Journal of
Biomolecular Research & Therapeutics

Shaik, J Biomol Res Ther 2014, 3:3
DOI: 10.4172/2167-7956.1000e137

Editorial Open Access

Targeting MicroRNA in Diagnosis and Therapeutics

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MicroRNAs (miRNAs) are part of a group of non-coding RNAs that can block messenger-RNA (mRNA) translation and affect mRNA stability. The miRNA may regulate the expressions of large non-coding RNAs as they predict to regulate at least 30% of all the human protein-coding genes by targeting their 3'-UTR sequences [1]. This indicates the role of miRNA in transcriptome networks in eukaryotic cells. The miRNA-deregulated expressions were reported in variety of complex diseases and the deregulated expressions of miRNA may be due to epigenetic changes [2].

MicroRNAs can be potential biomarkers in Neurological diseases like Alzheimer's Diseases [3] and migraine [4] where epigenetics play main role in the complexity of the disease [5-7]. Determination of circulating blood biomarkers helps to earlier diagnosis which may help in treatments earlier and prevent these devastating diseases which can have the potential to positively impact patient comfort. Additionally, the expressions of miRNAs are dysregulated in vascular diseases and they are critical modulators for vascular cell functions such as cell differentiation, contraction, migration, proliferation, and apoptosis [8]. The miRNAs play vital role in ischemic angiogenesis, vascular dysfunction, re-endothelialization and vascular neointimal lesion formation. Due to this, miRNAs may have vital role as novel therapeutic targets for vascular diseases.

Based on reasons mentioned above, there is great excitement on miRNAs research as biomarker and therapeutic target for major diseases. Regulation of mRNA levels and protein expression involves the miRNA binding step to their target and which may be affected by polymorphisms. These polymorphisms may play vital role in pharmacodynamics and pharmacokinetics of the drugs. The multiple miRNAs may be therapeutic targets and newer drugs can inhibit miRNAs with minimal toxicity.

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Received October 13, 2014; **Accepted** October 14, 2014; **Published** October 22, 2014

Citation: Shaik MM (2014) Targeting MicroRNA in Diagnosis and Therapeutics. J Biomol Res Ther 3: e137. doi: 10.4172/2167-7956.1000e137