



Journal Club, February 2026 – April 2026

The February 2026 – April 2026 edition of the **AIROyoung Journal Club** focus on the role, the timing and the risks of stereotactic treatment for brain metastases. Deciding on the most appropriate time to treat brain metastases in patients with oligo- or polymetastatic disease that has metastasised to the brain at a later stage, and assessing the risks associated with the treatment itself, is one of the challenges facing radiotherapists today. These articles, published in leading journals in the field of radiotherapy, address this issue, with a particular focus on indices that can help us classify patients appropriately, dividing them into risk groups, thereby guiding our treatment choices and enabling us to estimate the risks of side effects associated with stereotactic treatment of the disease sites.

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Green Journal, January 2026

Quantifying risk of radiation necrosis: Normal tissue complication probability modeling following stereotactic radiosurgery for small brain metastases in the modern era

Sreenija Yarlagadda, Ranjini Tolakanahalli, Yanjia Zhang, DJay J. Wieczorek, Tatiana Bejarano, Yongsook C. Lee, Eyub Akdemir, Matthew D. Hall, Robert H. Press, Evan D. Bander, Michael W. McDermott, Alonso N. Gutierrez, Minesh P. Mehta, Rupesh Kotecha



This retrospective study evaluated radiation necrosis after single-fraction stereotactic radiosurgery for small brain metastases in 234 patients comprising 1,494 lesions. Using modern planning and dose-volume analysis, the authors found that the normal brain volume receiving 15 Gy (V15Gy) was the strongest predictor of radionecrosis. A V15Gy of 2.52 cc and 4.65 cc corresponded to less than 5% risk of any-grade and grade 2 radionecrosis, respectively. The work proposes V15Gy as a clinically practical constraint to optimize target coverage while minimizing toxicity in contemporary radiosurgery practice.

Green Journal, January 2026

Prognostic scores for patients with multiple brain metastases treated with repeated stereotactic radiosurgery – a secondary analysis of the CYBER-SPACE randomized phase 2 trial

Annabella Schiele, Denise Bernhardt, Thomas Welzel, Paul Thalmann, Laila König, Tanja Eichkorn, Anna Krämer, Kristin Lang, Adriane Lentz-Hommertgen, Fabian Weykamp, Farastuk Bozorgmehr, Michael Thomas, Anja Sander, Stefan Rieken, Jürgen Debus, Rami A. El Shafie

This secondary analysis of the CYBER-SPACE phase II trial evaluated whether legacy prognostic scores remain valid in patients with up to ten brain metastases treated with repeated stereotactic radiosurgery plus modern systemic therapy. Among 192 patients, only the Brain Metastasis Velocity (BMV) score consistently predicted both overall survival and the need for salvage whole-brain radiotherapy, whereas BSBM predicted survival only and melanoma-specific dsGPA predicted both endpoints in melanoma. BMV remained prognostic across repeated recurrences, and endpoint-specific cut-offs



were identified. The study suggests that contemporary decision-making requires dynamic, treatment-era-adapted prognostic models rather than historical scores.

Green Journal, March 2026

Development and external validation of an MRI radiomics-based machine learning model to predict tumour recurrence in brain metastases treated with Gamma Knife radiosurgery

Umaru A, Manan HA, Kumar RKA, Hamsan SK, Tan D, Yahya N

This study developed and externally validated an MRI radiomics-based machine learning model to predict recurrence after Gamma Knife radiosurgery for brain metastases. Using 103 institutional lesions for model development and 125 TCIA lesions for validation, the authors compared MRI-only, clinical, dosimetric, and combined pipelines. The best model integrated log-filtered MRI features with clinical variables, achieving strong discrimination in internal testing and acceptable external performance. Tumour shape complexity and intensity heterogeneity were the dominant predictors. The results support radiomics as a reproducible, interpretable tool for recurrence risk stratification and personalized follow-up in brain metastasis management.

Red Journal, March 2026

A New Predictive Model for Radiation Necrosis Risk Based on PTV-Enriched Blood Inflammatory Biomarkers in Patients With Brain Metastases Treated With Stereotactic Radiosurgery



Paola Anna Jablonska, Diego Serrano, Nuria Galán, Jennifer Barranco, Sergio Leon, Victoria Zelaya, Ramón Robledano, José Ignacio Echeveste, Mikel Rico, Sonia Flamarique, Teresa Cuenca, Marta Moreno-Jiménez, Joaquim Bosch-Barrera, Alfonso Calvo, Javier Aristu

This retrospective study evaluated whether circulating inflammatory biomarkers and clinical variables could predict radiation necrosis in patients with brain metastases treated with stereotactic radiation. Plasma from 47 patients was profiled using a multiplex immuno-oncology assay, and available necrotic tissue was analyzed for immune infiltration. Multivariable Cox regression identified planning target volume, MUC-16, and CXCL11 as independent predictors of necrosis. Their combination in a Necrosis Predictive Index yielded strong discrimination, with an area under the curve of 0.808 and a significant hazard ratio for necrosis development. The findings suggest a proinflammatory signature may support individualized risk stratification.