# Audit of stereotactic radiosurgery for brain metastases

**Descriptor:**

This audit measures the management of stereotactic radiosurgery or hypofractionated stereotactic radiotherapy for brain metastases against the NHS Commissioning Board’s criteria and also assesses the management and outcomes against locally agreed standards.

**Background:**

In patients with metastatic cancer, cerebral metastases occur in around 20-40% and are increasingly being diagnosed as systemic therapies become more effective. Life expectancy with steroids alone is typically around 1-2 months and with whole brain radiotherapy (WBRT) for patients with 1-3 brain metastases is around 5 months [1]. Phase III evidence has shown that SRS improves survival in selected patients with a solitary brain metastasis and improves functional independence in patients with 1-3 brain metastasis [1]. A summary and systematic review of the evidence for SRS for brain metastases was published in 2010 [2]. Since then, a further Phase III trial has shown that adding whole brain radiotherapy (WBRT) to SRS improves intracranial control but not overall survival [3].

The NHS Commissioning Board has published its criteria for commissioning stereotactic radiosurgery (SRS) for brain metastases [4]. These criteria include discussion by the appropriate MDT(s), Karnofsky Performance Status (KPS) = 70, absent or controllable systemic disease, total volume of metastases = 20 cm3, and life expectancy from extracranial disease greater than 6 months. It has been estimated that up to 1725 patients per annum would be eligible for SRS in England [4].

Patient selection is critical to outcomes, yet is to some extent subjective. The Disease Specific Graded Prognostic Assessment (DS-GPA) is the latest attempt to predict prognosis for the purpose of patient selection. It is a prognostic index based on a multi-institutional database of 3940 patients with brain metastases treated from 1985 to 2007 [5]. The prognostic factors include age, KPS, presence or absence of extracranial metastases, number of brain metastases and histology. While median survival figures predicted by the DS-GPA are out-dated and affected by selection biases, it might be used to exclude the very worst prognosis patients (e.g. in whom DS-GPA predicts a median survival ~ 3 months) [6].

The NHS Commissioning Board’s guidance applies to single fraction treatment (denoted SRS) or hypofractionated treatment (denoted SRT) of not more than 5 fractions. The RTOG and EORTC trials used single fraction treatment, to slightly different doses, while some have used hypofractionation for larger tumours or tumours close to critical structures to improve the therapeutic ratio [1,3,7].

The reasons for carrying out audit of SRS treatment of brain metastases are:

- To ensure that appropriate individuals are being selected (in accordance with NHS commissioning criteria and those most likely to benefit)

- To ensure that treatment outcomes are as expected (especially overall survival, and if follow up MRI imaging is done, local control of treated metastases)

- To ensure that treatment toxicity is acceptable

- To identify opportunities for improvement in patient selection, the patient pathway and treatment protocols

- To comply with the NHS Commissioning Board’s requirements for audit [4]

Results of local audit should be fed back to the local specialized MDTs (e.g. neurosciences and/or SRS MDTs) to provide reassurance about patient selection or to provide guidance about how patient selection and the patient pathway may be improved. Treatment outcomes and toxicity should be reviewed to provide reassurance about the treatment protocol or to inform changes in treatment protocol (e.g changes in dose / fractionation). The results of audit may be requested by the NHS Commissioners to ensure that the service complies with commissioning guidance.

## The Cycle

**The standard:**

1) Compliance to NHS Commissioning Board’s selection criteria [4]:

   a) Discussion by appropriate MDT(s)

   b) KPS=70

   c) Diagnosis of cancer established & absent or controllable systemic disease

   d) Pressure symptoms best relieved by surgery excluded

   e) Tumour volume< 20cc

   f) MDT confirmed life expectancy from extracranial disease is expected to exceed 6 months

   g) In patients previously treated with SRS/SRT, at least 3 months have elapsed since previous SRS/SRT and at least 6 months since SRS/SRT to the same lesion, in addition criteria a) to g) are still satisfied and the disease specific cancer MDT has confirmed the appropriateness of further SRS/SRT

2)Compliance to SRS treatment protocol

3)Incidence of serious (CTCAE grade = 3) side effects

4)Overall survival

5)Local control of SRS/SRT treated metastases (if follow up imaging is done)

**Target:**

1. Compliance to NHS Commissioning Board’s patient selection criteria – 100% (for routinely funded cases)2. Compliance to SRS treatment protocol = locally agreed target (e.g. 90%)3. Incidence of serious (CTCAE grade = 3) side effects = locally agreed target (e.g. 10%)4. Median (actuarial) overall survival = locally agreed target (e.g. 6 months)5. Median time to local progression of one or more SRS/SRT treated metastases = locally agreed target (e.g. 9 months)

## Assess local practice

**Indicators:**

1. Proportion of patients treated with SRS / SRT complying with all of the NHS Commissioning Board’s selection criteria

2. Proportion of patients whose treatment plan complies with the local SRS treatment protocol

3. Proportion of patients with a serious (CTCAE grade 3 or 4) treatment toxicity

4. Median (actuarial) overall survival of SRS/SRT treated patients (Kaplan Meier analysis)

5. Median time to local progression of one or more SRS/SRT metastases (Kaplan Meier analysis)

**Data items to be collected:**

Data items to audit against NHS Commissioning Board’s guidance:

- Whether discussed in appropriate local MDT(s)

- Karnofsky Performance Status

- Primary cancer diagnosis

- Tumour volume (cc)

- Number of tumours

- Size of largest tumour

- Dose

- Fractionation

- Treatment outcome

- For retreatments of new lesions, in addition: time since previous SRS/SRT

- For retreatments of previously treated lesions: time since previous SRS / SRT

Other items recommended:

- Whether compliant with local SRS treatment protocol

- Serious treatment toxicity (CTCAE grade = 3)

- Overall survival (days from completion of SRS / SRT until death)

- Time to local progression of one or more SRS/SRT treated metastases

**Suggested number:**

All patients treated with SRS/SRT for brain metastases over a 1 year period.

**Suggestions for change if target not met:**

- If non-compliant with patient selection criteria, could the patient pathway (especially operation of the MDT) be improved?

- Review reasons for non-compliance with SRS treatment protocol (e.g. errors, or overly stringent protocol?)

- Review cases of serious toxicity for any possible predisposing factors; consider whether dose / fractionation should be amended

- If overall survival is below expectation, scrutinise patient selection; also review whether delays in the patient pathway may be compromising outcomes

- If local control is below expectation, might this be due to dose / fractionation?

- Re-audit: the NHS Commissioning Board’s draft guidance requires the prescribed data items to be collected for each patient. It is therefore strongly recommended that this is done prospectively. No time interval is prescribed for re-audit, but 12-24 months would seem reasonable depending on the results of the initial audit and changes made.

**Resources:**

- Personnel: Audit lead, clinical oncologist, specialist registrar, SRS radiographer, physicist / planning radiographer (for protocol compliance), possibly statistician (for Kaplan Meier analysis)

- Time: prospective collection of key data items is recommended and will minimize the time needed to complete the audit. Total 2-4 working days, depending on the number of patients and completeness of prospective data collection, to collect/complete data, analyse and prepare report

**References:**

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5. Sperduto PW, Kased N, Roberge D, et al. Summary report of the Graded Prognostic Assessment: An accurate and facile diagnosis-specific tool to estimate survival for patients with brain metastases. J Clin Oncol 2012;30:419-425. <http://dx.doi.org/10.1200/jco.2011.38.0527>
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**Editor's comments:**

An audit of local compliance with selection of patients with brain metastases for SRS/SRT against NHS commissioning board criteria.

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