Pre-treatment Bone Scan Index as an Outcome Measure Predicting for Survival in Patients with Castration-Refractory Prostate Cancer

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Disclosure: Edenbrandt is Scientific Director and shareholder in EXINI diagnostics AB
BACKGROUND

• A manual method for quantification of whole-body bone scans was presented by a group at Memorial Sloan-Kettering Cancer Center, New York

• Bone Scan Index (BSI) reflects the skeletal involvement by tumor

• BSI was associated with survival in patients with prostate cancer *

• Their BSI method was manual, time-consuming, and not suitable for use in the clinical routine

• We have developed an automated method to measure BSI

* Sabbatini et al. J Clin Oncol 1999;17:948
OBJECTIVES

• To evaluate the value of BSI, calculated using an automated method, for the prediction of survival in patients with prostate cancer at the onset of chemotherapy treatment
METHODS

Whole-Body Bone Scan

↓

Segmentation of Skeleton

↓

Hotspot Detection

↓

Normalization

↓

Hotspot Classification

↓

Bone Scan Index (BSI)

BSI – total metastatic burden as a percentage of the total skeleton
# METHODS

<table>
<thead>
<tr>
<th>BSI</th>
<th>0%</th>
<th>1%</th>
<th>2%</th>
<th>3%</th>
</tr>
</thead>
</table>

![Images of bone scans for different BSI levels](image_url)
MATERIAL

• Retrospective study
• Patients with castration-refractory prostate cancer using docetaxel chemotherapy
• Digitally stored whole-body bone scans obtained in the interval 180 days before to 30 days after the onset of docetaxel treatment
• 44 patients with a mean age of 67.8 years (range 52-80 years)
METHODS

• Whole-body bone scans were obtained after injection of 600MBq Tc-99m-MDP
• BSI values were calculated using the EXINI bone™
• Survival data from the patient records
• Cox proportional hazards regression models were used to investigate the association between BSI and survival
RESULTS

• Median survival time for the 19 patients who died was 20.6 months
• Median follow-up time for the 25 patients who were still alive was 21.2 months
• BSI was significantly associated with survival (p=0.026). The hazard ratio was estimated to 1.31 (95% Confidence Interval 1.03-1.67)
## RESULTS

<table>
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<tr>
<th>BSI</th>
<th>0%</th>
<th>1%</th>
<th>2%</th>
<th>3%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk increase</td>
<td>31%</td>
<td>72%</td>
<td>125%</td>
<td></td>
</tr>
</tbody>
</table>

- **Alive**
  - 42 months
- **Died**
  - 32 months
  - 14 months
  - 5 months
CONCLUSION

• BSI, calculated using an automated quantitative method, appears to predict for survival in patients with castration-refractory prostate cancer at the onset of chemotherapy treatment

• BSI for quantification of whole-body bone scans might be a future method for monitoring this patient group
WORK IN PROGRESS

• Investigate the value of BSI in relation to prostate-specific antigen (PSA) for the prediction of survival in patients with prostate cancer

• Assess the value of BSI in patients with other types of cancer

• Evaluate the effect of therapy by analyzing BSI pre- and post-treatment