Prognostic value of Bone Scan Index for survival in patients with prostate cancer

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Backgrund and Aim

● **Bone scintigraphy (Bone Scan):** Bone scans are image studies commonly used to assess metastatic spread to the skeleton.

● **Bone Scan Index (BSI)** is a quantitative measure that reflects the tumor burden in bone as a percent of the total skeletal mass calculated from Bone Scans.

● **What do we know about BSI?** BSI has been proposed both as a prognostic biomarker and as a response biomarker in prostate cancer (PCa) patients.
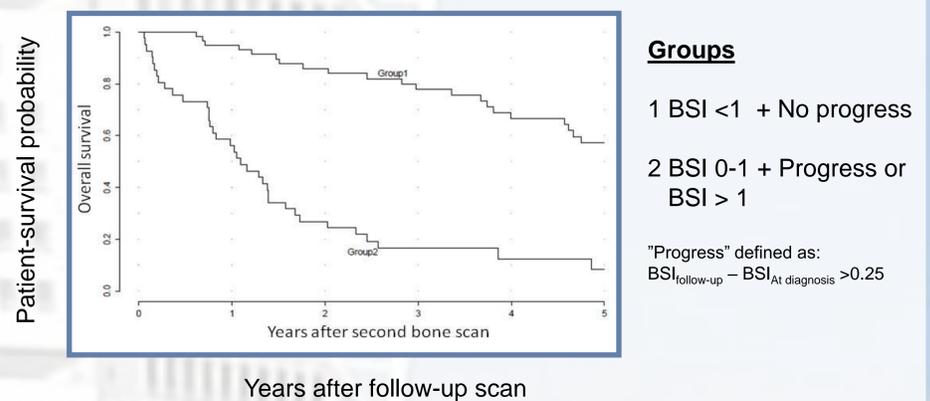
● **Why is it now more interesting?** Recently, an automated method to calculate BSI was developed, which makes it feasible to use in clinical routine.
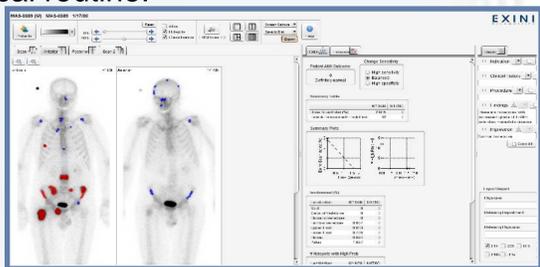
● **Aim** To evaluate the prognostic value of BSI as a response biomarker in prostate cancer patients after hormonal therapy.

Bone Scan Index - BSI

BSI is an Imaging biomarker that reflects the tumor burden in bone as a percent of the total skeletal mass.

At diagnosis
BSI= 1.1

After hormonal therapy
BSI= 1.4

Patients and Methods

● **100 Prostate Cancer Patients**
- **Consecutive group**
- **Retrospective analysis**
- **High risk at the time of diagnosis:**
Clinical stage T2c/T3/T4, Gleason score 8-10 or PSA level >20 ng/mL.

● **Whole-body bone scans**
- **At the time of diagnosis – Before treatment**
- **After hormonal therapy**
- **BSI** calculated using the automated software EXINI Bone™

● **Clinical and Survival Data**
- T stage, Gleason score, prostate-specific antigen (PSA), treatment and survival data were collected from computerized medical records.

Results

Kaplan Meier curves showing patient-survival probability stratified by Bone Scan Index (BSI) groups.

Years after follow-up scan

Groups

1 BSI <1 + No progress

2 BSI 0-1 + Progress or BSI > 1

"Progress" defined as:
$BSI_{follow-up} - BSI_{At\ diagnosis} > 0.25$

Both BSI at follow-up and changes in BSI compared to BSI before treatment are significantly associated with survival.

Cox proportional hazards regression analysis
In a multivariate analysis, BSI at follow-up (p<0.001) was associated with survival, but PSA was not prognostic.

Conclusions

Advances in Knowledge
● BSI is highly associated with 5-year survival in prostate cancer.
● Treatment response after hormonal therapy can be evaluated with BSI.
● Increase in BSI can be used as an indicator for progress.

Implications for patient care
● BSI can be used to risk-stratify prostate cancer patients.
● BSI can be a complement to PSA in patient management.
● Automated BSI method available for clinical routine use.

Clinical relevance
Life expectancy is a major factor to be considered in the management of prostate cancer patients. Risk-stratification schemes based on clinical T stage, Gleason score and PSA are widely used to estimate risk in individual patients. The extent of bone metastases is also associated with survival, but there has not been any clinically useful technique of quantifying the skeletal tumour burden and including this information in the risk assessment.

In Summary
This predictive imaging biomarker may prove complementary to PSA for an objective treatment response evaluation and prediction of survival in the management of patients with prostate cancer.