

# The Predictive Value of the Spinal Instability Neoplastic Score (SINS) System for Adverse Events of Pathologic Fracture and Spinal Cord Compression in Patients with Single Spinal Metastasis.

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# The Predictive Value of the SINS System

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# Concept of “Spinal Instability”

- **Classic but, Poorly defined yet Widely accepted**
  - *Harrington 1986 JBJS*
  - *Wise et al 1999 Spine*
  - *Bilsky et al 2006 Hematol Oncol Clin North Am*
- instability with tumor (≠injury from high energy trauma)
- **Failed systemic reviews** to define “spinal instability” with tumor
  - *Weber MH et al 2011 Int J Oncol*
  - *Fehlings et al in press Spine*

# SINS: spinal neoplastic instability score

- Spinal Oncology Study Group
- Delphi technique
- 2010, *Spine*
- 2011, *J Clin Oncology*

## Spinal Neoplastic Instability

neoplastic process



loss of spinal integrity



under physiologic loads  
 ✓ movement related pain,  
 ✓ symptomatic or progressive deformity  
 ✓ neural compromise

SINS Component	Score
<b>Location</b>	
Junctional (occiput-C2, C7-T2, T11-L1, L5-S1)	3
Mobile spine (C3-C6, L2-L4)	2
Semirigid (T3-T10)	1
Rigid (S2-S5)	0
<b>Pain*</b>	
Yes	3
Occasional pain but not mechanical	1
Pain-free lesion	0
<b>Bone lesion</b>	
Lytic	2
Mixed (lytic/blastic)	1
Blastic	0
<b>Radiographic spinal alignment</b>	
Subluxation/translation present	4
De novo deformity (kyphosis/scoliosis)	2
Normal alignment	0
<b>Vertebral body collapse</b>	
> 50% collapse	3
< 50% collapse	2
No collapse with > 50% body involved	1
None of the above	0
<b>Posterolateral involvement of spinal elements†</b>	
Bilateral	3
Unilateral	1
None of the above	0

NOTE. Data adapted.<sup>14</sup>

Abbreviation: SINS, Spinal Instability Neoplastic Score.

\*Pain improvement with recumbency and/or pain with movement/loading of spine.

†Facet, pedicle, or costovertebral joint fracture or replacement with tumor.

# Purpose

“Validation of SINS system for prediction of spinal events requiring surgical intervention”

SINS system

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- ✓ Spinal cord compression?
- ✓ Pathologic fracture?

# Materials & Methods

- A consecutive series of 78 patients with a single spinal metastasis diagnosed with MRI in 2007 and 2008

Why single spinal metastasis?

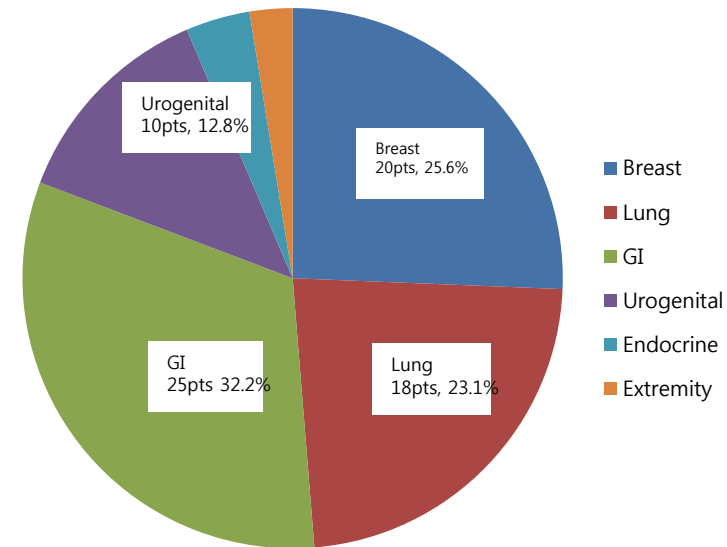
*Simplified model*

*To exclude confounding effects from multisegmental disease*

- Survival analysis with Cox-regression analysis
  - End point 1: Spinal cord compression
  - End point 2: Pathologic fracture
  - Variable: scores of each item in SINS system

# Results

- Spinal metastasis confirmed with MRI in 1411 pts
- Single spinal metastasis: 78pts
  - Known cancer patients with spine lesion: 68pts
  - Initial presentation with malignancy of unknown origin in spine : 10pts (their diagnosis was confirmed with biopsy)
- Male 39 pts, Female 39 pts / Age:  $55 \pm 13$  yrs
- Survival period after diagnosis of spinal metastasis:  $43 \pm 60$  mos
- Spinal events at  $8 \pm 14$  months after Dx of cancer
- Spinal cord compression: 11 cases / Pathologic fracture: 17 cases
- Treatment
  - CTx+RTx: 30 cases / CTx alone : 26 cases / RTx alone : 20 cases / None : 2 cases



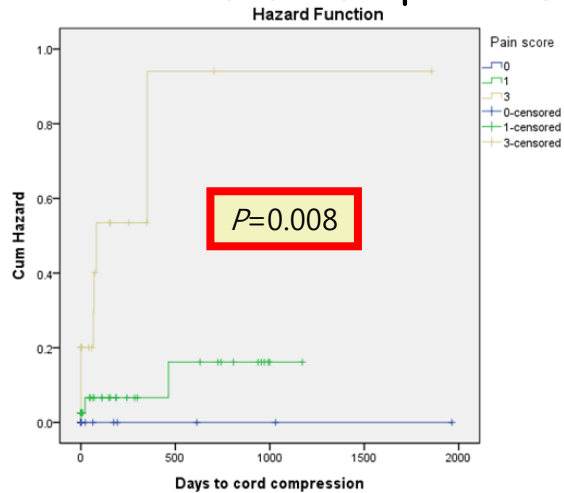
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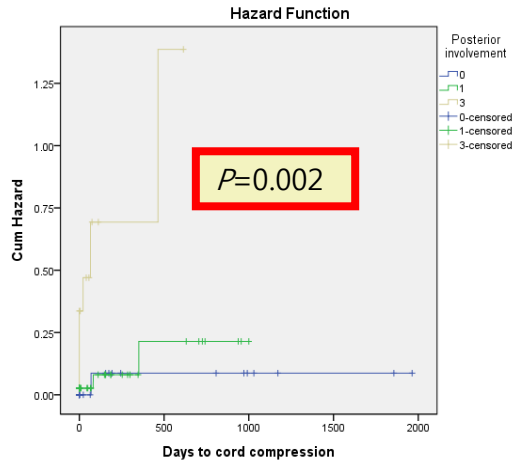


# Results

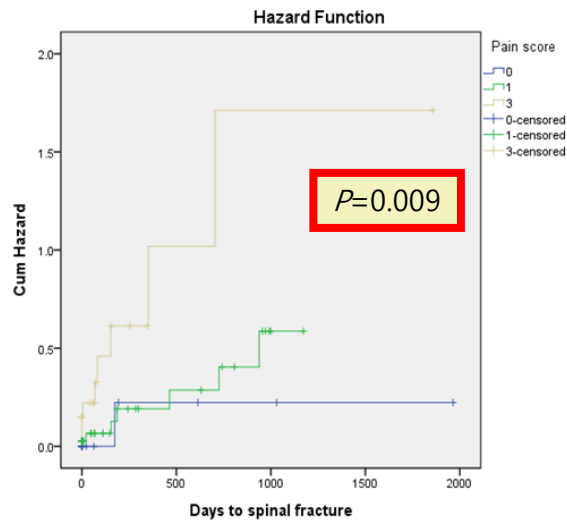
Pain \* cord compression



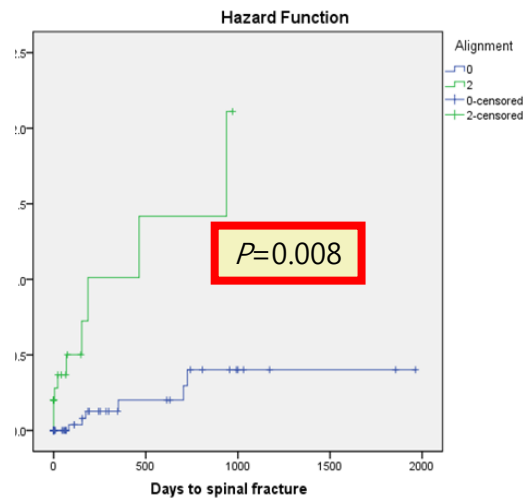
Posterior involve \* cord compression



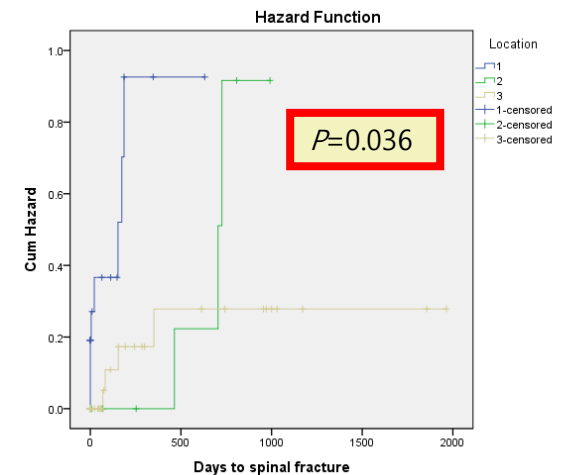
Pain \* fracture



Alignment \* fracture



Location \* fracture



# Spinal events according to Tx

## Treatment option ~ spinal cord compression

	B	SE	Wald	df	Sig.	Exp(B)
CTx			2.575	3	.462	
CTx+RTx	.523	.672	.606	1	.436	1.687
none	-.807	.866	.869	1	.351	.446
RTx	-12.245	734.160	.000	1	.987	.000

## Treatment option ~ pathologic fracture

	B	SE	Wald	df	Sig.	Exp(B)
CTx			.204	3	.977	
CTx+RTx	.092	.608	.023	1	.880	1.096
none	-.175	.583	.091	1	.764	.839
RTx	-13.149	785.896	.000	1	.987	.000

# SINS

## regarding Solitary Spinal Metastasis

SINS Component	Score
<b>Location</b>	
Junctional (occiput-C2, C7-T2, T11-L1, L5-S1)	3
Mobile (C3-C6, L2-L5) <i>"Thoracic &gt; mobile &gt; junctional?"</i>	2
Semirigid (T3-T10)	1
Rigid (S2-S5)	0
<b>Pain*</b>	
Yes	3
Occasional pain but not mechanical	1
Pain-free lesion	0
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**Pathologic Fracture**

**Spinal Cord Compression**

NOTE. Data adapted.<sup>14</sup>

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