

# Correlation between Gleason Score and Bone Scintigraphy Results in Metastatic Prostate Cancer, the Silent Marauder: Whether a Fact or a Fictitious Scenario??

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## Abstract

**Background:** To interpret the association between gleason score and bone scintigraphy results in patients with metastatic prostate cancer. **Subjects and Methods:** A five years retrospective study (January 2013 to December 2017) of patients with diagnosis of locally advanced & metastatic prostatic adenocarcinoma at Institute of Nephro-Urology, Bangalore was carried to collect information about prostate volume, serum PSA, Gleason score and bone isotope scan results. Statistical analysis was performed using Chi-square test, Fisher exact test and student's unpaired t test to analyse the association between these clinical, pathological and radiological parameters and a value of <0.05 was considered statistically significant. **Results:** Mean (SD) patient age was 68.96 (7.56) years. Both serum PSA levels and prostate volume showed statistically significant association (P<0.001) with gleason score/ISUP grade and positive bone scan results but Gleason score was not found have significant association (P=0.78) with bone metastasis. **Conclusion:** Although high grade prostatic carcinomas [GS ≥ 7 (4+3)] are known to have high plausibility of bone metastasis, we did not see such association in our study, hence high Gleason score was not a predictor for bone metastasis always & we conclude it as a fictitious scenario to be looked upon with utmost importance.

**Keywords:** Gleason Score, Bone Scintigraphy.

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## Introduction

Prostate cancer is the most common neoplasia and the second most frequent cause of death by cancer in men.<sup>[1]</sup> Nuclear bone scan is the current gold standard for staging bone metastases compared to plain skeletal radiography.<sup>[2]</sup> The grading of prostatic carcinoma by Gleason score is a good predictor of the pace of disease. Patients with well differentiated tumors (Gleason score 2 to 6) generally have a favorable prognosis while high grade tumors (Gleason score 7 to 10) are associated with higher mortality rate. Metastatic prostate cancer commonly spreads into bones and often causes back pain, which can sometimes be the first symptom of this cancer. Autopsies have revealed that 80% of advanced prostate cancer is accompanied by the development of skeletal metastases.<sup>[3]</sup> While Gleason score has been utilized as a prognostic factor to predict staging such as lymph node metastases,<sup>[4]</sup> its role and value in predicting the results of bone scans has not been specifically studied. Hence we conducted a retrospective study in patients with metastatic prostatic carcinoma with an objective to further evaluate the association between Gleason score and bone metastasis.

## Subjects and Methods

A five years retrospective study (January 2013 to December 2017) of 220 patients with diagnosis of locally advanced & metastatic prostatic adenocarcinoma at Institute of Nephro-Urology, Bangalore was carried to collect information about Gleason score and bone isotope scan results.. The diagnosis of prostate carcinoma was established through prostate biopsy guided by trans-rectal ultrasonography. The Gleason score was given by pathologists in the Department of Pathology according to the Gleason grading system. The diagnosis was based on invasion or architectural disturbance. Histological grading was performed according to the Gleason system.<sup>[5]</sup> Prostatic carcinomas with score < 7 were considered low-grade; and score > 7 were considered high-grade.<sup>[6]</sup> When S.PSA was >20 ng/ml Bone scans were done as per AUA & EAU Guidelines. Bone scans were done for evaluation of bone metastases in the Diagnostic Radiology department according to the standard procedures. Patients were intravenously given MBq Technetium-99m (99mTc) methylene diphosphonate. Statistical analysis was performed using Chi-square test, Fisher exact test and student's unpaired t test to analyse the association between these clinical, pathological and radiological parameters and a value of <0.05 was

considered statistically significant.

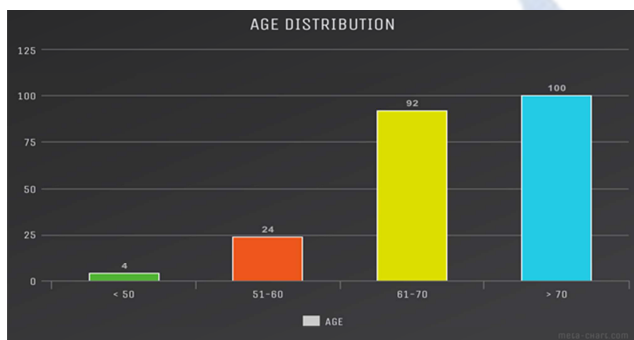
**Results**

The mean age of the patients was 68.96 years (Age range from 46-85 years). Age distribution is shown in [Figure 1]. Relationship between gleason score & bone metastasis is depicted in [Table 1]. Out of 220 patients with prostate cancer, 96 (43.63 %) patients had positive bone scan suggestive of metastasis. 4 patients (33.3 %) were categorized as low Gleason score (< 7 (3+3)) & 28 patients were categorised as intermediate risk Gleason score (7 (3+4)) while 64 patients (66.77%) had a high Gleason score ( $\geq 7$  (4+3)).

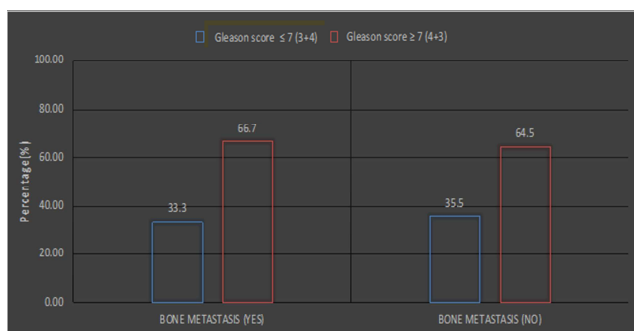
**Table 1: Relationship Between Gleason Score & Bone Metastasis**

Gleason Score	Bone Metastasis (Yes)	Bone Metastasis (No)	Total
Low & intermediate Gleason Score < 7 & 7 (3+4)	32 (33.3%)	44 (35.5%)	76
High Gleason Score $\geq 7$ (4+3)	64 (66.7%)	80 (64.5%)	144
Total	96 (100.0%)	124 (100.0%)	220

Statistical test: Fisher Exact Test : P=0.78



**Figure 1: Age Distribution.**



**Figure 2: Correlation between Gleason score and Bone Metastasis.**

Of the 76 patients with low & intermediate Gleason score among the 220 patients studied, 44 (57.8%) were negative for bone metastasis and 32 patients (42.1%) revealed metastasis on bone scan, while in 144 patients with high

Gleason score out of 220 patients of the study group, 80 patients (55.5 %), were negative and 64 patients were positive (44.4 %) respectively for bone metastasis, Statistical test revealed no significant correlation between high Gleason score and bone metastasis.

**Discussion**

In this present era of Ca Prostate wherein high end advances are upcoming day by day in the management of Ca prostate it is apt from the part of clinician to accurately diagnose and stage the patient in order to advice on the precise management protocol.

Hence Factors like Gleasons Grade & score, S.PSA, Bone scan, Molecular Testing, Local imaging all form an array which lead to precise diagnosis of prostate cancer.

Of the many histologic grading systems that we know, to help predict pathologic stage and prognosis for prostate cancer, the most commonly used is the Gleason system, which correlates directly with pathologic extent of disease. Bone scintigraphy using the radioisotope Technetium (99 mTc) methylene diphosphate is a sensitive method for evaluating the skeleton in bone metastasis diagnosis, being superior to conventional radiological study and to the serum levels of prostatic alkaline phosphatase.

In our study we had 220 patients diagnosed with Locally advanced & Metastatic Carcinoma Prostate, and as per protocol various factors were considered with respect to Management approach and prognosis.

144 patients were diagnosed with high gleason grade CaP which included Gleason scores 7(4+3) and >7. 76 patients were diagnosed with low & intermediate gleason grade CaP which included Gleason scores <7 & 7(3+4) respectively. Irrespective of the S PSA levels Metastatic evaluation was performed.

Among these patients 96 patients had Positive Bone Scan study with 32 in Low & intermediate risk Gleason grade & 64 in High risk grade with Statistical analysis suggesting no significant correlation(P=0.78) which was also confirmed in studies by Lai et al & others.

**Table 2: Comparison of incidence rates of bone metastasis by Tc99m, and other findings in prostatic adenocarcinoma with other studies**

Author, year	Incidence (%)	Findings
H osuda et al, 2002	22.2	Bone scans can be eliminated in newly diagnosed prostatic cancer patients with PSA <10ng/ml, Gleason grade <2 or Gleason score <6
Lai et al, 2011	29.3	No statistically significant relationship between Gleason score and bone scan results
Jaukovic et al, 2011	19.35	Bone scans are not needed in Gleason score <6 and PSA <10ng/ml
Our study	46.63	No statistically significant correlation between Gleason score and bone metastasis

Thus Gleason score might not always corroborative with Bone metastatic state and other positive factors like S.PSA, Local imaging, lymphovascular invasion, Perineural invasion must be considered in tandem to predict the stage of the disease, plan a management protocol which is individualistic, and detect the prognosis.

## Conclusion

We conclude that although high grade prostatic carcinomas [GS  $\geq$  7 (4+3)] are known to have high plausibility of bone metastasis, we did not see such association in our study, hence high Gleason score was not a predictor for bone metastasis always & we conclude it as a fictitious scenario to be looked upon with utmost importance. However, important limitation of the present study is its relatively small study population and few patients with bone metastases.

## References

1. Wymenga LF, Boomsma JH, Groenier K, Piers DA, Mensink HJ. Routine bone scans in patients with prostate cancer related to serum prostate-specific antigen and alkaline phosphatase. *BJU Int.* 2001; 88:226-30
2. McGregor, B., Tulloch, A.G., Quinlan, M.F., and Lovegrove, F. (1978) The role of bone scanning in the assessment of prostatic carcinoma. *Br. J. Urol.* 50, 178–181.
3. Galasko CS. Skeletal metastases. *Clin Orthop Relat Res.* 1968; 210:18-30.
4. Abuzallouf, S., Dayes, I., and Lukka, H. (2004) Baseline staging of newly diagnosed prostate cancer: a summary of the literature. *J. Urol.* 171, 2122–2127.
5. Gleason DF, Mellinger GT. Prediction of prognosis for prostatic adenocarcinoma by combined histological grading and clinical staging. *J Urol.* 1974; 111:58-64.
6. Gleason DF: Histologic grading of prostate cancer: a perspective. *Hum Pathol.* 1992; 23: 273-9.
7. Salgaonkar et al : Diagnostic correlation between S PSA, Gleason Score & Bone Scan results in Prostate cancer with Bone Metastasis. *British Biomedical bulletin* January 2015.

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