

Hypofractionated stereotactic radiotherapy

- [Evaluation of clinical and volumetric outcomes following adaptive gamma knife radiosurgery for brain metastases](#)
- [Dosimetric advantages of dual-layer MLC in hypofractionated stereotactic radiotherapy for multiple brain metastases: a comparative study with single-layer MLC](#)
- [Intensity-modulated moderately hypofractionated radiotherapy versus stereotactic body radiotherapy for prostate cancer \(PACE-C\): early toxicity results from a randomised, open-label, phase 3, non-inferiority trial](#)
- [Histological Classifier of Radiosensitivity to Spine Stereotactic Body Radiation Therapy](#)
- [Hypofractionation/Ultra-hypofractionation for Prostate Cancer Radiotherapy](#)
- [Efficacy and safety of stereotactic radiosurgery for large meningiomas: A comprehensive systematic review and meta-analysis](#)
- [Prostate Stereotactic Body Radiotherapy With Synchrony-Based Fiducial Tracking on Radixact X9](#)
- [Congress of Neurological Surgeons Systematic Review and Evidence-Based Guideline on the Role of Radiosurgery \(Stereotactic Radiosurgery\) and Radiation Therapy in the Management of Patients With Vestibular Schwannomas: Updates](#)

see also [Single-fraction stereotactic radiosurgery](#).

Fractionated [Stereotactic Radiotherapy](#) also refers to a method of [cancer treatment](#) with [radiotherapy](#). When the total dose of [radiation](#) is divided into several, smaller doses over a period of several days, there are fewer toxic effects on healthy cells. This maximizes the effect of [radiation](#) on [cancer](#) and minimizes the negative [side effects](#). Typical fractionation schemes divide the dose into 30 units delivered every weekday over 6 weeks, though current [research](#) is considering the benefits of accelerated fractionation (2 deliveries per day and/or deliveries on weekends as well). Hypofractionation is a treatment regimen that delivers higher doses of radiation in fewer visits. The logic behind this treatment is that applying greater amounts of radiation works to lower the effects of accelerated tumor growth that typically occurs during the later stages of radiotherapy.

Many tumors in the brain and in other parts of the body are not suitable for treatment by surgery.

Features that determine this include:

Site (including proximity to important brain structures such as the optic chiasm and the brain stem)

Involvement of the spinal cord

Previous treatment

Patient preference for non-surgical treatment

Types of brain tumours suitable for Fractionated Stereotactic Radiotherapy include: Benign:

Malignant:

Meningiomas

Gliomas

[Fractionated Stereotactic Radiotherapy for Glioblastoma recurrence](#)

Pituitary tumours

Medulloblastomas

see [Fractionated stereotactic radiotherapy for vestibular schwannoma](#)

Chordomas

Craniopharyngiomas

Haemangiomas

Stereotactic radiation treatment relies upon precisely locating the lesion in the brain with exact co-ordinates (as with latitude and longitude).

Fractionated Stereotactic Radiotherapy (FSRT) is delivered over a number of fractions for a specific number of days. The number of treatments is determined by the size and type of the tumour and proximity to adjacent tissues. FSRT can be delivered as 'multiple fixed beams' using the MMLC (Mini-Multi Leaf Collimator), or IMRT (Intensity Modulated Radiotherapy). This department was the first in the world to treat any patient with stereotactic IMRT. IMRT is used to treat tumours of irregular shape. This technique enables the specialist to shape the beam to better treat the tumour and minimise the dose to normal tissue. Consultation for FSRT with the Specialist

Not all patients are suitable for FSRT. The proximity of the tumour(s) to critical brain structures determines whether the radiotherapy should be given in small doses over a number of fractions each day, ranging from 5-30Gy, and for a number of days or weeks.

Scans are evaluated at the time of consultation with your doctor and discussion regarding the benefits and possible side effects of the treatment will also be discussed. Treatment sessions average from fifteen to twenty minutes daily with little to no acute side effects, however over the course of the treatment there may fatigue, alopecia (hair loss) and sometimes mouth discomfort associated with using the dental plate (this generally settles quickly after treatment is concluded).

At consultation a Stereotactic Radiotherapy Brochure will be given to you. If the decision is made to have treatment you will be contacted by the Planning Co-ordinator confirming the date and time of your planning session.

Planning Sessions

Planning sessions are usually organised 1-2 weeks prior to commencement of radiotherapy treatment and take approximately half a day. This includes:

Impression of your upper palate and the back of the head (occipital region)

Head frame fitting

Attachment of impression moulds to the base head ring.

CT scan

MRI

It is important that all dental work is avoided during the period of the head frame fitting, planning and during the course of treatment. Also, any changes of hair style may affect the accuracy and stability of the 'head frame set' during treatment.

The head frame fitting session is usually attended in the morning. Once the fitting is done there is a free 1-2 hour break (this allows time for the impression to set, to have lunch and familiarise yourself with the department and our resources available). When the impression is set you will have a CT scan with the head frame fitted in the afternoon. An MRI is also needed to complete your plan for your treatment and is usually arranged during your planning session.

Radiation Treatment

Treatment usually commences approximately one week after planning. When arriving the first day for treatment, please notify the radiation reception staff of your arrival and you will be escorted to the Treatment Area. When the radiotherapists are ready you will be called into the treatment room where the head frame is fitted daily prior to each treatment. At the conclusion of each treatment the following day's treatment time will be confirmed with you (this occasionally may change). Weekly Reviews

Review with your clinician is weekly either before or after treatment. This allows time to discuss any concerns you may have and informs the clinician how treatment is progressing.

In the final week of treatment at clinic review your clinician will organise a follow-up appointment 4-6 weeks post treatment. A follow-up scan may also be organised at this time.

Fractionated Stereotactic Radiotherapy for skull base meningioma

[Fractionated Stereotactic Radiotherapy for skull base meningioma.](#)

The current treatment for patients with relapsed [malignant glioma](#) (MG) remains unsatisfactory. Utilization of hypofractionated [stereotactic radiotherapy](#) (HFSRT) for [recurrent malignant glioma](#) has shown some encouraging results and may be a proper option.

Hu et al., performed a [systematic review](#) and [meta-analysis](#) of [publications](#) which investigated the use of HFSRT for recurrent MG. Relevant studies were obtained through searching [PubMed](#), [EMBASE](#), and [Cochrane Library](#). Data about treatment regimens, median overall survival, [radiation necrosis](#), as well as other major [neurological complications](#) were extracted. They performed a descriptive analysis of the median overall survival and meta-analysis of the reported rates of radiation necrosis and other major neurologic complications (MNC).

A total of 26 studies were included in our study, containing 861 patients. Median overall survival

ranged from 8.6 to 18 months. A total of 19 studies were included to perform a meta-analysis of radiation necrosis rate and the pooled radiation necrosis rate was 5% (0-64%). The pooled rate of other major neurological complications was 3% (0-14%), calculated from 20 studies.

Based on the present evidence, it suggests that HFSRT is an efficacious and safe treatment approach to treat patients with recurrent MG. However, retrospective and observational nature of the studies included in our systematic review and meta-analysis restricted formation of more solid conclusions. Thus, well-designed prospective controlled trials are warranted to further define the therapeutic role of HFSRT for recurrent MG ¹⁾.

¹⁾

Hu YJ, Chen D, Zhang LF, Chen J. Efficacy and Safety of Hypofractionated Stereotactic Radiotherapy for Recurrent Malignant Gliomas: A Systematic Review and Meta-analysis. World Neurosurg. 2019 Apr 5. pii: S1878-8750(19)30978-7. doi: 10.1016/j.wneu.2019.03.297. [Epub ahead of print] Review. PubMed PMID: 30959254.

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