POLR2A

- Hypoxia exposure impairs male fertility via inhibiting Septin2-mediated spermatogonial proliferation
- The regulatory variant rs1950834 confers the risk of depressive disorder by reducing LRFN5 expression
- Genetic determinants of proteomic aging
- Bclaf1 mediates super-enhancer-driven activation of POLR2A to enhance chromatin accessibility in nitrosamine-induced esophageal carcinogenesis
- A disease-specific convergence of host and Epstein-Barr virus genetics in multiple sclerosis
- Molecular biomarkers in meningioma (Review)
- Genome wide analysis of allele-specific circular RNAs in mammals and their role in cell proliferation
- Molecular Subtype Identification and Potential Drug Prediction Based on Anoikis-Related Genes Expression in Keratoconus

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POLR2A, also known as RNA polymerase II subunit A, is an essential component of RNA polymerase II, a key enzyme involved in transcription. Transcription is the process by which genetic information encoded in DNA is used to synthesize RNA molecules. RNA polymerase II is responsible for transcribing protein-coding genes to produce messenger RNA (mRNA), which serves as a template for protein synthesis.

Here are some key points about POLR2A:

Function:

POLR2A is the largest subunit of RNA polymerase II and plays a central role in the transcription process. It catalyzes the synthesis of mRNA by adding nucleotides complementary to the DNA template strand.

Transcription Process:

During transcription, POLR2A, along with other subunits of RNA polymerase II, binds to the promoter region of a gene on the DNA molecule. It then unwinds the DNA, reads the template strand, and synthesizes a complementary mRNA strand. Catalytic Activity:

POLR2A has catalytic activity responsible for the polymerization of ribonucleotides into the growing RNA chain during transcription.

Phosphorylation:

Phosphorylation of specific residues on POLR2A is a crucial regulatory mechanism in transcription. Phosphorylation events are associated with various stages of transcription, including initiation, elongation, and termination. Regulation:

The activity of RNA polymerase II, including POLR2A, is tightly regulated to control gene expression. Various transcription factors and co-factors influence the binding and activity of RNA polymerase II at specific gene promoters.

Disease Associations:

Mutations or dysregulation of POLR2A can be associated with certain diseases. For example, alterations in RNA polymerase II activity have been implicated in various cancers, and specific mutations in POLR2A have been linked to developmental disorders.

Research and Studies:

POLR2A is a subject of extensive research in molecular biology and biochemistry. Understanding its structure, function, and regulation contributes to our knowledge of gene expression and the molecular mechanisms underlying various cellular processes. Technological Applications:

The study of POLR2A and RNA polymerase II has implications for the development of therapeutic strategies, especially in the context of diseases where transcriptional dysregulation plays a role. It's important to note that the information provided here is a general overview, and specific details about POLR2A may vary based on the context of research or the organism under investigation. Researchers continue to explore the intricacies of transcription and the role of RNA polymerase II in cellular processes.

Recent molecular analyses have shown that the driver genetic mutations of meningiomas were associated with the anatomic location. Among these, POLR2A mutation is common among lesions in the skull base, mainly in the cerebellopontine angle (CPA). The objective of this study was to investigate the efficacy of POLR2A mutation as a prognostic marker for CPA meningiomas.

Methods: We retrospectively analyzed the clinical data of 70 patients who had World Health Organization grade I CPA meningiomas. Somatic DNA was analyzed by Sanger sequencing and microsatellite array to examine for NF2, AKT1, KLF4, SMO, and POLR2A mutations and 22q loss. Genetic and clinical parameters were analyzed to identify the factors related with tumor recurrence.

Results: We detected clearly the clinical features of the CPA cases with POLR2A mutation. Compared with cases without POLR2A mutation, cases with POLR2A mutation had more meningothelial type (P = 6.9 × 10-4), and higher rate of recurrence (P = .04). We found that the poor prognostic factors associated with the recurrence of CPA meningiomas were POLR2A mutation (P = .03, hazard ratio [HR] 9.38, 95% CI 1.26-70.0) and subtotal resection (STR) (P = 5.1 × 10-4, HR 63.1, 95% CI 6.09-655.0). In addition, in the group that underwent STR, POLR2A mutation was a poor prognostic factor associated with tumor recurrence (P = .03, HR 11.1, 95% CI 1.19-103.7).

Conclusion: POLR2A mutation and STR were the poor prognostic markers associated with the recurrence of CPA meningioma. For CPA meningioma cases that underwent STR, only POLR2A mutation was a poor prognostic factor. Detecting POLR2A mutation may be a cost-effective, easy, and useful marker for prognostication [1)].

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Okano A, Miyawaki S, Teranishi Y, Hongo H, Dofuku S, Ohara K, Sakai Y, Shin M, Nakatomi H, Saito N. POLR2A Mutation is a Poor Prognostic Marker of Cerebellopontine Angle Meningioma. Neurosurgery. 2024 Feb 21. doi: 10.1227/neu.0000000000002873. Epub ahead of print. PMID: 38380947.