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*Special Issue Reprint*

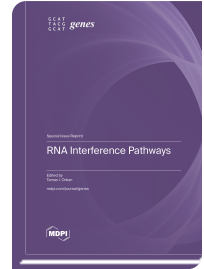
## RNA Interference Pathways

[www.mdpi.com/books/reprint/11638](http://www.mdpi.com/books/reprint/11638)

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ISBN 978-3-7258-5151-5 (Hardback)

ISBN 978-3-7258-5152-2 (PDF)



One of the most important breakthroughs of the 20th century was the discovery of how short RNA molecules from the genomic “dark matter” can control invasive genetic elements or fine-tune endogenous gene expression. The collective name of these pathways is RNA interference (RNAi), or “gene silencing”, and the main players here are short, single-stranded RNA molecules in complex with Argonaute proteins. The scientific significance of these small RNA-based regulatory pathways was recognized by the awarding of the Nobel Prize in 2006 for the discovery of RNAi and by the recently awarded 2024 Nobel Prize for the discovery of miRNAs. This reprint is mainly a tribute to the diversity of the miRNA pathway. The selected articles provide an overview not only of some molecular aspects of the maturation of these tiny regulators but also provide evidence of how miRNAs control cell proliferation and differentiation and how their misregulation could lead to the formation of various types of cancer. As certain gene therapy applications also involve miRNA-based strategies, the importance of understanding the molecular details of this pathway clearly extends beyond pure scientific interest. This collection of articles not only presents scientific discoveries using cutting-edge technologies in several model systems but also provides evidence of how modern molecular genetics, as well as molecular medicine, can benefit from an in-depth understanding of the miRNA pathway.



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