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Editorial
RNA Interference

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The past decade has witnessed a true revolution in our understanding of how RNA can act as regulator of gene functions. Central to these new advances is a growing appreciation that small interfering RNAs (siRNAs) can induce sequence-specific destruction of homologous mRNAs in mammalian cells via a natural process referred as RNA interference (RNAi). During a period of only five years, RNAi has grown from a biological phenomenon to one of the most widely used tools in research. In effort to facilitate functional genomics with RNAi, several libraries of siRNAs or short hairpin RNAs have been constructed and screened in vitro and in vivo. Although RNAi has many advantages over other methods such as antisense and ribozyme technologies, the specificity of silencing is not absolute and there is a danger of "off-target effects," and activation of the innate immunity. Notably, the success of siRNAs as therapeutic agents largely depends on the development of a delivery vehicle that can efficiently deliver them to specific tissues or cells. A deeper understanding of the mechanisms of RNAi should allow better design of siRNA agents. The purpose of this issue is to review this exciting field and to provide the reader with current design rules, delivery strategies, and methods to minimize unintended siRNA effects.

It should be noted that the emergence of RNAi has helped to clarify another enigma of noncoding temporal RNAs or microRNAs (miRNAs). These tiny RNA regulators are being implicated in diverse biological pathways, ranging from development to neuronal differentiation and insulin production. In addition to their roles in cell biology, recent studies have implicated miRNAs in tumorogenesis and metastasis. Indeed, gene profiling analysis found a number of miRNAs that were upregulated in various cancers, which suggests a potential diagnostic and prognostic value. Also, the identification of virus-encoded miRNAs indicate that some viruses are able of exploiting RNA silencing as a convenient method for gene regulation of host and viral genes. Although we have learned much about the general mechanism underlying miRNA biogenesis, a detailed understanding of how miRNAs and related small RNAs work remains to be elucidated. This issue on RNAi also highlights the recent advances in understanding the biogenesis and expression of miRNAs in mammalian cells.

As our understanding of the functions of small RNAs and the mechanisms by which RNA activate innate immunity continues to increase, we should become better equipped to translate this naturally occurring process into our own therapeutic benefit.

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Mouldy Sioud received his DEA degree in pharmaceutical sciences from the University René Descates Paris V and his PhD degree in molecular biology from the University of Paris VII, France. He performed his postdoctoral fellowship at the Public Health Research Institute, New York, USA, in the laboratory of Karl Drlica. In 1990, he joined Prof Jacob Natvig's Group at the National Hospital, Institute of Immunology, University of Oslo, where he obtained in 1996 a second PhD degree in biotechnology and medicine. Presently, he is Group Leader and Professor in molecular immunology. His current research interests are in the area of RNA interference, innate immunity, and tumor immunology. He published more than 100 publications, edited three books (*Methods in Molecular Biology*), and he has received awards from both academic and industrial sources.

Abdelali Haoudi received his PhD degree in cellular and molecular genetics jointly from Pierre & Marie Curie University and Orsay University in Paris, France. He then joined the National Institutes of Health (NIEHS, NIH) for a period of four years after winning the competitive and prestigious NIH Fogarty International Award. He then joined the Myles Thaler Center for AIDS and Human Retroviruses at the University of Virginia Medical School, Charlottesville, then shortly after joining the faculty in the Department of Microbiology and Molecular Cell Biology at Eastern Virginia Medical School in Norfolk, Va, in 2001. He is interested in uncovering mechanisms by which mobile genetic retroelements, both retroviruses and retrotransposons, induce genetic instability and apoptosis in human cells and the molecular basis of cancer including cell cycle checkpoints and DNA repair mechanisms. He is also the Codirector of the Cancer Biology and Virology Focal Group. He has founded the *Journal of Biomedicine and Biotechnology* (http://www.j-biomed-biotech.org) and is also the Founder and President of the International Council of Biomedicine and Biotechnology (http://www.i-council-biomed-biotech.org).