

## Morphometric Analysis Predicts Survival In Patients with Lung, Breast, or Prostate Cancer Metastasis to the Spine

Hesham Mostafa Zakaria MD; Lara Walsh Massie MD; Azam Basheer MD; David Boyce-Fappiano; Erinma Elibe; Thomas Noh MD; Lonni Schultz PhD; Farzan Siddiqui; Ian Yu Lee MD; Brent Griffith MD; Victor W. Chang MD
   
 Henry Ford Hospital, Detroit, MI

### Introduction

Currently, prediction of survival for patients with cancer is by TNM staging. Identifying accurate prognostic markers of survival would allow better treatment stratification between more aggressive treatment strategies or palliation. This is especially relevant for patients with spinal metastases who all have identical TNM staging, and whose surgical decision-making is potentially complex. Analytic morphometrics quantifies patient frailty by measuring lean muscle mass and can predict risk for postoperative morbidity after lumbar spine surgery. This study evaluates whether morphometrics is predictive of survival in patients with spinal metastasis.

### Methods

Utilizing a retrospective registry of spinal metastases patients who have undergone stereotactic body radiation therapy (SBRT), we identified patients with primary lung, breast, or prostate cancer. Morphometric measurements were taken of the psoas using CT of the lumbar spine at the time of SBRT. Patients were stratified into tertiles based on psoas muscle area. The primary outcome measure was overall survival from the date of CT scan. Cox proportional hazards regression analyses were done to estimate the hazard ratios.

### Learning Objectives

By the conclusion of this session, participants should be able to:

- 1) Describe why it is important to predict outcomes in patients with spinal metastases
- 2) Discuss the role of morphometrics in predicting mortality in patients with spinal metastases
- 3) Apply morphometrics to stratify high risk and low risk patients for surgery for spinal metastases

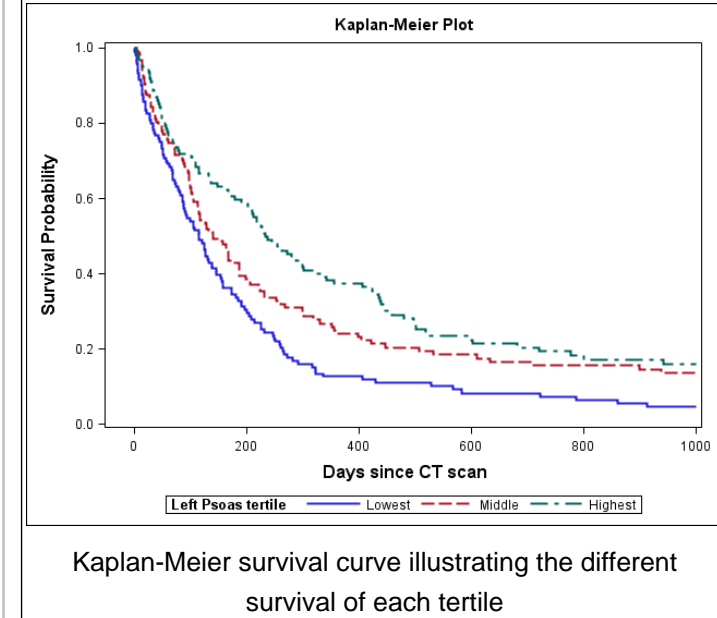
### Results

A total of 371 patients with cancer metastasis were included; 156 with lung cancer, 118 with breast cancer, and 97 with prostate cancer. The median survival for all patients was 156 days (95%CI=126-186 days). Patients in the smallest third for left psoas size had significantly shorter survival: 115 days versus 234 days, hazard ratio 1.79 (95%CI=1.36-2.25),  $p < 0.001$ . Patients below the median psoas size also had significantly shorter survival: 124 days versus to 218 days, hazard ratio 1.49 (95%CI=1.20-1.86),  $p < 0.001$ .

### Conclusions

In patients with lung, breast, or prostate cancer metastases to the spine, morphometric analysis of psoas muscle size can be used to identify patients who are at risk for shorter survival. This information can be used to help with surgical decision making in patients with the same burden of disease.

### Kaplan-Meier Survival Curve



### References

1. Zakaria HM, Basheer A, Boyce-Fappiano D, et al. Application of morphometric analysis to patients with lung cancer metastasis to the spine: a clinical study. *Neurosurg Focus*. Aug 2016;41(2):E12.
2. Laufer I, Rubin DG, Lis E, et al. The NOMS framework: approach to the treatment of spinal metastatic tumors. *Oncologist*. Jun 2013;18(6):744-751.
3. Schoenfeld AJ, Le HV, Marjoua Y, et al. Assessing the utility of a clinical prediction score regarding 30-day morbidity and mortality following metastatic spinal surgery: the New England Spinal Metastasis Score (NESMS). *The spine journal : official journal of the North American Spine Society*. Sep 25 2015.
4. Ghori AK, Leonard DA, Schoenfeld AJ, et al. Modeling 1-year survival after surgery on the metastatic spine. *The spine journal : official journal of the North American Spine Society*. Nov 1 2015;15(11):2345-2350.
5. Tokuhashi Y, Matsuzaki H, Oda H, Oshima M, Ryu J. A revised scoring system for preoperative evaluation of metastatic spine tumor prognosis. *Spine*. Oct 1 2005;30(19):2186-2191.
6. Quraishi NA, Manoharan SR, Arealis G, et al. Accuracy of the revised Tokuhashi score in predicting survival in patients with metastatic spinal cord compression (MSCC). *European spine journal*. Mar 2013;22 Suppl 1:S21-26.