

## BRIEF OPINION

# Radiosurgery Nomenclature: A Confusion of Tongues



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Since the time of its inception within neurosurgery, the practice of radiosurgery has grown and evolved with the introduction of new technologies and the involvement of other disciplines. Currently, radiosurgery practices involve neurosurgery, radiation oncology, medical physics and, in many centers, neuroradiology. Various commercially available radiosurgical devices are used, including the conventional linear accelerator, CyberKnife, Gamma Knife, and even particle therapy units.

The historical roots of each radiosurgery practice affect the terminology and procedures applied for treatment planning and delivery, resulting in wide variability in image acquisition, planning, and verification practices across the community. This organic development has led to a “confusion of tongues,” challenging our ability to interpret the published scientific literature in a meaningful way and hindering the radiosurgery community’s ability to collaborate effectively to advance the science and practice of radiosurgery.

The broader radiation therapy literature contains a growing body of evidence that the quality of radiation delivery has a significant impact on clinical outcomes. This was highlighted in a secondary report of a large multicenter phase 3 trial of head and neck cancer, which showed

significantly worse survival when greater deficiencies were found during the central quality assurance review of the radiation therapy plans (1). Particularly for radiosurgery, a high-precision treatment delivered over a single or few fractions, the quality of treatment planning and delivery is likely to have an even greater impact.

The recent publication from Quantitative Analyses of Normal Tissue Effects in the Clinic provided a landscape of our understanding of normal tissue tolerances to radiation. However, this report largely summarized the tissue tolerances observed for conventionally fractionated radiation therapy, and it was emphasized that tissue tolerances in the setting of treatments with large dose per fraction, as used in radiosurgery, are largely unknown. Although the number of radiosurgery publications has risen exponentially over recent years, the variability in reporting dosimetric data, treatment response, and toxicity data has hindered meaningful systematic reviews or meta-analyses. To perform meaningful, quantitative measurements of the impact of quality on our outcomes across institutions, we need standardized terminology for reporting radiosurgery planning parameters and standardized delineation of organs at risk (OAR). Variability in our target and OAR delineation practices and reporting of dosimetry for radiosurgery limits our ability to aggregate and

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compare radiosurgery treatments and their clinical impact across institutions and the published literature.

The authors of this article are excited by the transformation that is emerging in the collective radiosurgery community. The International Leksell Gamma Knife Society (LGKS) recently created a standardization committee that worked with society members to establish recommendations for uniform terminology and standardized dose reporting for radiosurgery that are better harmonized with the current recommendations of the International Commission on Radiation Units and Measurements (ICRU) (2). In parallel, the ICRU is preparing updated recommendations for standardized reporting of small field treatments, including radiosurgery. The LGKS and the International Society of Stereotactic Radiosurgery are supporting a unified effort to standardize the reporting of radiosurgery treatments and outcomes through collaboration on standardized OAR definitions. An effort by the radiosurgery community through the American Association of Neurological Surgeons and the American Society for Radiation Oncology has recently been launched to gather data in a national registry for stereotactic radiosurgery.

These larger group efforts are helping resolve our confusion of tongues, but the diligent action of each and every member of the radiosurgery community to apply the new standardized terminology and to use standardized dose and outcome reporting is critical to the successful implementation of these efforts. Let us ensure that we continue to innovate and improve treatment for our patients by taking advantage of this transformative movement that has unified our growing multidisciplinary radiosurgery community.

## References

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