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EDITORIAL

Noncoding RNAs: a new fine-tuner is a key player of human pathogenesis

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Sequencing of the human genome has demonstrated that a significant portion of the human genome is transcribed into RNA molecules that do not code for proteins. This class of RNA is termed 'noncoding RNAs' (ncRNAs). Until recently, many researchers believed that ncRNAs represented transcriptional noise or residual junk resulting from RNA processing. In contrast to former beliefs, it is now known that ncRNAs are essential functional molecules in several types of cells. ncRNAs have been classified into several categories based upon their molecular sizes and functions. These categories include microRNAs (miRNAs), long ncRNAs, PIWI-interacting RNAs and circular RNAs. ncRNAs play essential regulatory roles in a broad range of developmental processes. In the past several years, an accumulating body of evidence has shown that aberrantly expressed ncRNAs are deeply involved in a variety of human pathologic processes including cancers.

miRNAs belong to a family of small ncRNAs that fine-tune the expression of protein coding/noncoding RNAs by repressing translation or cleaving RNA transcripts in a sequence-dependent manner. The discovery of miRNAs and subsequent studies have deepened our understanding of the roles of miRNA in human diseases. A unique characteristic of human miRNAs is that a single miRNA species can regulate a large number of RNA transcripts. Therefore, dysregulated miRNA expression can disrupt RNA networks that are otherwise tightly regulated. The starting point of miRNA studies has been to identify aberrantly expressed miRNAs in human cells.

Circulating miRNA in biological fluid is a current topic in diagnostic fields. A growing body of evidence has shown the presence of miRNAs in plasma and urine and suggested their possible utility as biomarkers in human cancers. Interestingly, recent reports indicate that exosomal miRNAs have a role in communication between cancer cells and surrounding fibroblasts. Thus, exosome-based delivery of small RNAs may provide an effective therapeutic delivery strategy in the treatment of human diseases.

This special issue of 'Dysregulated non-coding RNAs and human diseases' provides 13 review articles and 2 original research articles. We are proud that these important articles are being published in *The Journal of Human Genetics*. These review articles cover a wide range of human cancers (prostate cancer, pancreatic cancer, breast cancer, colorectal cancer, bladder cancer, renal cell carcinoma, head and neck cancer and lung cancer) and diseases (liver disease, cardio metabolic disease, neurodegenerative diseases, idiopathic pulmonary fibrosis and T-follicular helper cells). Identification and categorization of the novel RNA networks regulated by dysregulated ncRNAs could provide new information about the molecular mechanisms underlying human diseases. Original research articles also clarify novel miRNA-mediated cancer pathways based on current genomic approaches. These articles may suggest new research directions in human cancer and disease.

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