The Emerging Role of Small Non-coding RNAs in the Failing Heart: Big Hopes for Small Molecules

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Published online: 6 April 2011
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Abstract

Key words ncRNAs · tRNA · rRNA · miRNAs · miRs · piRNAs · snoRNAs · PARs · tel-sRNAs

Research into small non-coding RNAs (ncRNAs) has fundamentally transformed our understanding of how gene networks are regulated. The term ncRNA refers to a family of functional RNA molecules that are not translated into proteins. The literature is replete with studies which have shown that ncRNAs are involved in functionally important cellular processes, such as transfer RNA (tRNA), and ribosomal RNA (rRNA). The ncRNA family also includes small interfering RNAs (siRNAs), microRNAs (miRNAs or miRs), PIWI-associated RNAs (piRNAs), small nucleolar RNAs (snoRNAs), promoter-associated RNAs (PARs) and telomere specific small RNAs (tel-sRNAs). Although a great deal of information has been generated with respect to the basic biology of ncRNAs, our understanding of the role that ncRNAs play in health and disease is embryonic at present. This statement notwithstanding, ncRNAs have been implicated in heart disease, immune disorders, cancer and neurodegenerative diseases. Given that ncRNAs can be targeted through modified antisense oligonucleotides, ncRNAs are emerging as exciting new therapeutic targets. The current issue of Cardiovascular Drugs and Therapy contains a series

of three thematically related articles that explore the role of small non-coding RNAs (ncRNA) in the pathogenesis of heart failure [1–3]. In the first article, Holley and Tokara review the biology of small ncRNAs, using miRs and small snoRNAs as examples [1]. The second article by van de Vrie, Heymans and Schroen explores the relationship between the immune activation, miRNAs, and the pathogenesis of heart failure, with a specific focus on the role of mir-155 [2]. In the final article Topkara and Mann review the role of miRs in the pathogenesis of cardiac remodeling and heart failure, as well as discuss the strategies that are being employed therapeutically for modulating the miR expression [3]. Taken together, these articles should provide the reader with an introduction to an exciting area of biology that is likely to lead to new approaches to the diagnosis and treatment of heart failure.

References

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