

**PREDICTORS OF FUNCTIONAL  
OUTCOME FOLLOWING  
LIMB SALVAGE SURGERY FOR  
LOWER EXTREMITY  
SOFT TISSUE SARCOMA**

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# INTRODUCTION

## (Revised) MSTs

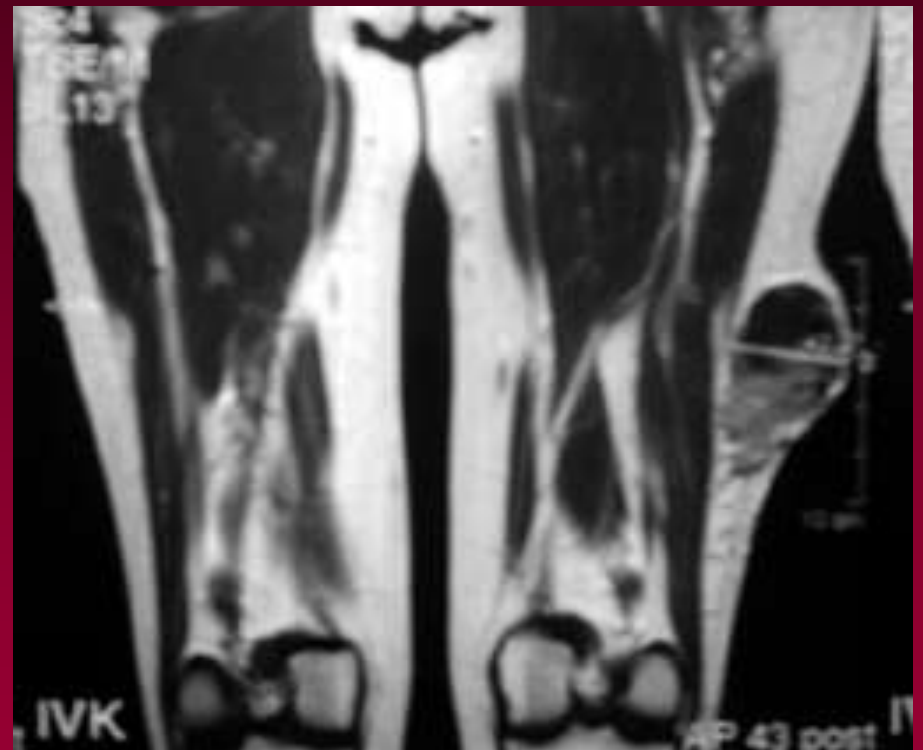
- Symptoms
- Clinical measures
- *But predictors vary depending on what aspect of function is measured...*



# Aim of The Study

## Evaluate variables

- Tumor *per se*
- Treatment modality



# Impairment

‘Loss or abnormality of  
physiological, psychological,  
or anatomical structure or  
function’

*Best evaluated by MSTTS  
scales...*



# Disability

‘Any restriction or lack of ability to perform an activity in the manner or within the range considered normal for a human being’

*Best evaluated by TESS and SF36*



# Patients & Method

- Limb salvage surgery for STS of lower extremity
- Min. 1 year f.-up for function
- Function scores plateau after 6 mos. for STS pts.

*Davis AM, CORR, 1999*



# Patients & Method

- **122 STS cases with complete f-up data**
- **Jan, 1991 – Dec, 1999**
- **Time from surgery to function assesment 42 +/- 12.2 mos.**
- **Clinician completed (Rev.) MSTS**
- **Patient completed TESS and SF-36**

# Patients & Method

- **MSTS:** Pain, ROM, strength, stability, deformity, emot. acceptance, function (x/35 pt.)
- **Revised MSTS:** Pain, function, emot. acceptance, walking ability, gait aid, limp (x/30 pt.; %x)
- **TESS:** 30 item questionnaire indicating level of difficulty during daily activities (%x)

**TESS demonstrated reliability, validity, and responsiveness for tumor patients**

*Davis, AM et al., CORR and Qual L Res, 1999*

- **SF36:** Function, role (body/emotion/social), body pain, general health, vitality (%x)

# Patients & Method

- Prospective data collection from a database related to the patient, tumor, therapy and complications
- Descriptive statistics, correlations and predictors were evaluated by SPSS



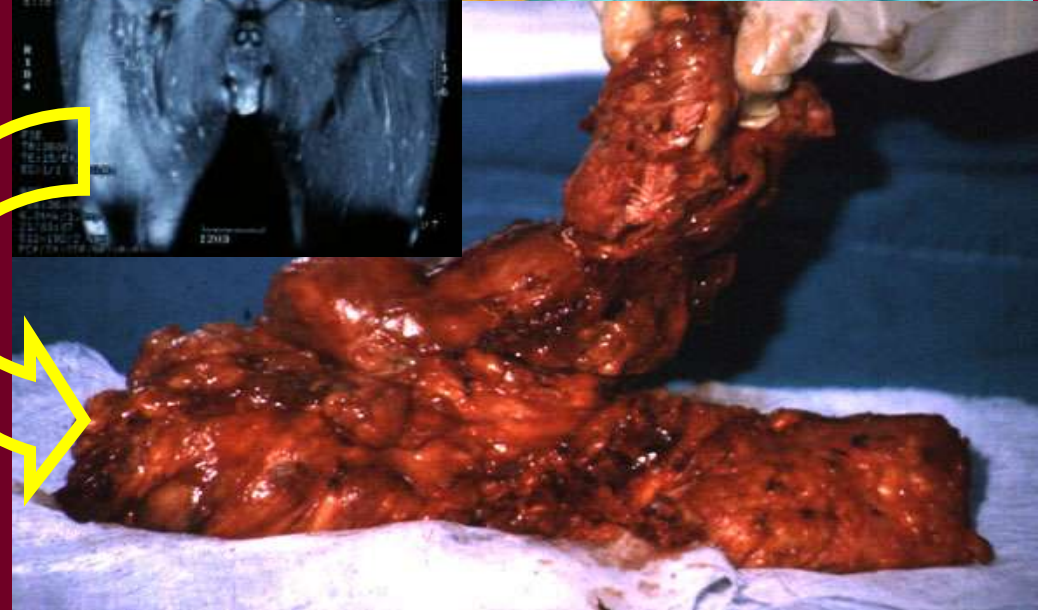
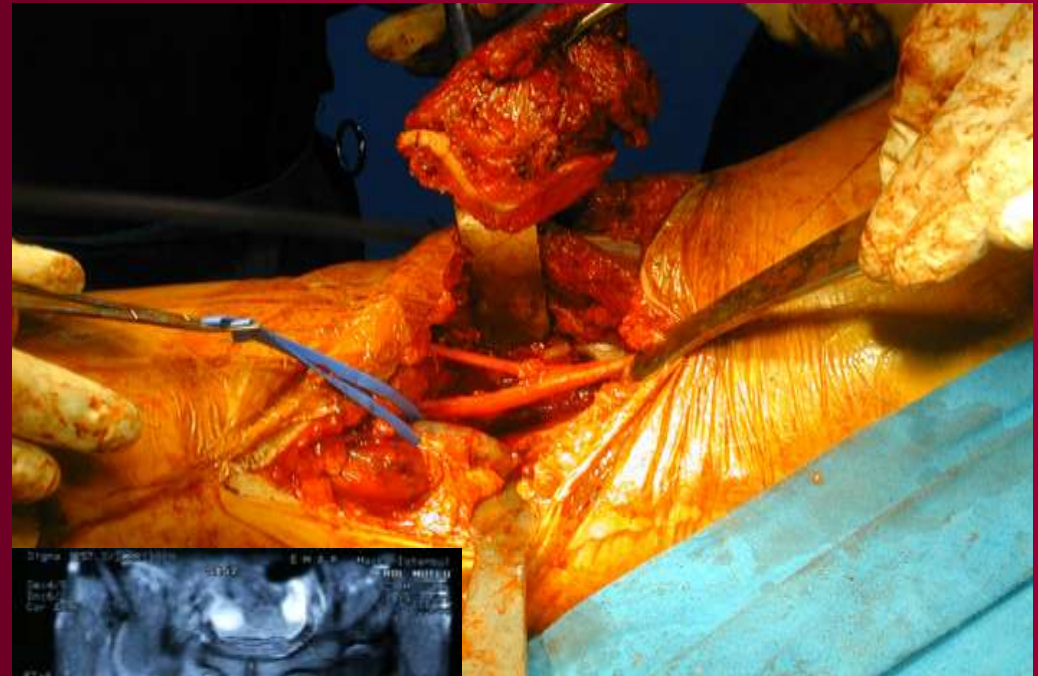
# Results

- Young patient group (med. 38 yrs.) with a male predominance (79/122)
- Large (mean 13.4 cm), deep (109/122), and high grade (80/122) tumors
- Almost all pts. had adjuvants
- <10% relapsed locally (10/122) and almost 1/3 (44/122) relapsed systemically at a mean of 18.
- 6 months



# Results

- Bone resection (19/122)
- Nerve resection (12/122)
- Artery resection (14/122)
- Complications
  - None 79
  - Wound 26
  - Fracture 2
  - Other 25
- Disease Status
  - CDF 64
  - AWD 11
  - MET 17
  - EX 30



# Functional Outcome Scores of Patients Treated for STS

<b>Outcome</b>	<b>Mean</b>	<b>SD</b>	<b>Range</b>
<b>MSTS</b>	<b>30</b>	<b>6.2</b>	<b>9-35</b>
<b>Rev. MSTS</b>	<b>84.9</b>	<b>20.4</b>	<b>13-100</b>
<b>TESS</b>	<b>82.7</b>	<b>18.7</b>	<b>23-100</b>
<b>SF36</b>	<b>71.1</b>	<b>22.9</b>	<b>8.2-100</b>

# Spearman Correlation Coefficients For Functional Measures

	<b>MSTS</b>	<b>Rev. MSTS</b>	<b>TESS</b>	<b>SF36</b>
<b>MSTS</b>	1.00			
<b>Rev. MSTS</b>	0.93	1.00		
<b>TESS</b>	0.71	0.76	1.00	
<b>SF36</b>	0.54	0.57	0.74	1.00

# Results

## Linear Regression

- ✓ Large tumor size
- ✓ Deep location
- ✓ High grade
- ✓ Prior incomplete rsx.
- ✓ Bone resection
- ✓ Major nerve sacrifice
- ✓ Complications

*Univariate predictors of MSTs*



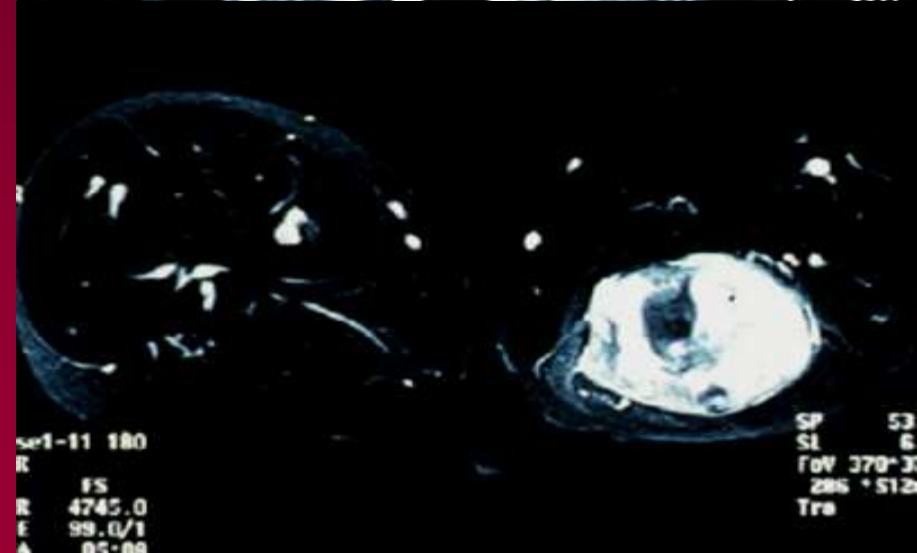


# Results

## Linear Regression

- ✓ Large tumor size
- ✓ Bone resection
- ✓ Major nerve sacrifice
- ✓ Complications

*Multivariate predictors  
of MSTs ( $R^2=0.32$ )*





# Results

## Increased disability

- ✓ Large tumor size
- ✓ Deep location
- ✓ High grade
- ✓ Use of RTx
- ✓ Bone resection
- ✓ Major nerve sacrifice

*Univariate predictors of TESS*

## Increased disability

- ✓ Large tumor size
- ✓ High grade
- ✓ Major nerve sacrifice

*Multivariate  
predictors of TESS  
( $R^2=0.24$ )*

# Results

## Decreased health status

- ✓ Increasing age
- ✓ Large tumor size
- ✓ High grade
- ✓ Prior incomplete resection

*Univariate predictors of SF-36*

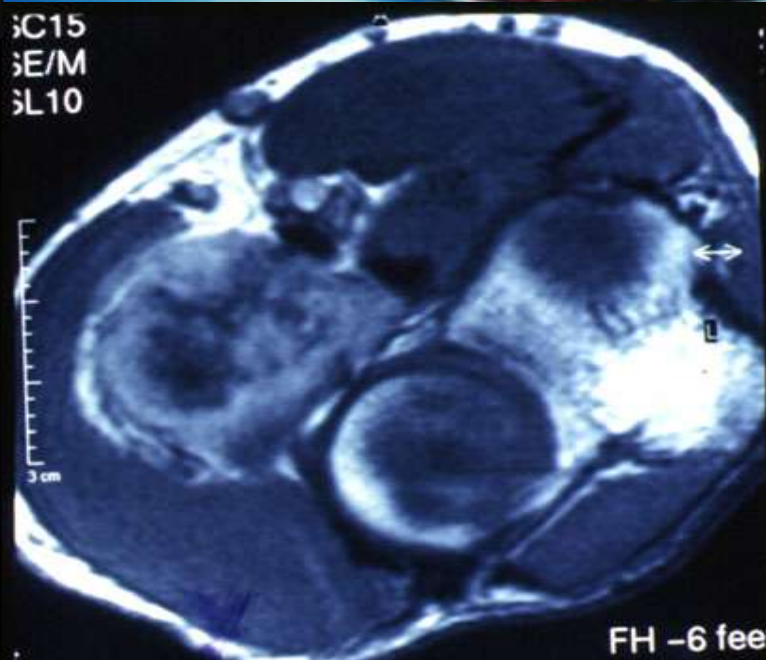
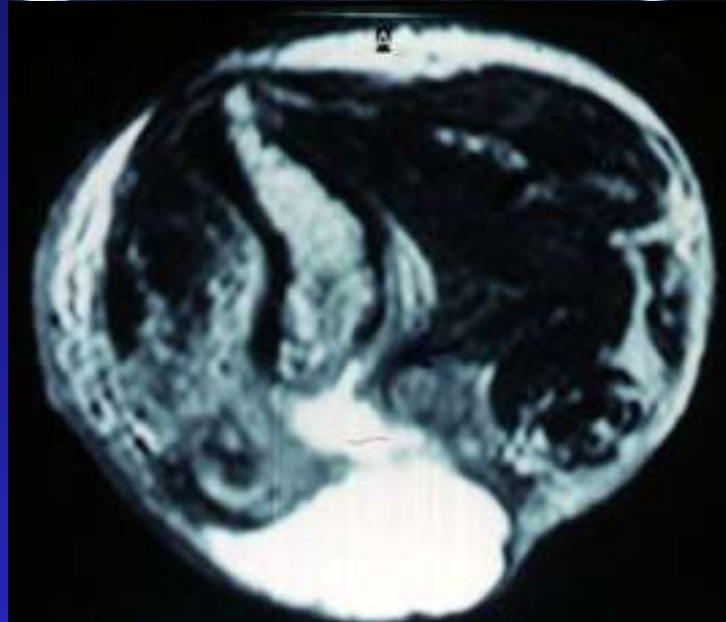
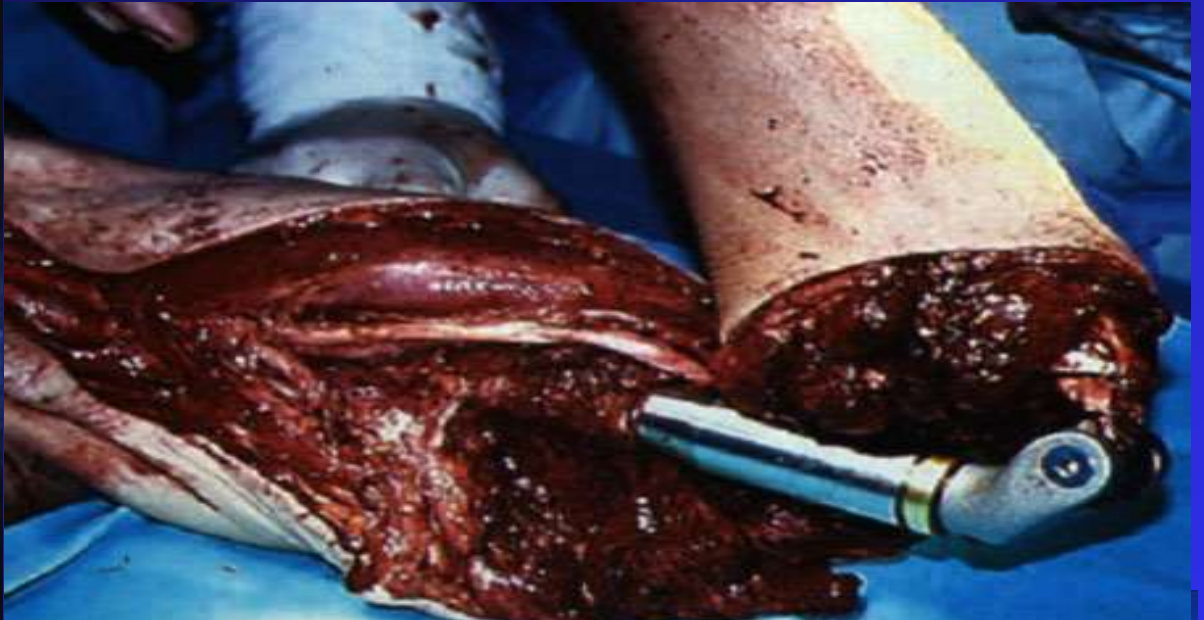
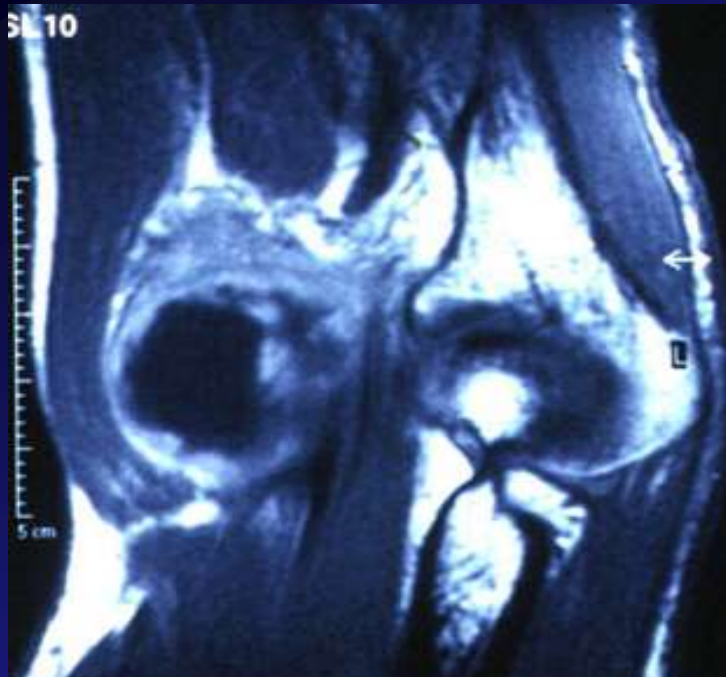
## Decreased health status

- ✓ Increasing age
- ✓ Prior incomplete resection

*Multivariate predictors of SF-36  
( $R^2=0.12$ )*

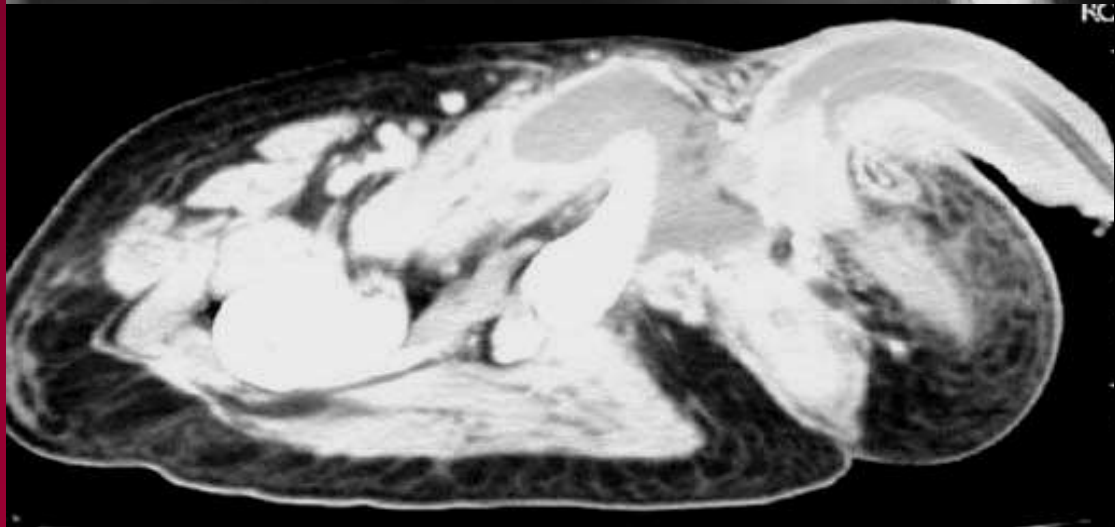
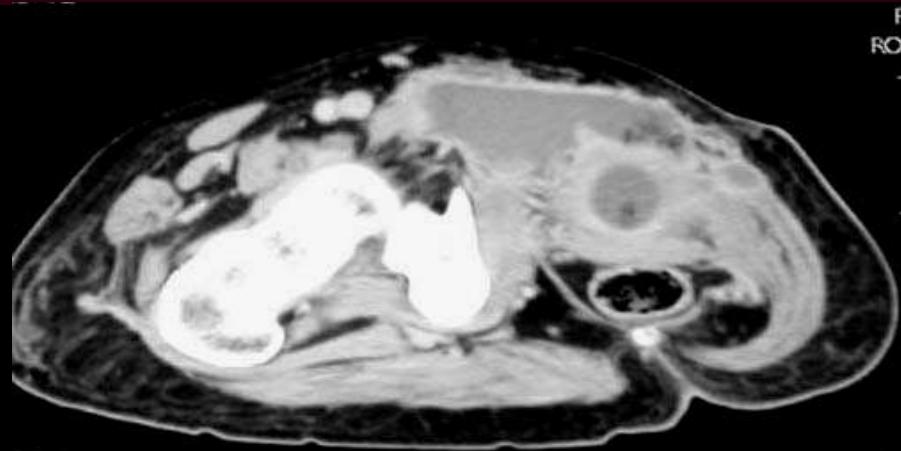
# Results

**Impairment or dysfunction at the organ level (e.g. joint, muscle) (Rev. MSTTS) increased, when patients had large tumors, required bone resection, and/or nerve sacrifice to provide wide surgical margins, and had treatment complications**



# Results

**General health status, as measured by SF36, was worse in older patients, who had prior excision of the tumor before referral to a specialized, multidisciplinary team**

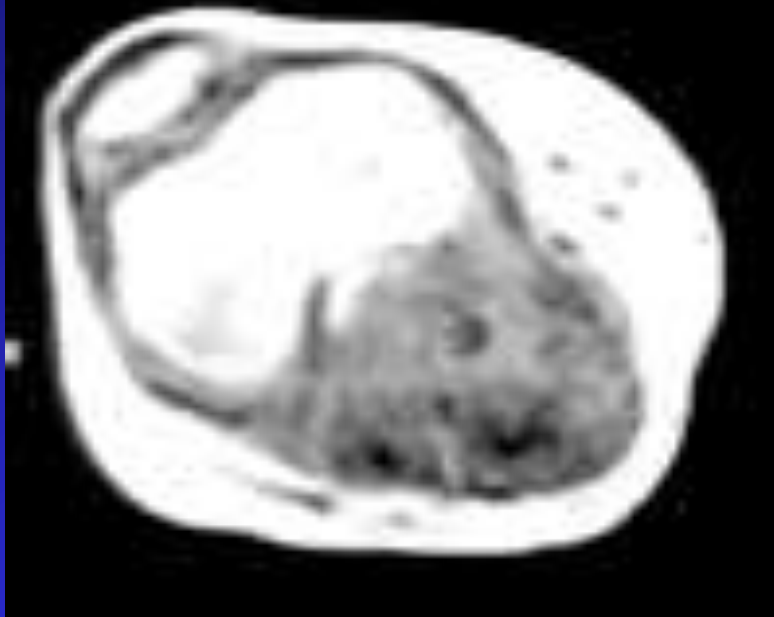


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RO

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# Results

**Patients with large, high grade tumors, who required major nerve resection, had greater physical disability or difficulty with routine daily activities as measured by the TESS**



**This study has established that, although outcome measures may purport to evaluate function, the underlying construct and definition of function vary such that different outcomes are achieved by patients depending on the measure**



**This has important  
implications for  
clinicians in  
counseling patients on  
their expected  
outcome following  
treatment for STS of  
lower extremity**



**From a surgical point of view, large, deep-seated, high grade tumors requiring resection of nerves and necessitating irradiation may cause impairments as detected by MSTs scores, which in fact does not mean that the patients are debilitated unless a major nerve is sacrificed or a major complication emerges postoperatively**





**Thank You For Your Attention**