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RNA Signaling in Microenvironment

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Abstract

RNA signaling has emerged to be focused in several diseases. Multiple types of RNAs including microRNA, long non-coding RNA, and circular RNA mediate the signals among cells in cancer microenvironment. These RNAs travel in the microenvironment via extracellular vesicles or exosomes. The messages carried by RNAs transactivate the cells in different organs, which may cause cancer metastasis or the amplification of diseases. Intercellular RNA signaling in microenvironment is of interest.

RNAs in Extracellular Vesicles

Intercellular communication is mediated by direct interaction, soluble factors, or extracellular vesicles [1]. Extracellular vesicles include exosomes, ectosomes or shedding microvesicles, and apoptotic bodies [1]. The presence of DNA, RNA, proteins, lipids and metabolites in extracellular vesicles have been identified [1-3]. Various forms of RNAs exist in the extracellular vesicles, which are mRNA, microRNAs (miRNAs), long non-coding RNAs (lncRNAs), and circular RNAs (circRNAs) [2,4,5]. These RNAs in extracellular vesicles play important roles in intercellular RNA signaling.

Inter- and intra-cellular travel of RNAs in cancer microenvironment

lncRNAs in exosomes mediate cell-to-cell communication in cancer microenvironment affecting tumor

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progression and metastasis [5]. Cancer cells and the surrounding cells in the cancer microenvironment intercellularly communicate via lncRNAs to promote tumor resistance and metastasis [5]. CircRNAs, which are single-stranded, covalently closed RNA molecules, and more stable than linear RNAs, regulate the cellular activities including cancer signaling pathways in the cancer microenvironment [4, 6]. A panel of miRNAs induces modulation of gene expression via regulation of mRNA, leading to cancer metastasis, tumor progression, drug resistance and recurrence [7,8].

Conclusion

The world of RNA molecules has been expanding in intercellular communications. The importance of the RNA signaling in terms of both forms of mRNA and signal-mediating RNAs such as miRNAs, lncRNAs, and circRNAs in the microenvironment would increase.

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