# Audit of Tomotherapy IMRT in the management of Soft Tissue Sarcoma at the Northern Centre for Cancer Care, Freeman Hospital

**Descriptor:**

Retrospective review of patients treated with tomotherapy for soft tissue sarcomas of the extremities and assessing local recurrence rates against international published data.

Comparison of dosimetry data against currently ongoing Phase II IMRiS clinical trial.

**Background:**

Radiotherapy plays an important role in the treatment of soft tissue sarcomas (STS). IMRT is an advanced radiotherapy technique which enables delivery of a highly conformal dose to the target whilst sparing surrounding normal tissue. In the UK, a phase II clinical trial (IMRiS) is currently assessing the feasibility, efficacy and toxicity of IMRT in patients with bone and soft tissue sarcomas.The NCCC was one of the first 2 NHS centres in the UK to commission a Tomotherapy planning and delivery unit. Since 2009, all STS identified at the North of England Bone and Soft Tissue Sarcoma MDT as requiring radiotherapy have been treated with Tomotherapy based IMRT, as this was considered a distinctive solution to treating long treatment fields with IMRT.Treatment target volumes and organ at risk delineation was done as per local protocol - for limb sarcomas, this matched the Vortex protocol. Pre operative radiotherapy was delivered using 50Gy in 25 fractions. The post operative dose consisted of 60Gy in 2 Gy fractions delivered in a two phase treatment. In recent years, we have delivered the post operative dose with a concurrent phase 1 and 2 technique.

We have undergone a retrospective review of patients treated using our local protocol between 2009-2017. The primary aim of this study is to assess our 5 year local control rates compared to rates from modern series. Secondary aim is to evaluate if planning target volumes and organs at risk dose constraints from our series meet the IMRiS trial requirements.

## The Cycle

**The standard:**

1) 5 yr local recurrence rates from international published series:

    a) O'Sullivan, et al  (2013), Phase 2 study of preoperative image-guided intensity-modulated radiation therapy to reduce wound and combined modality morbidities in lower extremity soft tissue sarcoma. Cancer, 119: 1878–1884. doi:10.1002/cncr.27951

    b) Folkert MR, Singer S, Brennan MF, et al. Comparison of Local Recurrence With Conventional and Intensity-Modulated Radiation Therapy for Primary Soft-Tissue Sarcomas of the Extremity. Journal of Clinical Oncology. 2014;32(29):3236-3241. doi:10.1200/JCO.2013.53.9452.

2) Phase II IMRis clinical trial PTV and OAR dose constraints

**Target:**

5 yr local recurrence rates to be comparable to international published data

100% of patients to achieve dose constraints of phase II IMRis clinical trial

## Assess local practice

**Indicators:**

5 year local recurrence rates

PTV dose constraints:

1) High dose PTV (PTV\_6000/ PTV\_6600) D98%>90%, D95%>95%, D50%-100% of dose, D5% < 105% , D2% <107%

2) Low dose PTV (PTV\_5220/PTV\_5350) D98%>90%, D95%>95%, D50% -100% +/- 1Gy, avoid hotspots

OARS

1) Normal tissue corridoe V20Gy <50%

2) Mean femur dose (whole bone) <40Gy

3) Femoral head/neck mean dose <40Gy

**Data items to be collected:**

1)Patient Demographics - Age, Sex, Date of diagnosis, Date of surgery, Dates of radiotherapy (pre/post op), dates of recurrence and pattern of recurrence, dates of death and last follow up

2) Tumour Charactheristics - Primary site, size of tumour (<10 or >=10cm), Grade, Histological subtypes

3) Dosimetry data as described above

**Suggested number:**

Patients treated with tomotherapy IMRT between March 2009-October 2017

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

​Review of local practice and radiotherapy planning process. Review of relationship of local recurrences to PTV.

**References:**

1. 1) A Study of IMRT in Primary Bone and Soft Tissue Sarcoma (IMRiS) -<https://clinicaltrials.gov/ct2/show/record/NCT02520128>

2) O'Sullivan, et al  (2013), Phase 2 study of preoperative image-guided intensity-modulated radiation therapy to reduce wound and combined modality morbidities in lower extremity soft tissue sarcoma. Cancer, 119: 1878–1884. doi:10.1002/cncr.27951

3) Folkert MR, Singer S, Brennan MF, et al. Comparison of Local Recurrence With Conventional and Intensity-Modulated Radiation Therapy for Primary Soft-Tissue Sarcomas of the Extremity. Journal of Clinical Oncology. 2014;32(29):3236-3241. doi:10.1200/JCO.2013.53.9452.

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