

Commentary

MicroRNA and Cancer Treatment: A Commentary

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ABSTRACT

MiRNAs play an important role as oncogenes and tumor suppressors in induction and suppression of tumor effects. Also in different stages of cancer therapy. High and low expression of some miRNAs could be used as factors for prognosis patients drug resistant. Regulation of these miRNA perform by some other miRNA that can suppression or active the translation of downstream miRNA, therefore, miRNAs play important role in the individual treatments and classification of miRNA in diagnosis and prognosis is highly valuable, also we could consider miRNA as a setting key for switching and off of genes.

Keywords: : MiRNA, Cancer, Molecular Treatment

For the first time, microRNA was discovered by Lee *et al.* in 1993 (1). MiRNAs play both as oncogenes as well as tumor suppressive (2,3). Therefore, recognizing miRNAs as the important factors in induction and suppression of tumor effects is shown to be very important (4-6).

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One of the treatment strategies is chemotherapy which is widely used in the treatment of cancer patients. In one hand, chemoresistance is one of the major problems of these treatment strategies (7,8). Therapeutic options due to different molecular mechanisms and early diagnosis enter in a challenge

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with chemoresistance in patients with breast, glioblastoma, prostate cancer. Therefore, about 30% of patients with breast cancer are faced to relapse with metastasis in the event of drug resistance (9-11). Chemotherapies, including taxanes and anthracyclines, may response up over 70% at the early stages of the disease but can drop to 20 to 30% after progression of the disease (8,12). Therefore, in addition to the mal-effects of metastasis, chemoresistance is a major obstacle for the treatment of cancer. As a result, by the elimination of drug resistance, better clinical systems can be provided for patients with other cancer.

Literature review

Despite the fact that miRNAs do not code any protein and their loci are located in non-coding regions of intronic transcription, but they have rarely been observed in the exonic region, too (13,14). miRNA genes in the cell nucleus are transcribed by RNA polymerase II enzyme so that a pri-miRNA

(primary miRNA) is produced which is finally converted to a pre-miRNA by the set of the drosha-DGCR8 complex. Exportin 5 binds to pre-micro RNA hairpins (pre-miRNA hairpins) and transfers to the cytoplasm and in the cytoplasm, it will be subjected to some important changes by RNaseIII-type enzyme dicer. The pre-miRNA, two single stranded miRNAs are produced with the names: (a) miRNA-3p and (b) miRNA-5p (13). Previously, it was commonly believed that a mature miRNA is single-stranded and the other strand of it is called the passenger strand which finally, will be decomposed, whereas, the current theory states that each strand acts as a mature miRNA (15,16). This phenomenon is clearly seen in cancer and about 300 human patients (17-20). In addition, significantly affects the results of drug specifications. For example, highly expressed miR-34a in breast cancer cells line is directly related to resistance to docetaxel drug, whereas, in quite opposite from, high expression of miR-34a leads to the sensitivity of Ewing's sarcoma

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cells to doxorubicin and vincristine drug (21,22). Various anticancer drugs, through the activation of intrinsic and extrinsic pathways, cause to induce the apoptosis in the tumor cells (23). Two main mechanisms lead apoptosis: the mitochondrial intrinsic pathway and the transmembrane extrinsic pathway. The main strategy is to control the Bcl-2 family which includes more than 30 molecules regulating apoptosis (24). Some of miRNAs in partnership with Bcl-2 family are involved in

cellular apoptosis. For example, miRNA-15/16, miR-21. MiR-125b in partnership with Bcl-2 act as an anti-apoptosis factor. In most tumors, when miR-21 is connected to the miRNA (3'-UTR) of BCL2, it shows the apoptotic functions (25). The relationship between miRNAs and cancer stem cell identifying several miRNAs as the key to controlling the glioblastoma, prostate cancer, and breast cancer was introduced (26).

Conclusion

When the effects of miRNAs in drug resistance may be positive or negative, so we can classify them both as useful and harmful. To understand the role of miRNAs in human cancer, including different settings of miRNA on their goals as well as the key role in the formation of apoptotic process can be very promising in the therapeutic section. Due to the medical science becoming molecular, miRNAs play an important role in the individual treatments of and classification of miRNAs in diagnosis and prognosis is highly valuable. Therefore, by understanding the developing role and importance as well as the practical potentials of miRNA it's necessary that the young researchers of our country focus further on researching in this area of genetics.

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