

ABSTRACT NO:15
RESEARCH ARTICLE**Transcriptomic Analysis Identifies the PVT1-miR-34a Axis as a Novel Non-Coding RNA Therapeutic Target in Diffuse Intrinsic Pontine Glioma**Ayesha Farooq¹, Hurmat Haroon², Faisal Khan³**Abstract**

Objective: Diffuse intrinsic pontine glioma (DIPG) is a lethal paediatric brainstem tumour with a median survival under one year and no effective therapy. Although non-coding RNAs (ncRNAs) regulate tumour progression, their regulatory networks in DIPG remain poorly characterised. This study aimed to identify dysregulated lncRNA-miRNA-mRNA axes in DIPG through integrated transcriptomic analysis, computationally validate these networks, and investigate their downstream impact on cancer-related pathways to reveal novel therapeutic targets for RNA-based precision medicine.

Methods: This study was conducted at the Precision Medicine Lab, National Centre in Big Data and Cloud Computing (NCBC), Peshawar, from 1st July to 22nd August 2025. RNA-seq datasets comprising 25 DIPG and 45 normal brain samples were obtained from GEO. Following normalization and differential expression analysis ($p_{adj} < 0.05$, $|\log_2FC| > 2$), dysregulated lncRNAs, miRNAs, and mRNAs were integrated into a ceRNA network using LncBase and miRTarBase. KEGG pathway enrichment, STRING protein-protein interaction analysis, Cytoscape network visualization, and Spearman correlation analysis were performed to identify and validate functionally relevant regulatory interactions.

Results: PCA demonstrated clear separation between DIPG and control transcriptomes. PVT1 was significantly upregulated ($\log_2FC = 3.44$), whereas miR-34a was downregulated ($\log_2FC = -3.66$). Eleven oncogenic mRNAs, including NOTCH1, PDGFRA, CDK4, SOX2, and MYC, were identified as predicted targets and formed a highly connected STRING interaction network. KEGG enrichment highlighted "MicroRNAs in cancer," while correlation analysis supported an inverse PVT1-miR-34a relationship and positive associations with these oncogenes, consistent with a ceRNA regulatory mechanism.

Conclusion: The PVT1-miR-34a axis appears to promote oncogenic pathways in DIPG. Targeting PVT1 or restoring miR-34a may represent potential RNA-based therapeutic strategies, warranting further experimental validation through reporter and knockdown assays.

Keywords: Diffuse Intrinsic Pontine Glioma; Non-coding RNA; Transcriptomics

DOI: <https://doi.org/10.47391/JPMA-7ANOS-ABS-16>

(JPMA 76:S17(Supple-1); 2026)

.....
¹Khyber Medical College, Peshawar, Pakistan, ²NCBC-Precision Medicine Lab,
Peshawar, Pakistan, ³Neobiology Institute, Peshawar

Correspondence: Ayesha Farooq **Email:** ayeshafarooq2969@gmail.com

ORCID ID: 0009-0009-6455-2473
.....