

عنوان مقاله:

MiR-15b and let-7a as Non-invasive Diagnostic Biomarkers of Alzheimer's Disease Using an Artificial Neural Network

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خلاصه مقاله:

Background: Gaining insight into the underlying molecular mechanisms of Alzheimer's disease (AD) is crucial. **Objectives:** This study aimed to employ a systems biology approach to identify new non-invasive diagnostic biomarkers for AD. **Methods:** Gene expression data series GSE122063 and microRNA (miRNA) expression data series GSE90828 were obtained from the Gene Expression Omnibus database. The Limma package under R software was used to assess differentially expressed miRNAs and differentially expressed genes (DEGs). Afterward the protein-protein interaction (PPI) network was constructed by the STRING software and evaluated with Cytoscape software. The multilayer perceptron neural network (MLP-NN), a widely used artificial neural network (ANN), was employed to classify two groups. **Results:** A total of 1388 DEGs were identified in AD patients compared to the control group, and 11 differentially expressed miRNAs were found in patients with mild cognitive impairment (MCI) in comparison to the control group. The results revealed that EGFR, identified as a hub gene, was targeted by miR-15b-3p and let-7a-Δp, while TLR4, another hub gene, was targeted by miR-15b-3p. The MLP-NN constructed using both hsa-let-7a-Δp and hsa-miR-15b-3p achieved a sensitivity of 0.857 and an area under the curve of 0.917 in detecting Alzheimer's patients. **Conclusion:** Our findings suggest that miR-15b-3p, by targeting EGFR and TLR4, and let-7a-Δp, by targeting EGFR, may play a significant role in AD. Additionally, the constructed ANN utilizing the expression levels of plasma miR-15b-3p and let-7a-Δp could serve as a potential non-invasive diagnostic tool with high sensitivity for AD detection.

کلمات کلیدی:

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