental to the survival of the species and the failure to establish or maintain this discrimination can lead to a wide spectrum of diseases As a consequence of intensive studies much has been learned with regard to the normal functioning of the immune system and the editing processes by which self tolerance is established Moreover many theories and experimental models have been developed to explore the mechanisms of autoimmune disease pathogenesis This book is the first volume of the new series Current Directions in Autoimmunity which aims to consolidate current knowledge of autoimmunity focusing on both basic and clinical aspects Given that these diseases have a strong genetic basis it seems appropriate that the first volume addresses this topic It reviews the most recent findings on genes affecting autoimmunity and genome wide studies defining the multiple loci predisposing to prominent autoimmune diseases such as lupus arthritis diabetes and multiple sclerosis For each of these entities studies in experimental models as well as humans are covered The authoritative and timely material will be of interest to investigators in the fields of immunology and genetics to clinicians with interest in rheumatology endocrinology and neurology and to those working to devise gene specific therapies for a variety of inflammatory conditions *Current Topics In Human Genetics: Studies In Complex Diseases* Hong-wen Deng,Hui Shen,Yongjun Liu,Hai Hu,2007-11-12 The sequencing of the human genome has brought human genetics into a new era of study resulting in the generation of an explosive amount of information Application of genomic proteomic and bioinformatics technologies to the study of human genetics has made it possible for human genetic diseases to be studied on an unprecedented scale both in silico and in the wet lab This volume provides up to date coverage of the broad range of research topics in this fascinating area In the first part of the book a whole spectrum of approaches to human genetics research is reviewed for both background and the latest progress In the second important topics related to genetic research of various complex human diseases are discussed The robust content and diverse array of subjects allow the book to serve as both a concise encyclopedia that introduces basic and essential concepts of human genetics and an in depth review of the current understanding of genetic research in human diseases **Rheumatoid Arthritis: New Insights for the Healthcare Professional: 2013 Edition** ,2013-07-22 Rheumatoid Arthritis New Insights for the Healthcare Professional 2013 Edition is a ScholarlyEditions book that delivers timely authoritative and comprehensive information about

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Budd,Sherine E Gabriel,Iain B McInnes,James R. O'Dell,2016-06-21 Consult the definitive resource in rheumatology for an in depth understanding of scientific advances as they apply to clinical practice Masterfully edited by Drs Gary S Firestein Ralph C Budd Sherine E Gabriel Iain B McInnes and James R O Dell and authored by internationally renowned scientists and clinicians in the field Kelley and Firestein s Textbook of Rheumatology 10th Edition delivers the knowledge you need for accurate diagnoses and effective patient care From basic science immunology anatomy and physiology to diagnostic tests procedures and specific disease processes this state of the art reference provides a global authoritative perspective on the manifestations diagnosis and treatment of rheumatic diseases An ideal balance of the basic science you need to know and how to apply that information to clinical practice An integrated chapter format allows you to review basic science advances and their clinical implications in one place and get dependable evidence based guidance for the full range of rheumatologic diseases and syndromes Consult this title on your favorite e reader conduct rapid searches and adjust font sizes for optimal readability New content on the latest diagnostic perspectives and approaches to therapy including five brand new chapters Metabolic Regulation of Immunity Principles of Signaling Research Methods in the Rheumatic Diseases Novel Intracellular Targeting Agents and IgG4 Related Diseases New and expanded chapter topics on small molecule treatment biologics biomarkers epigenetics biosimilars and cell based therapies More schematic diagrams clearly summarize information and facilitate understanding **Firestein & Kelley's Textbook of Rheumatology - E-Book** Gary S. Firestein,Ralph C.

Budd,Sherine E Gabriel,Iain B McInnes,James R. O'Dell,2020-07-05 Through 10 outstanding editions Kelley Firestein s Textbook of Rheumatology has provided authoritative in depth guidance in rheumatology with an ideal balance of basic science and clinical application The 11th Edition of this classic text continues this tradition of excellence while keeping you abreast of recent advances in genetics and the microbiome new therapies such as biologics and biosimilars and other rapid changes in the field It provides comprehensive global coverage of all aspects of diagnosis screening and treatment in both adults and children in a user friendly full color reference Covers everything from basic science immunology anatomy and physiology to diagnostic tests procedures and specific disease processes including key data on therapeutic outcomes to

better inform clinical decision making Includes new chapters on Innate Lymphoid Cells and Natural Killer Cells Pathogenesis of Inflammasome Mediated Diseases Bisphosphonates Ultrasound Evaluation of the Musculoskeletal System and Evaluation of Monoarticular and Polyarticular Arthritis Features 1 200 high quality illustrations including superb line art quick reference tables and full color clinical photographs Shares the knowledge and expertise of internationally renowned scientists and clinicians including new editor Dr Gary Koretzky specialist in immunology and rheumatology Demonstrates the complete musculoskeletal exam in online videos including abnormal findings and the arthroscopic presentation of diseased joints Enhanced eBook version included with purchase Your enhanced eBook allows you to access all of the text figures and references from the book on a variety of devices The Mouse In Animal Genetics And Breeding Research Eugene J Eisen,2005-06-27 The sequencing of the mouse genome has placed the mouse front and center as the most important mammalian genetics model However no recent volume has detailed the genetic contributions the mouse has made across the spectrum of the life sciences this book aims to fill that vacuum Mouse genetics research has made enormous contributions to the understanding of basic genetics human genetics and livestock genetics and breeding The wide ranging topics in the book include the mouse genome sequencing effort molecular dissection of quantitative traits embryo biotechnology ENU mutagenesis and genetics of disease resistance and have been written by experts in their respective fields **Handbook of Laboratory Animal Science, Volume III** Jann Hau,Steven J. Schapiro,2013-12-26 While replacing and reducing the use of laboratory animals are integral parts of the 3Rs replace reduce refine which form the cornerstones of laboratory animal science biomedical research involving animals remains absolutely essential for the advancement of the medical veterinary agricultural and biological sciences Building upon the bestsel Kelley's Textbook of Rheumatology Gary S. Firestein,William N. Kelley,2013 Helps you to better understand scientific underpinnings of rheumatic diseases so that you can better manage your patients **Index Medicus** ,2001-05 Vols for 1963 include as pt 2 of the Jan issue Medical subject headings Encyclopedia of Immunobiology ,2016-04-27 Encyclopedia of Immunobiology Five Volume Set provides the largest integrated source of immunological knowledge currently available It consists of broad ranging validated summaries on all of the major topics in the field as written by a team of leading experts The large number of topics covered is relevant to a wide range of scientists working on experimental and clinical immunology microbiology biochemistry genetics veterinary science physiology and hematology The book is built in thematic sections that allow readers to rapidly navigate around related content Specific sections focus on basic applied and clinical immunology The structure of each section helps readers from a range of backgrounds gain important understanding of the subject Contains tables pictures and multimedia features that enhance the learning process In depth coverage allows readers from a range of backgrounds to benefit from the material Provides handy cross referencing between articles to improve readability including easy access from portable devices

Genomic and Personalized Medicine ,2012-10-30 Genomic and Personalized Medicine Second Edition winner of a

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Immunogenomics and Human Disease Andras Falus,2006-03-30 This book provides an overview of key conceptual and molecular technologies being deployed in immunogenomics followed by detailed evaluations of the impact of genomics and systems biology on important areas such as cancer immunology autoimmunity allergy and the response to infection

Preclinical Rheumatic Disease, An Issue of Rheumatic Disease Clinics Vivian P. Bykerk,2014-11-20 The ability to intervene at the earliest phases in the pathogenesis of a chronic rheumatic disease caused by auto inflammatory autoimmune or tissue injury mechanisms has the potential to prevent disease manifestations and consequences limited loss of quality of life comorbidity and costs to society This issue is dedicated to exploring the stages of rheumatic disease biologic mechanisms contributing to the pathogenesis along with possible ways to study and screen for persons at risk with the ultimate goal of finding ways to prevent these devastating diseases Oxford Textbook of Rheumatoid Arthritis David L. Scott,James Galloway,Andrew Cope,Arthur Pratt,Vibeke Strand,2020-09-18 This brand new textbook of rheumatoid arthritis RA is an important addition to the Oxford Textbooks in Rheumatology series and provides a comprehensive overview of both the scientific and clinical aspects of the disease Divided into eight sections from the history diagnosis and epidemiology of the disease through the pathogenesis clinical presentation and assessment to treatments and management strategies both drug and non drug based each chapter is written by leading clinicians and scientists in the field to deliver a contemporary view of RA During the past two decades there have been revolutionary changes in the understanding and management of rheumatoid arthritis in particular the development of biological treatments

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Animal Models in Experimental Medicine Faris Q. Alenzi,2024-02-06 This reference presents information about models utilized in experimental medicine and pharmaceutical research and development for several human diseases Written by experts in immunology cancer biology and pharmacology the book provides readers with handy notes and updated data on animal models that are critical to research planning and lab execution The main feature of the book is a set of 12 structured chapters that focus on a specific disease such as cancer infectious diseases autism autoimmune diseases Alzheimer s disease and anemia The contributors have gathered information on a wide range of genetic and physiological animal models that are employed in research with comparative charts that highlight their main differences The book also includes chapters for special topics like food allergies and dentistry Additional features of the book are an explanation of disease mechanisms that give an easy understanding notes for idiopathic models and specific clinical conditions and a list of references for advanced readers Animal Models In Experimental Medicine is essential reading for scholars graduate students and senior researchers in life sciences and clinical medicine It also serves as a resource for professionals involved in bench to bedside pharmaceutical projects Readership Scholars graduate students and senior researchers in life sciences and clinical medicine professionals involved in bench to bedside pharmaceutical projects *Departments of Labor, Health and Human Services, Education, and Related Agencies Appropriations for 1998* ,1997

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Table of Contents Genetic Studies Of Rheumatoid Arthritis Using Animal Models

1. Understanding the eBook Genetic Studies Of Rheumatoid Arthritis Using Animal Models
 - The Rise of Digital Reading Genetic Studies Of Rheumatoid Arthritis Using Animal Models
 - Advantages of eBooks Over Traditional Books
2. Identifying Genetic Studies Of Rheumatoid Arthritis Using Animal Models
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Genetic Studies Of Rheumatoid Arthritis Using Animal Models
 - User-Friendly Interface
4. Exploring eBook Recommendations from Genetic Studies Of Rheumatoid Arthritis Using Animal Models
 - Personalized Recommendations
 - Genetic Studies Of Rheumatoid Arthritis Using Animal Models User Reviews and Ratings
 - Genetic Studies Of Rheumatoid Arthritis Using Animal Models and Bestseller Lists
5. Accessing Genetic Studies Of Rheumatoid Arthritis Using Animal Models Free and Paid eBooks
 - Genetic Studies Of Rheumatoid Arthritis Using Animal Models Public Domain eBooks
 - Genetic Studies Of Rheumatoid Arthritis Using Animal Models eBook Subscription Services

- Genetic Studies Of Rheumatoid Arthritis Using Animal Models Budget-Friendly Options
- 6. Navigating Genetic Studies Of Rheumatoid Arthritis Using Animal Models eBook Formats
 - ePub, PDF, MOBI, and More
 - Genetic Studies Of Rheumatoid Arthritis Using Animal Models Compatibility with Devices
 - Genetic Studies Of Rheumatoid Arthritis Using Animal Models Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Genetic Studies Of Rheumatoid Arthritis Using Animal Models
 - Highlighting and Note-Taking Genetic Studies Of Rheumatoid Arthritis Using Animal Models
 - Interactive Elements Genetic Studies Of Rheumatoid Arthritis Using Animal Models
- 8. Staying Engaged with Genetic Studies Of Rheumatoid Arthritis Using Animal Models
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Genetic Studies Of Rheumatoid Arthritis Using Animal Models
- 9. Balancing eBooks and Physical Books Genetic Studies Of Rheumatoid Arthritis Using Animal Models
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Genetic Studies Of Rheumatoid Arthritis Using Animal Models
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Genetic Studies Of Rheumatoid Arthritis Using Animal Models
 - Setting Reading Goals Genetic Studies Of Rheumatoid Arthritis Using Animal Models
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Genetic Studies Of Rheumatoid Arthritis Using Animal Models
 - Fact-Checking eBook Content of Genetic Studies Of Rheumatoid Arthritis Using Animal Models
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
- 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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