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A Universal Predictive Model for Dose Fall-Off in MLC-Based Stereotactic Brain Radiosurgery

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Predictive modeling of dose fall-off in radiosurgery could assist in clinical decision-making when prescribing a treatment plan with minimized toxicity risk. The purpose of this study is to develop a predictive dose fall-off model. **Materials/Methods:** We retrospectively reviewed treatment plans from 257 patients (365 lesions) with total doses ranging from 20 to 35Gy in 5 fractions. For each plan, we measured both total volume of the external contour (EXT) and BrainMinusPTV (BMP) receiving P=20% to P=80% of the prescription dose. The model has form $y=Fa(PTV)^b+/-\delta$. y =volume of EXT or BMP (cc's); a and b are curve-fitting coefficients; PTV=total planning target volume (cc's); F is an adjustment factor (>1) to account for number of targets; δ is the 95% prediction band. F , a , b , and δ were modeled such that dose-fall can be forecast for any PTV and dose level. **Results:** The model coefficients were as follows: Coefficient EXT BMP a 19927(100×P)exp(-2) 17122(100×P)exp(-2) b 0.42(100×P)exp(0.17) 0.63 F -0.0156×(100×P)+2.5517 δ 384467×(100×P)exp(-2.3159) The table can be used to determine the model for any P from 20% to 80%. Example: the EXT receiving 50%, P=0.5, a =8.0, b =0.82, F =1.8, δ =45. Thus, EXT-50=8(PTV^{0.82}) or 1.8×8(PTV^{0.82}) for 1-3 or >3 targets, respectively, +/-45cc's. The model was verified against published values of dose fall-off from linacs. **Conclusion:** A predictive dose fall-off model was generated for linac-based radiosurgery. The model can be used for quality assurance or for inter-institutional comparisons. Ongoing work is being conducted to extend the model to a SRS cones system.

QUALITY OF LIFE

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Assessment of Function and Quality of Life in a Phase II Multi-Institutional Clinical Trial of Fractionated Simultaneous In-Field Boost Radiotherapy for Patients with 1-2 Brain Metastases

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We examined functional outcomes and quality of life of whole brain radiotherapy (WBRT) with integrated fractionated stereotactic radiotherapy boost (FSRT) for brain metastases treatment. Methods Eighty seven people with 1-3 brain metastases were enrolled on this Phase II trial of WBRT (30Gy/10) + simultaneous FSRT, (60Gy/10). Results Mean (Min-Max) baseline KPS, Mini Mental Status Exam (MMSE) and FACT-Br quality of life were 83 (70-100), 28 (21-30) and 143 (98-153). Lower baseline MMSE (but not KPS or FACT-Br) was associated with worse survival after adjusting for age, number of metastases, primary and extra-cranial disease status. Crude rates of deterioration (>10 points decrease from baseline for KPS and FACT-Br, MMSE fall to <27) ranged from 26-38% for KPS, 32-59% for FACT-Br and 0-16% for MMSE depending on the time-point assessed with higher rates generally noted at earlier time points (< 6 months post-treatment). Using a linear mixed models analysis, significant declines from baseline were noted for KPS and FACT-Br (largest effects at 6 weeks to 3 months) with no significant change in MMSE. **Conclusions** The effects on function and quality of life of this integrated treatment of WBRT + simultaneous FSRT were similar to other published series combining WBRT+SRS.

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A Mixed Method Study of a Peer Support Intervention for Newly Diagnosed Primary Brain Tumour Patients

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The purpose of this study was to investigate the impact of an intervention designed to support newly diagnosed primary brain tumour patients. The intervention involved a structured, one time meeting between newly diagnosed patients and trained volunteer "veteran" primary brain tumour patients. **Methods** Two trained volunteers met for a single, face to face meeting on an individual basis with a total of 10 newly diagnosed patients. A combination of questionnaires and interviews were used to investigate the impact of the intervention for the new patients and the volunteers. **Results:** The intervention appeared to be of substantial value for both groups of participants. Analysis revealed that the newly diagnosed patients experienced a range of benefits, including those related to the themes of: increased hope; valued guidance; hearing what it's really like; overcoming aloneness; and realignment of priorities. Veteran patients experienced a sense accomplishment and decreased anxiety as a result of the intervention. Only minor adverse effects and challenges were reported. **Conclusions** The findings provide initial evidence that the experimental intervention