Meningioma grade

- Integrated proteomic and targeted Next Generation Sequencing reveal relevant heterogeneity in lower-grade meningioma and ANXA3 as a new target in NF2 mutated meningiomas
- Predicting intraoperative meningioma consistency using features from standard MRI sequences: a preoperative evaluation
- Online and ChatGPT-generated patient education materials regarding brain tumor prognosis fail to meet readability standards
- Simultaneous surgical management of a giant tuberculum sellae meningioma and pregnancy-related complications: a case report and literature review
- Management of skull base meningiomas with extracranial extension: resection, recurrence, and prognostic factors
- NOTCH3 Drives Fatty Acid Oxidation and Ferroptosis Resistance in Aggressive Meningiomas
- Parapharyngeal space meningioma
- Aggressive intracranial meningioma associated with multiple sclerosis: A case report and literature review

World Health Organization grade 1 meningioma.

World Health Organization grade 2 meningioma.

World Health Organization grade 3 meningioma.

The current system of grading has been shown to be unsatisfactory due to its poor reproducibility as well as the considerable variability within grades. With the increasing availability of genomic and epigenomic profiling, several markers have been suggested to correlate with the location, histological subtype, and clinical behavior of meningiomas. These developments have enabled the development of targeted therapy, as well as individualized use of currently available adjuvant methods. These include copy number alterations (CNAs), specific genetic abnormalities (germline and sporadic), and genome-wide methylation profiles [1)].

Cohort Studies

Chromosome 1p Loss and 1q Gain for Grading of Meningioma

Type of study: Cohort Study **Citation:** JAMA Oncol. 2025 Apr 3. doi: 10.1001/jamaoncol.2025.0329. Online ahead of print.

Authors: Alexander P. Landry et al. **PMID:** 40178835

Critical Review

This multicenter cohort study spanning institutions in Canada, the US, and Germany offers a compelling contribution to the evolving field of molecular neuropathology and meningioma grading. It

critically addresses the limitations of the 2021 WHO CNS classification, which incorporated rare markers like homozygous deletion of CDKN2A an B and TERT promoter mutations, by proposing more broadly applicable cytogenetic criteria based on copy number alterations [2].

Key findings include:

- Loss of chromosome 1p in WHO grade 1 meningiomas correlates with significantly reduced progression-free survival (PFS), approximating outcomes of WHO grade 2 tumors.
- Combined 1p loss and 1q gain predicted outcomes similar to WHO grade 3, regardless of histopathological grade.
- These alterations show strong prognostic power, suggesting their inclusion could refine and personalize the current WHO CNS grading system.

The study's strength lies in its **large sample size** (n = 1964), long follow-up, and **integration of genomic and clinical data**. Its statistical approach—mainly Cox regression analysis—was well-suited to evaluate prognostic factors across grades. The authors convincingly demonstrate that current grading overlooks key genomic drivers of progression and recurrence.

Clinical implications:

Incorporating 1p loss as a criterion for WHO grade 2 and 1q gain for WHO grade 3 would allow for a **more accurate risk stratification** and **better patient management**. This aligns with the current momentum in neuro-oncology to move beyond histology and adopt integrated molecular grading—already in place for entities like glioma.

Limitations:

- Although multicenter, some variability in pathology protocols and treatment across sites could have introduced bias.
- Radiation exposure was not uniformly reported, which could affect PFS independently of genetic markers.
- The study does not explore the cost or feasibility of widespread cytogenetic screening, which is critical for real-world application.

Conclusion:

This paper is a significant step toward a more nuanced and **genomically-informed meningioma classification system**. The proposed inclusion of chromosome 1p loss and 1q gain into future WHO grading guidelines deserves serious consideration by the neuro-oncologic community and classification committees.

Back to meningioma section

1)
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