Study of Gene- microRNA Regulatory Networks across different tissues in a Schizophrenic patients

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Abstract

Schizophrenia is one of the most prevalent psychotic disorder that affected an estimated 20 million worldwide, according to WHO estimates in 2019. It is characterized by positive symptoms such as delusions and hallucinations as well as negative symptoms such as reduced speech and apathy. While many factors, including genetic, epigenetic, environmental, and chemical imbalances have been thought to be linked with this disease, the pathogenesis of SCZ still remains elusive without much mechanistic insights. Many functional studies have pointed to a critical role of regulatory elements such as microRNAs and transcription factors. However, a systematic investigation of the gene regulatory networks in SCZ across the various tissues is still missing. In this study, we mapped the several miRNA regulatory networks with biological context in SCZ across 9 different tissue types including various regions of the brain, immune cells, and blood. We identified several SCZ-contextual regulatory hubs that shed light on the differential activation of these regulatory elements across the various brain tissues. In particular, miR-34 family is a critical regulatory hub that is activated differentially across the various tissue types.
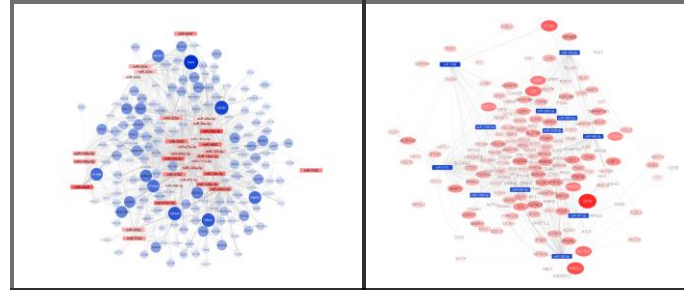
Introduction
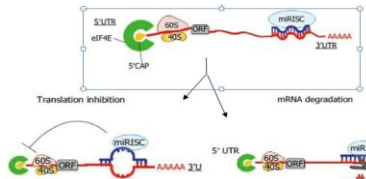
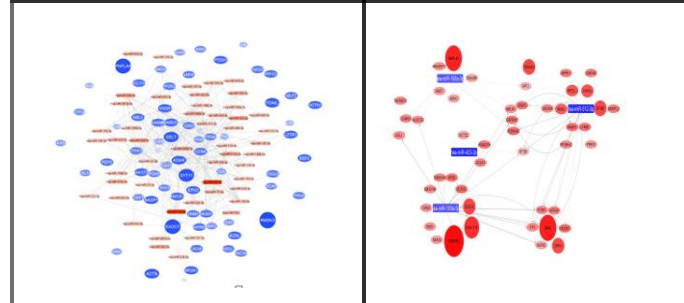| S.No	Tissue	Genes	miRNA	PubMed ID
1	Pluripotent stem cells neurons	3521	45	27732689, 26173148
2	Dorsofrontal Cortex	205	61	32006661
3	Ventrolateral prefrontal cortex	680	12	23917947

Up-regulated miRNA Gene Network   Down-regulated miRNA Gene Network

Pluripotent Stem Cells

Dorsofrontal Cortex

Conclusion

To conclude, our research primarily focuses on identifying the most differentially expressed miRNA's in various tissues. We have visualized the miRNA's – gene networks in these tissue with the Cytoscape Software and performed some statistical analysis to understand these important miRNA's. Therefore, with this data one can conclude on the important miRNA targets that can be used for effective drug delivery.

Analytics

Up-regulated miRNAs   Down-regulated miRNAs