Molecular profiling may improve meningioma decision making

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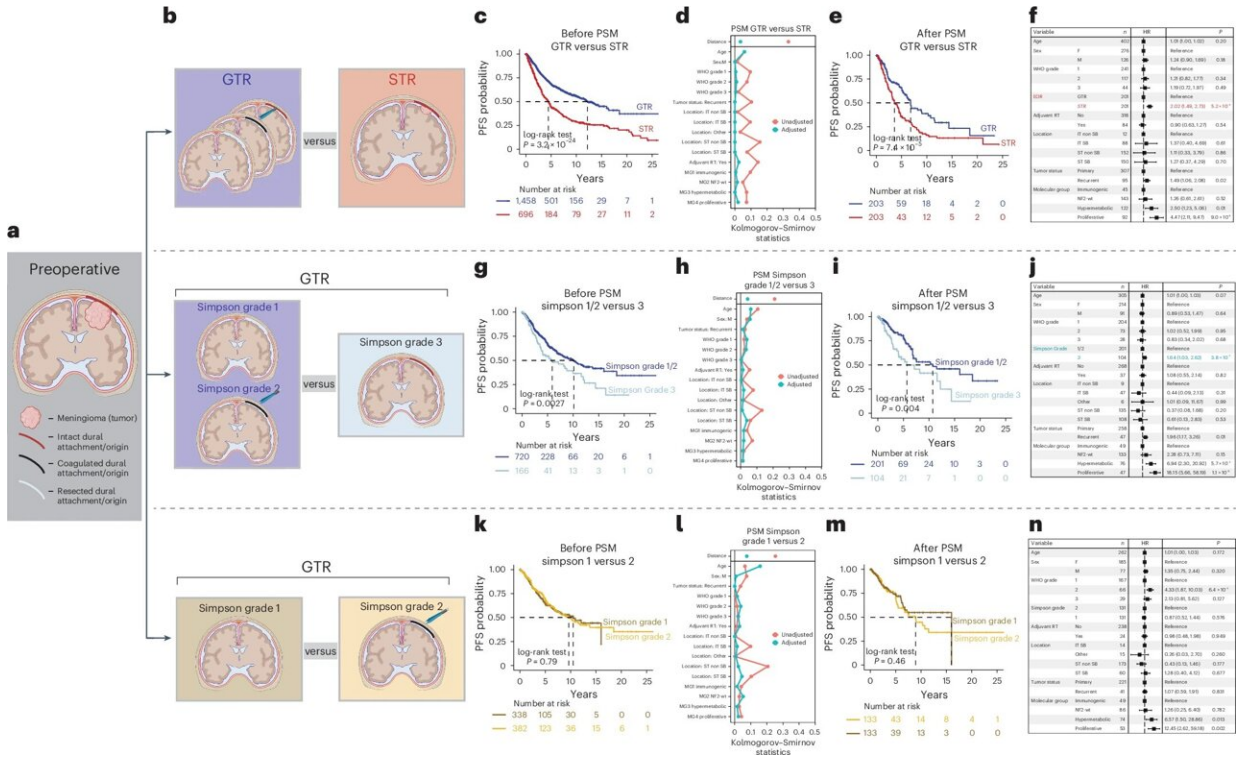

Propensity score matched analysis of degrees of surgical resection in meningioma. Credit: *Nature Medicine* (2024). DOI: 10.1038/s41591-024-03167-4

Investigators have demonstrated how molecular profiling tumors can be used to help predict treatment response and survival in patients with meningiomas, the most common type of primary brain tumor, according

to a recent study published in *Nature Medicine*.

The findings highlight the potential of using molecular data to improve clinical decisionmaking and outcomes for patients with meningiomas, according to Craig Horbinski, MD, Ph.D., director of Neuropathology in the Department of Pathology and a co-author of the study.

Meningiomas are tumors that grow from membranes, or meninges, surrounding the brain and spinal cord. Unlike other types of brain tumors, such as glioblastoma, meningiomas are largely localized outside of the brain and rarely spread throughout the brain. They are also unlikely to metastasize to other parts of the body.

The first-line treatment is normally surgical resection of the entire tumor. However, many of these tumors will recur and require follow-up resection and subsequent radiation, but those treatments are not always successful. If the tumor continues to grow, it can cause long-term brain damage and cognitive impairment, and even death.

Only in the last decade, however, has more attention been focused on improving treatment strategies for patients with meningiomas, the management of which has not substantially changed in the last 50 years, according to Horbinski.

"The majority of biomedical research efforts have been directed towards other kinds of brain tumors, particularly gliomas like glioblastoma. In the last 10 years or so, there's been a growing awareness that we should be doing something more for patients with these tumors," said Horbinski, who is also Professor of Pathology in the Division of Experimental Pathology and of Neurological Surgery.

In the current study, Horbinski and colleagues sought to better understand the molecular biology of meningiomas and define molecular

biomarkers of treatment response by analyzing retrospective data on more than 2,800 meningiomas collected from a previous prospective phase II clinical trial.

The scientists used propensity score matching, a statistical technique, to characterize the benefits of different degrees of tumor resection, in addition to identifying a group of molecularly defined radiation-resistant meningiomas.

From this analysis, the authors found that total tumor resection was associated with longer progression-free survival across all molecular groups and longer overall survival in proliferative meningiomas. Dural margin treatment, in which the membrane of the tumor is surgically resected in addition to the actual tumor, prolonged progression-free survival compared to no treatment.

"This speaks to the idea that it's not enough just to take the entire tumor out with a naked eye. We've got to do something about the tumor cells that we know are still there, but we can't see them," Horbinski said.

The scientists also found that tumors which have lost large sections of DNA and changes in how the genome of the tumor is chemically modified by DNA methylation ultimately determined tumor behavior, the investigators found.

"Those two parameters do have a lot to say in how these tumors are going to behave, in particular how quickly they're going to grow back and how well they're going to respond to radiation, if they're going respond to radiation," Horbinski said.

The findings underscore the clinical utility of molecular testing of tumors in predicting treatment response for patients with meningiomas and other types of brain tumors, according to Horbinski.

"One of the problems we have in pathology and in oncology in general is that a lot of third-party payers are resistant to covering molecular testing because they still see it as experimental. They still see it as not providing meaningful data for patient care and studies like this really should put that notion to rest," Horbinski said.

More information: Justin Z. Wang et al, Molecular classification to refine surgical and radiotherapeutic decision-making in meningioma, *Nature Medicine* (2024). DOI: 10.1038/s41591-024-03167-4

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