Special Section on Non-Coding RNAs in Clinical Practice: From Biomarkers to Therapeutic Tools—Editorial

Non-Coding RNAs in Clinical Practice: From Biomarkers to Therapeutic Tools

Non-coding RNAs have recently emerged as fundamental players in a number of physiologic and pathologic processes. This Special Section, published in the Journal of Pharmacology and Experimental Therapeutics, collected original articles and systematic reviews focusing on non-coding RNAs, with the final goal to provide a comprehensive, state-of-the-art overview on this intriguing topic.

Specifically, this Special Section summarizes the key aspects of non-coding RNA in clinical practice, starting from their applications as reliable biomarkers of disease and concluding with their most recent employment as therapeutic tools.

An updated analysis examining, in a thorough manner, the mechanisms of action of non-coding RNAs in mammalian cells opens this Special Section, describing the most proficient investigations on the formation of the RNA-induced silencing complex (Mauro et al., 2022).

The opening paper is followed by a truly painstaking appraisal of the roles of non-coding RNAs in cancer, including the regulation of chromosomal instability (Mohapatra et al., 2022) and cell death, with a particular attention on how non-coding RNAs can modulate ferroptosis in processes like carcinogenesis and metastasis (Farooqi, 2022). The finely tuned interplay between microRNAs (miRNAs) and long non-coding RNAs is also elegantly presented (Yaylim et al., 2022). Then, the latest opportunities and challenges facing clinical application of circulating non-coding RNAs as tumor biomarkers are skillfully outlined (El-Daly et al., 2022).

Then, Liu et al. (2022) introduce circular RNAs, covalently closed RNA produced by back-splicing, which have been considered as a type of non-coding RNAs for a long time; however, recent studies have demonstrated that some circular RNAs can be translated into functional proteins that have been proved to play important roles in cancer pathology. The functional contribution of non-coding RNAs to the cellular and molecular mechanisms underlying renal fibrosis (Ai et al., 2022), in the pathophysiology of mitochondrial impairment in patients with Anderson-Fabry disease (Gambardella et al., 2022a), and in the regulation of hematopoiesis is then summarized, especially in terms of cellular metabolism (Sangeeth et al., 2022) and cell differentiation (Dahariya et al., 2022). A couple of reports explore the link between miRNAs and the current pandemic, coronavirus disease 2019 (COVID-19), caused by SARS-CoV-2: the first one assesses the cardiovascular implications of miRNAs in COVID-19 (Izzo et al., 2022); in the second one, two endothelial exosomal miRNAs targeting the tissue factor and the von Willebrand factor are identified as critical predictors of thromboembolic events in COVID-19 patients (Gambardella et al., 2022b). The mechanistic relationship between miRNAs and endothelium is also harnessed to successfully validate a novel signature of endothelial dysfunction (Mone et al., 2022) in patients with diabetes and heart failure with preserved ejection fraction.

ABBREVIATIONS: COVID-19, coronavirus disease 2019; miRNA, microRNA.
The Special Section is concluded by two nicely organized reviews deeply delving into the latest developments in terms of actual applications of miRNAs in both diagnosis and treatment of cardiovascular disorders (Wronska, 2022) and the newest versatile therapeutics based on RNA interference and RNA-mediated bioengineering technologies (Traber and Yu, 2022), including the pharmacology of four small interfering RNA medications (givosiran, inclisiran, lumasiran, and patisiran) approved by the Food and Drug Administration.

In summary, this Special Section on “Non-Coding RNAs in Clinical Practice: From Biomarkers to Therapeutic Tools” highlights the importance of basic, translational, and clinical research on non-coding RNAs and provides a detailed snapshot of the current state of research in the field.

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