# Modified RANO Criteria

- Response Assessment in Long-Term Glioblastoma Survivors Using a Multiparametric MRI-Based Prediction Model
- Comparative Analysis of Intracranial Response Assessment Criteria in Patients With Melanoma Brain Metastases Treated With Combination Nivolumab + Ipilimumab in CheckMate 204
- PEARL: A Multicenter Phase 2 Study of Lorlatinib in Patients with ALK-Rearranged NSCLC and Central Nervous System Disease
- Systemic inflammatory markers and volume of enhancing tissue on post-contrast T1w MRI images in differentiating true tumor progression from pseudoprogression in high-grade glioma
- Treatment-associated imaging changes in newly diagnosed MGMT promoter-methylated glioblastoma undergoing chemoradiation with or without cilengitide
- Response Assessment in Brain Metastases Managed by Stereotactic Radiosurgery: A Reappraisal of the RANO-BM Criteria
- "A net for everyone": fully personalized and unsupervised neural networks trained with longitudinal data from a single patient
- RANO 2.0: Update to the Response Assessment in Neuro-Oncology Criteria for High- and Low-Grade Gliomas in Adults

In 2010, the RANO criteria for high-grade gliomas was developed by a consensus of experts to update the original Macdonald criteria and account for challenges to response assessment such as pseudoprogression and pseudoresponse. Subsequent studies have suggested a limited benefit of incorporating T2/FLAIR evaluation on the correlation of PFS with OS. Moreover, some new therapies, particularly immunotherapy and viral therapies, are more likely to induce transient worsening of contrast enhancement that might lead to erroneous determination of radiographic disease progression. As a result, the modified RANO criteria were proposed in 2017 and differed from RANO by use of the post-radiation scan as the baseline scan, omission of FLAIR evaluation, and requirement of a confirmation scan to determine progressive disease.

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The Response Assessment in Neuro-Oncology (RANO) criteria for high-grade gliomas (RANO-HGG) and low-grade gliomas (RANO-LGG) were developed to improve the reliability of response assessment in glioma trials. Over time, some limitations of these criteria were identified, and challenges emerged regarding integrating features of the modified RANO criteria (mRANO) or the immunotherapy RANO (iRANO) criteria.

Informed by data from studies evaluating the different criteria, updates to the RANO criteria are proposed (RANO 2.0).

They recommend a standard set of criteria for both high- and low-grade gliomas, to be used for all trials regardless of the treatment modalities being evaluated. In the newly diagnosed setting, the postradiotherapy magnetic resonance imaging (MRI), rather than the postsurgical MRI, will be used as the baseline for comparison with subsequent scans. Since the incidence of pseudoprogression is high in the 12 weeks after radiotherapy, continuation of treatment and confirmation of progression during this period with a repeat MRI, or histopathologic evidence of unequivocal recurrent tumor, are required to define tumor progression. However, confirmation scans are not mandatory after this period nor for the evaluation of treatment for recurrent tumors. For treatments with a high likelihood of pseudoprogression, mandatory confirmation of progression with a repeat MRI is highly recommended. The primary measurement remains the maximum cross-sectional area of the tumor

(two-dimensional) but volumetric measurements are an option. For IDH wild-type glioblastoma, the non-enhancing disease will no longer be evaluated except when assessing response to antiangiogenic agents. In IDH-mutated tumors with a significant non-enhancing component, clinical trials may require evaluating both the enhancing and non-enhancing tumor components for response assessment [1].

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Wen PY, van den Bent M, Youssef G, Cloughesy TF, Ellingson BM, Weller M, Galanis E, Barboriak DP, de Groot J, Gilbert MR, Huang R, Lassman AB, Mehta M, Molinaro AM, Preusser M, Rahman R, Shankar LK, Stupp R, Villanueva-Meyer JE, Wick W, Macdonald DR, Reardon DA, Vogelbaum MA, Chang SM. RANO 2.0: Update to the Response Assessment in Neuro-Oncology Criteria for High- and Low-Grade Gliomas in Adults. J Clin Oncol. 2023 Nov 20;41(33):5187-5199. doi: 10.1200/JCO.23.01059. Epub 2023 Sep 29. PMID: 37774317.