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Exploration of phosphatase signaling -related gene expression changes

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Background: Schizophrenia disrupts cognition, emotion, and behavior, with cognitive deficits linked to impaired NMDAR function. Altered phosphatase activity, particularly involving STEP61 and RPTPα, contributes to this by disrupting neurotransmitter signaling critical for learning, memory, and neurodevelopment. Abnormal activity of these phosphatases impairs synaptic function, while genetic variations in phosphatases like PTPRA and PTPN5 increase schizophrenia risk. Phosphatases regulate signal transduction by removing phosphate groups from proteins, balancing phosphorylation cycles essential for cellular function. Dysregulated phosphatase activity impairs pathways like those involving NMDARs, contributing to schizophrenia's cognitive and behavioral symptoms. Modulating phosphatase activity or regulating gene-level mechanisms could restore neurotransmitter balance, improve synaptic plasticity, and alleviate symptoms.

Objectives: To explore how phosphatases and their targets can inform potential treatments for schizophrenia.

Methods:
●Literature Review: Comprehensive search for research on phosphatases and schizophrenia via NCBI and Google Scholar.
●BLAST Sequence Analysis: Extracted phosphatase sequences to identify sequences for schizophrenia.
●Kaleidoscope Gene Expression Profiling: Analyzed SCZ patient vs. control samples using statistical methods.

Results: The literature review identified PTPRA (encoding RPTPα) and PTPN5 (encoding STEP61) as genes associated with schizophrenia. These phosphatases affect neurotransmitter signaling, particularly NMDARs, and contribute to cognitive deficits.

Conclusion: Altered phosphatase activity, especially involving PTPRA and PTPN5, plays a critical role in schizophrenia's cognitive deficits. Targeting these phosphatases using bioinformatics tools offers potential therapeutic strategies to restore neurotransmitter balance and improve cognitive function.

Keywords: Phosphatase, Schizophrenia, Gene Expression, Bioinformatics, Phosphatase Signaling

