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Jan Barciszewski and Volker A. Erdmann

# Noncoding RNAs:

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# Noncoding Rnas Molecular Biology And Molecular Medicine

**Jan Barciszewski**



## **Noncoding Rnas Molecular Biology And Molecular Medicine:**

*Non-Coding RNAs* Jan Barciszewski, 2003-08-31 General inspection of a role performed in the cell by RNAs allows us to distinguish three major groups of transcripts I protein coding mRNAs II non coding housekeeping and III regulatory RNAs The housekeeping RNAs include RNA classes that are generally constitutively expressed and whose presence is required for normal function and viability of the cells On the other hand a group of regulatory RNAs includes RNA species that are expressed at certain stages of organism development or cell differentiation or as a response to external stimuli and can affect expression of other genes on the levels of transcription or translation Non coding RNA transcripts form a heterogeneous class of RNAs that can not be characterized by a single specific function Initially the term non coding RNA ncRNA was used primarily to describe polyadenylated and a capped eukaryotic RNAs transcribed by RNA polymerase II but lacking long open reading frames Now this definition can be extended to cover all RNA transcripts that do not show protein coding capacity and is sometimes used to describe any RNA that does not encode protein including introns This book is an in depth look at the function of Non Coding RNAs and their relationship to Molecular Biology and Molecular Biology Noncoding RNAs Jan

Barciszewski, 2003 General inspection of a role performed in the cell by RNAs allows us to distinguish three major groups of transcripts I protein coding mRNAs II non coding housekeeping and III regulatory RNAs The housekeeping RNAs include RNA classes that are generally constitutively expressed and whose presence is required for normal function and viability of the cells On the other hand a group of regulatory RNAs includes RNA species that are expressed at certain stages of organism development or cell differentiation or as a response to external stimuli and can affect expression of other genes on the

**Molecular Biology of Long Non-coding RNAs** Ahmad M. Khalil, 2019-06-06 This second edition shows how long non coding RNAs lnc RNAs have emerged as a new paradigm in epigenetic regulation of the genome Thousands of lncRNAs have been identified and observed in a wide range of organisms Unlike mRNA lncRNA have no protein coding capacity So while their function is not entirely clear they may serve as key organizers of protein complexes that allow for higher order regulatory events Advances in the field also include better characterization of human long non coding RNAs novel insights into their roles in human development and disease their diverse mechanisms of action and novel technologies to study them

*AGO-Driven Non-Coding RNAs* Bibekanand Mallick, 2019-01-20 The RNA world hypothesis that proposed RNA molecules as the first form of genetic material was put forwarded in the late 1980s but got impetus only recently when high throughput sequencing technologies began unearthing new types of non coding RNA ncRNA transcripts in higher eukaryotes Till then research on ncRNAs were primarily confined to transfer RNAs and ribosomal RNAs which act as the messengers of the protein synthesis and allow translation of genetic information encoded by DNA into proteins In recent years the integration of high throughput genomic technologies with molecular biology and omics sciences have revolutionized the fields of ncRNA research by identifying the hidden treasures of several new types of ncRNAs encoded in the genomes of several organisms

and decrypting their versatile roles in gene expression and epigenetics Among these two small endogenous ncRNAs namely microRNAs miRNAs and piwi interacting RNAs piRNAs that drive argonaute AGO family of proteins namely Ago and Piwi respectively and silence the expression of genes have geared up molecular and disease biology research in recent years Both miRNAs and piRNAs are expressed in higher eukaryotes including human and act as cellular rheostats by regulating the expression of significant fraction of genes encoded in the genomes The aberrant expressions of these small ncRNAs within the cells cause various abnormalities and diseases including cancer Manipulating their aberrant expression or function can serve as potential novel diagnostic prognostic biomarkers and bring in new therapeutic strategies for multiple human diseases This can be further translated from bench side to clinic for improving human health This book captures the essence of the pioneering work of some of the world's leading researchers showcasing the scientific excitements surrounding the evolving regulatory roles of miRNAs and piRNAs highlighting their potential towards the diagnosis and therapeutics of various diseases The book is geared towards scientists students and will particularly appeal to active investigators in RNA biology molecular biology cancer research as well as clinicians and will provide them a comprehensive view of recent discoveries and research progresses to utilize miRNAs piRNAs and their interacting proteins Ago and Piwi for diagnosis prognosis and therapeutics of diseases Provides a unified cutting edge resource for both miRNAs and piRNAs two promising AGO clade small ncRNAs their functions and potential applications Showcase high throughput technologies and other approaches for discovery of these small ncRNAs and their targets Unveils the diverse molecular mechanisms by which miRNAs and piRNAs regulate gene expression in animal cells Showcase recent discoveries on involvement of Argonaute and Piwi proteins in different biological processes and diseases as well as their possible use in diagnosis Report breakthroughs in the use of small ncRNAs for diagnosis and personalized therapy

### **The Chemical Biology of Long Noncoding RNAs**

Stefan Jurga, Jan Barciszewski, 2020-10-01 This book offers a comprehensive and detailed overview of various aspects of long non coding RNAs It discusses their emerging significance in molecular medicine ranging from human cancers to cardiovascular and metabolic diseases Transcriptomic studies have demonstrated that the majority of genomes found in complex organisms are expressed in highly dynamic and cell specific patterns producing huge numbers of intergenic antisense and intronic long non protein coding RNAs lncRNAs Thousands of lncRNAs have been identified and unlike mRNA they have no protein coding capacity A large repertoire of ncRNAs actively transcribed from the mammalian genome control diverse cellular processes both in terms of development and diseases through a variety of gene regulatory mechanisms lncRNAs have emerged as a new paradigm in epigenetic regulation of the genome Given its scope the book will be of particular interest to molecular chemical cell and developmental biologists as well as specialists in translational medicine involved in disease oriented research It also offers a valuable resource for in silico experts seeking a deeper understanding of lncRNA expression and function through computational analysis of the NGS data

*From Nucleic Acids Sequences to*

*Molecular Medicine* Volker A. Erdmann, Jan Barciszewski, 2012-06-13 Despite a half century of structural biophysical and biochemical investigations of ribonucleic acids they are still mysterious RNAs stand at fertile crossroads of disciplines integrating concepts from genomics proteomics dynamics as well as biochemistry and molecular biology From 20 years it is clear that genetic regulation of eukaryotic organisms has been misunderstood for the last years that the expression of genetic information is effected only by proteins Basic understanding of nucleic acids has enhanced our foundation to probe novel biological functions This is especially evident for RNA molecules whose functionality maturation and regulation require formation of correct secondary structure through encoded base pairing interactions      **International Review of Cytology** Kwang W. Jeon, 2003-12-18 The acclaimed International Review of Cytology series presents current advances and reviews in cell biology both plant and animal Articles address structure and control of gene expression nucleocytoplasmic interactions control of cell development and differentiation and cell transformation and growth Authored by some of the foremost scientists in the field each volume provides up to date information and directions for future research Contributors to this volume are The acclaimed International Review of Cytology series presents current advances and reviews in cell biology both plant and animal Articles address structure and control of gene expression nucleocytoplasmic interactions control of cell development and differentiation and cell transformation and growth Authored by some of the foremost scientists in the field each volume provides up to date information and directions for future research      **Long Non Coding RNA Biology** M.R.S. Rao, 2017-08-16 This contributed volume offers a comprehensive and detailed overview of the various aspects of long non coding RNAs and discusses their emerging significance Written by leading experts in the field it motivates young researchers around the globe and offers graduate and postgraduate students fascinating insights into genes and their regulation in eukaryotes and higher organisms      RNA Towards Medicine Volker A. Erdmann, Jürgen Brosius, Jan Barciszewski, 2006-02-04 Developments over the past few years have revealed the remarkable versatility of RNA in any compartment of the cell tasks that had been thought to be exclusively in the realm of proteins and even beyond The chapters in this book written by leading investigators in the field provide insight into various promising avenues where RNA and nucleic acid derivatives including antisense RNAs such as siRNA miRNAs amplification selection SELEX generated aptamers as well as ribozymes are at the threshold of impacting medicine      *Human Reproductive Genetics* Juan A. Garcia-Velasco, Emre Seli, 2020-04-19 Human Reproductive Genetics Emerging Technologies and Clinical Applications presents a great reference for clinicians and researchers in reproductive medicine Part I includes a brief background of genetics and epigenetics probability of disease and the different techniques that are being used today for analysis and genetic counseling Part II focuses on the analysis of the embryo current controversies and future concepts Part III comprises different clinical scenarios that clinicians frequently face in practice The increasing amount of genetic tests available and the growing information that patients handle makes this section a relevant part of the fertility treatment discussion Finally Part IV concludes with the psychological aspects of genetic

counseling and the role of counselor and bioethics in human reproduction Provides an essential reference for clinicians involved in reproductive medicine Builds foundational knowledge on new genetic tests coming into the clinical scenario for physicians involved with patients Assembles critically evaluated chapters that cover basic concepts of genetics and epigenetics and the techniques involved including preimplantation genetic testing controversies and more

**Recent Advances in Noncoding RNAs** Lütfti Tutar, 2022-11-02 The discovery of noncoding RNAs ncRNAs is changed our understanding of genome transcriptome and interactions with proteome in a cell Since the discovery of the first microRNA miRNA called lin 4 on *Caenorhabditis elegans* in 1993 our understanding of gene expression has deepened Further miRNA discoveries have led to the investigation of new ncRNA families and their function biogenesis and interactions with other types of molecules Recent developments in bioinformatics public databases sequencing technologies and biochemical techniques have increased our understanding of the biogenesis function and interactions of ncRNAs This book provides an overview of current ncRNA research dealing with human diseases and cancer and plant miRNAs

**RNA Technologies and Their Applications** Volker A. Erdmann, Jan Barciszewski, 2010-09-02 RNA technologies are the driving forces of modern medicine and biotechnology They combine the fields of biochemistry chemistry molecular biology cell biology physics nanotechnology and bioinformatics The combination of these topics is set to revolutionize the medicine of tomorrow After more than 15 years of extensive research in the field of RNA technologies the first therapeutics are ready to reach the first patients Thus we are witnessing the birth of a very exciting time in the development of molecular medicine which will be based on the methods of RNA technologies This volume is the first of a series It covers various aspects of RNA interference and microRNAs although antisense RNA applications hammerhead ribozyme structure and function as well as non coding RNAs are also discussed The authors are internationally highly respected experts in the field of RNA technologies

*Clinical Applications of Noncoding RNAs in Cancer* Subash Gupta, Kishore Challagundla, 2022-01-19 Clinical Applications of Noncoding RNAs in Cancer summarizes the existing strategies advances and future opportunities on the role of noncoding RNAs in cancer patients Established clinicians and researchers from all around the world share their views and expertise and provide readers with invaluable knowledge on the subject This book provides a comprehensive collection of information on the utility of noncoding RNAs in the diagnosis prognosis and therapy of cancer It also discusses the evolutionary significance of noncoding RNAs and how the molecular tools such as RNA seq RNA FISH ic SHAPE and quantitative real time PCR help in the detection and elucidation of the functions of noncoding RNAs Additionally the challenges associated with noncoding RNA approaches and future developments are discussed It is a valuable resource for cancer researchers oncologists clinicians and other biomedical field members who want to learn more about noninvasive ways to diagnose and efficiently treat diverse cancer types Presents a beginning chapter summary to help readers understand the content thoroughly Encompasses detailed description of information from clinical studies on noncoding RNAs in cancer therapy Discusses one cancer type per

chapter making the content easy to reference      **RNA Interference Technology** Krishnarao Appasani,2005-01-17 RNA Interference RNAi technology has rapidly become one of the key methods used in functional genomics RNAi is used to block the expression of genes and create phenotypes that can potentially yield clues about the function of these genes In the postgenomic era the elucidation of the physiological function of genes has become the rate limiting step in the quest to develop gene based drugs and RNAi could potentially play a pivotal role in the validation of such novel drugs In this overview the basic concepts and applications of RNAi biology are discussed Leading experts from both academia and industry have contributed to this invaluable reference The volume is forwarded by Andrew Fire one of the winners of the 2006 Nobel Prize for the discovery of RNA Interference      *Non-coding RNAs at the Cross-Road of Cardiometabolic Diseases and Cancer* Paul Holvoet,2021-03-26 This book gives insight into the functional role of non coding RNAs in central pathways contributing to the development of obesity type 2 diabetes non alcoholic fatty liver disease atherosclerosis myocardial infarction cardiomyopathy and heart failure It also sheds light on the relationship of this cluster with cancer Tumor cells in contrast to cells in cardiometabolic tissues can regulate this cluster of non coding RNAs to escape from oxidative stress and anti tumor immunity and maintain insulin sensitivity facilitating cancer progression The book presents a cluster of non coding RNAs that may be prospectively analyzed in extensive cohort studies to determine their value in risk predicting machine learning algorithms In addition it emphasizes the role of microvesicles in communication between tumor adjacent tissue inflammatory cells and tumor cells with a special focus on the role of miR 155 The book intends to promote interdisciplinary research Due to the comprehensive background information provided in each chapter it is suitable for researchers in academia and industry and for graduate students in biology bioengineering and medicine      Small RNAs as a Diverse Toolkit of Bacteria Olga N. Ozoline,Klaus Neuhaus,2022-01-05      *Long Non-Coding RNAs - Function, Mechanisms, and Applications* ,2025-07-02 LncRNAs contribute to cancer progression by regulating gene expression epigenetically and post transcriptionally They influence tumorigenesis through interactions with chromatin modifiers act as competitive endogenous RNAs to modulate microRNA activity and regulate processes such as epithelial mesenchymal transition EMT that facilitate metastasis LncRNAs affect cancer cell proliferation apoptosis migration metabolism and drug resistance making them crucial players in tumor development and potential targets for diagnosis and therapy The book covers the latest reports about lncRNAs      Proceedings Of The 4th Asia-Pacific Bioinformatics Conference Limsoon Wong,Phoebe Yi-ping Chen,Ueng-cheng Yang,Tao Jiang,2005-12-13 High throughput sequencing and functional genomics technologies have given us a draft human genome sequence and have enabled large scale genotyping and gene expression profiling of human populations Databases containing large numbers of sequences polymorphisms and gene expression profiles of normal and diseased tissues in different clinical states are rapidly being generated for human and model organisms Bioinformatics is thus rapidly growing in importance in the annotation of genomic sequences in the understanding of the interplay between genes and proteins in the

analysis of the genetic variability of species and so on This proceedings contains an up to date exchange of knowledge ideas and solutions to conceptual and practical issues of bioinformatics by researchers professionals and industrial practitioners at the 4th Asia Pacific Bioinformatics Conference held in Taipei in February 2006

**Non-Coding RNAs** Lütü Tutar,Sumer Aras,Esen Tutar,2020-03-04 Noncoding RNAs ncRNAs are an attractive research field in the RNA world ncRNAs play important roles in regulating gene expression in animals plants and various human diseases It is clear that current and further research on ncRNAs will change our knowledge of the nature of genome composition by editing previous dogmas This book provides an overview of current knowledge on ncRNA research by dealing with miRNA and ncRNA related human diseases plant miRNA markers and the roles of lncRNAs in cancer and epigenetics

**Non-coding Rna Transcripts In Cancer Therapy: Pre-clinical And Clinical Implications** Gautam Sethi,Milad Ashrafizadeh,2023-03-14 Non coding RNA Transcripts in Cancer Therapy Pre clinical and Clinical Implications provides a new insight towards role of non coding RNAs molecules including microRNAs long non coding RNAs and circular RNAs in cancer The reason of focusing on cancer is that this malignant disease is responsible for high death around the world and after cardiovascular diseases it is a leading cause of death In the current book the basic information and knowledge about ncRNAs their biogenesis and their biological functions are covered It is shown that ncRNAs can regulate expression level of genes at transcriptional and post transcriptional levels and therefore ncRNAs are master and key players in molecular pathways Then the impact of regulation of molecular pathways by ncRNAs on important molecular mechanisms such as proliferation metastasis epithelial to mesenchymal transition apoptosis and autophagy are described All of these aspects are integrated in cancer and for treatment of this disease In case of miRNAs their biogenesis and biological functions in physiological conditions are described Then impact of miRNAs on proliferation metastasis therapy response drug resistance and radio resistance is described For lncRNAs and circRNAs a same way is followed and their biogenesis and functional roles in cells are discussed At the next step function of lncRNAs and circRNAs in regulating proliferation metastasis and therapy response chemoresistance and radio resistance is introduced These subjects are discussed based on pre clinical studies and in order to make the book more comprehensive and broaden its scope the function of exosomal ncRNAs in diagnosis and prognosis of cancer patients is described



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