



MicroRNA's as Biomarkers for Drug Resistance and Response to Therapy in Cancers

SUMMARY

Current cancer research, on one hand, has led to the improved response rate in cancer with reduced side effects of anticancer treatment and on the other hand onset of drug resistance is a major concern. Mechanisms of drug resistance such as epigenetic modifications, deregulated apoptosis or survival, adapted signaling pathways, modifications in the drug transport have proven roles in many cancers.

MicroRNA's, evolutionarily conserved RNA molecules of 20–22 nucleotides are known to alter the ability of cells to commence fundamental biological processes such as development, proliferation, differentiation, apoptosis, and maintenance of tissue specificity. Aberrant expression of these miRNA's lead to deregulation of gene expression further promoting drug resistance, a phenomenon commonly occurring under treatment and characterized by decreased drug efficacy and relapse.

Therefore, the role of miRNA's as indicators of chemoresistance and disease progression is unquestionable. Restoration or suppression of deregulated miRNA's may help overcome drug resistance. Understanding miRNA's expression patterns with response to different drugs is challenging yet promising for development of highly specific miRNA-targeted therapeutics.

AIM OF STUDY



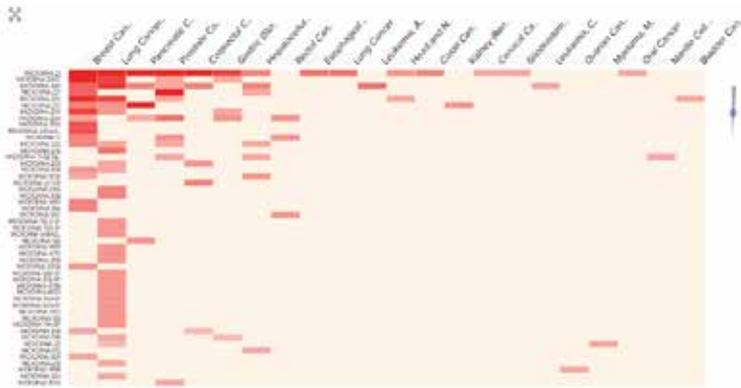
To predict and analyze miRNA's indicative of treatment response and drug resistance in various cancers through heatmap analytics



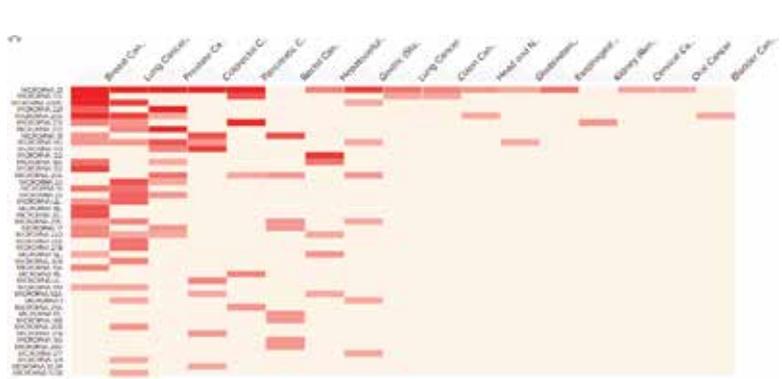
To identify the decisive miRNA's and position them as potential therapeutic targets in the area of oncology

METHODOLOGY

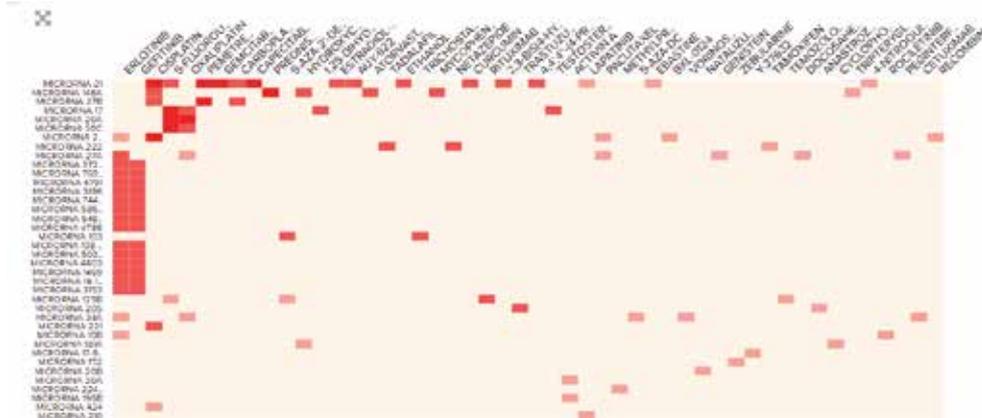
- To expedite heatmap analytics was chosen in GOBIOM
- Heatmap analytics was used to draw forth the list of potential miRNA's indicative of response to the therapy and drug resistance by plotting miRNA's against various oncology related indications
- The list of drugs showing disease resistance was obtained by plotting drugs against various miRNA's across different indications.



miRNA's indicative of **drug resistance** across various oncology indications



miRNA's indicative of **drug response** across various oncology indications



miRNA's indicative of drug resistance across various drugs in oncology therapeutics

CONCLUSION

- miRNA 21 was found to be the predominant indicator of drug resistance in Breast Cancer, Prostrate Cancer, Pancreatic Cancer, Non-Small Cell Lung Cancer, Colorectal Cancer, Hepatocellular Cancer and Gastric Cancer. Other notable miRNA's across these indications are miRNA 200, miRNA 34A, miRNA 221, miRNA 205, miRNA 210, miRNA 146A, miRNA 27A, miRNA 20A and miRNA 125B
- Expression of miRNA 21 was found to be significantly associated with response to therapy in Breast Cancer, Prostrate Cancer, Pancreatic Cancer, Non-Small Cell Lung Cancer, Colorectal Cancer, Hepatocellular Cancer and Gastric Cancer. Other notable miRNA's across these indications are miRNA 122, miRNA 155, miRNA 200, miRNA 221, miRNA 205, miRNA 210, miRNA 375, miRNA 31 and miRNA 145
- Greater number of miRNA's indicated drug resistance towards Erlotinib and Gefitinib