systems in study documentation. Systematic evaluation of quality score adherence will allow us to identify common flaws in this field for enabling translation of models into clinical workflow.

RADIATION

RADI-01. CYSTIC BRAIN METASTASES MANAGED WITH RESERVOIR PLACEMENT AND STEREOTACTIC RADIOSURGERY

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BACKGROUND: Stereotactic radiosurgery (SRS) has become a mainstay of treatment for patients with metastatic brain tumors. However, metastatic tumors with a large cystic component often exceed the size limit for safe and effective SRS. In such cases, surgical resection may not be the preferred first method of treatment, due to tumor location, patient co-morbidities, and patient preference. In such cases volume reduction by cyst aspiration followed by SRS may be a preferred option. METHODS: Seven patients were treated with this method. We performed reservoir insertion for the aspiration of cystic component in each patient and followed that with outpatient SRS. RESULTS: Mean overall volume reduction from this treatment method was 80% (range 46.5–94.9). Mean volume reduction from the cyst aspiration alone was 60.7% (range 3.5–90.9), and after SRS a further 71.6% (range 34.6–94.4), accounting for some cyst reaccumulation between the time of surgery and SRS. The interval between those two procedures were 24 days on average (range 11–58 days). Repeat reservoir aspiration was done a total of 10 times in 5 patients. CONCLUSION: Cyst aspiration with reservoir placement followed by SRS is a good option for patients with large cystic brain metastases. The reservoir allows for repeat aspiration if needed. Catheter placement at the center of the cyst, and SRS within 2–3 weeks of surgery, can maximize the likelihood of a successful outcome.

RADI-02. HIPPOCAMPAL-SPARING WHOLE BRAIN VOLUMETRIC MODULATED ARC THERAPY (VMAT) PLANNING IN MONACO: A "HOW-TO" NOT PULL YOUR HAIR OUT.

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PURPOSE: NRG-CC001 recently reported positive results on hippocampal-sparing IMRT (HS-IMRT) in conjunction with memantine for the reduction in cognitive decline compared to conventional whole brain radiation therapy. Herein, we report our experience in planning volumetric modulated arc therapy (VMAT) cases in Monaco® with the anticipation of increased utilization of the planning technique for delivery on Elekta linear accelerators. METHODS AND MATERIALS: Twelve patients previously treated with whole brain radiation therapy who would have been eligible for NRG-CC001 were replanned with VMAT HS-IMRT for to a dose of 30Gy/10fx using constraints from the trial. RESULTS: All twelve patients were able to be planned with VMAT and achieve NRG-CC001 dose constraints. Median maximum and D100% to the right and left hippocampi were: 13.37Gy and 13.43Gy, respectively and 8.76Gy and 8.86Gy, respectively. Median coverage of the brain minus the hippocampi with 30Gy was 96.53%. All cases passed quality assurance testing with 3%/3mm and 2%/2mm criterion. CONCLUSIONS: Hippocampal-sparing IMRT whole brain radiation therapy can be feasibly planned with VMAT technique in Monaco® and delivered on Elekta linear accelerators.

RADI-03. A STRATEGY TO PERSONALIZE THE USE OF RADIATION IN PATIENTS WITH BRAIN METASTASIS BASED ON S100A9-MEDIATED RESISTANCE

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Finding effective treatment options for patients with brain metastasis remains an unmet need. Given the limitations imposed by the blood-brain-barrier for systemic approaches, radiotherapy offers a superior ability to access the brain. While clinical practice recently adapted the use of stereotactic radiosurgery (SRS), Whole-Brain-Radiotherapy (WBRT) continuous to be an important treatment option, since many patients present with multifocal lesions or bad performance scores, rendering them ineligible for SRS. Unfortunately, overall survival of patients remains unaffected by radiotherapy. Despite this clinical data, the molecular mechanisms that allow metastatic cells to resist radiotherapy in the brain is unknown. We have applied WBRT to experimental brain metastasis from lung and breast adenocarcinoma and validated their resistance *in vivo*. An unbiased search to identify potential mediators of resistance identified the S100A9-RAGE-NFkB-JunB pathway. Targeting this pathway genetically reverts the resistance to radiotherapy and increases therapeutic benefits *in vivo*. In two independent cohorts of brain metastasis from lung and breast adenocarcinoma patients, levels of S100A9 correlate with the response to radiotherapy, offering a novel approach to stratify patients according to their expected benefit. In order to make this biomarker also available for brain metastasis patients receiving palliative WBRT without preceding surgery, we complemented our tumor-specimen based approach with the less invasive detection of S100A9 from liquid biopsies. Here, serum S100A9 also correlated with a worse response to WBRT in brain metastasis patients. Furthermore, we have validated the use of a blood-brain-barrier permeable RAGE inhibitor to restore radio-sensitivity in experimental brain metastasis models *in vivo* and in patient-derived organotypic cultures of radio-resistant brain metastasis *ex vivo*. In conclusion, we identified S100A9 as a major mediator of radio-resistance in brain metastasis and offer the molecular framework to personalize radiotherapy by exploiting it as a biomarker and as a therapeutic target, thus maximizing the benefits for the patient.

RADI-04. STEREOTACTIC RADIOSURGERY IN ALVEOLAR SOFT PART SARCOMA BRAIN METASTASIS

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BACKGROUND: Alveolar soft part sarcoma (ASPS), although rare, has the highest incidence of brain metastasis amongst all sarcomas. Stereotactic radiosurgery (SRS) has been shown to be a well tolerated and effective treatment of intracranial sarcomatous metastasis. However, there is a paucity of published literature that guides radiation therapy in this condition. METHODS: This is a single centre retrospective review of all ASPS patients with intraparenchymal brain metastasis in our centre treated with stereotactic radiosurgery (SRS). SRS dosing is dichotomised into high and low dose (≥25 Gy and <25 Gy respectively) and outcomes such as local recurrence (LR) and radiation effects are noted. Successful treatment was defined as a lesion that regressed, is stable, or has less than 25% increase in tumour volume. Local recurrence (LR) was defined as increase in tumour volume by more than 25% during follow up. RESULTS: There were three patients with 11 ASPS metastatic brain lesions, one of which underwent retreatment. Each lesion was followed up for a mean duration of 12 months (range: 5 – 22 months). Five lesions treated with a high dose regime and six lesions were given low dose. Lesions treated with high dose SRS experienced significantly less LR (20% vs 83.3%, OR 20.0 [95%CI 0.93 – 430), p = 0.036) with no increase in undue symptomatic radiation effects. Retreatment of lesions with LR after initial SRS using a low dose regime was successful, albeit only in the single recurrent lesion. CONCLUSIONS: We conclude that SRS can be used as a first line treatment for ASPS brain metastasis that are not surgically accessible and that using a high dose for treatment is effective and safe. Multicentre collaborative studies can be performed to validate this claim.

RADI-05. METASTATIC NEOPLASM VOLUME KINETICS FOLLOWING TWO-STAGED STEREOTACTIC RADIOSURGERY

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INTRODUCTION: Multisession staged stereotactic radiosurgery (2-SSRS) represents an alternative approach for management of large brain metastases (LBMs), with potential theoretical advantages over fractionated SRS and rep-