Down regulation of miR-21 as a promising strategy to overcome drug resistance in cancer

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Introduction:

One of the main obstacles in chemotherapy is resistance to chemotherapeutic agents, which according to literature up to 90 percent of deaths among cancer patients, happen due to this problem. miR-21 is one of the first identified microRNAs that is involved in chemoresistance.

Methods:

We conducted a literature review to categorize various strategies of this RNA in driving drug resistance. This study was conducted on papers that were indexed in Pubmed before September 2021. The literature review was based on the following keywords: miR-21, drug resistance, drug therapy, metastasis, etc.

Results:

miR-21 targets various genes involved in many pathways that can justify chemoresistance. It alters cancer cell metabolism and facilitates adaptation to the new environment. It also enhances drug detoxification within cells. miR-21 inhibits pro-apoptotic genes and increases genomic instability.

Conclusion:

Although huge progress has been achieved in the down regulation of miR-21 in drug-resistant cancer cells, there are still many challenges to be resolved. More research is still required to find the best strategy and timeline for down regulation of miR-21 and also the most feasible approach for delivery of this system into the tumor cells. It is not clear whether complete knocking out of miR-21 is safe for normal cells, or what is the long-term effect of miR-21 knockout on cancer cells. In total, down-regulation of miR-21 is a promising strategy to reverse chemoresistance but still more studies are needed to clarify the aforementioned issues.

Key words:

Cancer, drug resistance, miR-21, chemotherapy, targeted therapy