

# SNMMI AUC Factsheet for Bone Scintigraphy in Prostate Cancer



## EXECUTIVE SUMMARY

Nuclear medicine imaging studies are essential for the diagnosis and management of many diseases, including neoplastic disease. The ready availability of medical imaging studies in conjunction with concerns about missed diagnoses has, at times, resulted in inappropriate use and overuse of medical imaging technology, including nuclear imaging. The overuse has resulted in an unnecessary financial burden on the health-care system and in some cases unnecessary exposure to ionizing radiation. Overuse and inconsistent use of imaging procedures has prompted a push for multi-stakeholder consensus documents outlining the most appropriate and cost-effective use of advanced medical imaging studies.

It is hoped that this document, developed by medical experts knowledgeable in the appropriate use of bone scintigraphy, will improve healthcare outcomes for the intended patient population while helping to decrease unnecessary imaging costs.

## AUC INTRODUCTION

The purpose of this document is to describe the appropriate use of bone scintigraphy specifically in patients with prostate cancer, one of the most common diagnoses for which bone scintigraphy is ordered in the adult population.

The most common clinical scenarios for bone scintigraphy in patients with this common malignancy are listed; however, the reader is reminded that patients may present with variations of the scenarios covered here, with signs or symptoms not described, or with neoplastic disease other than prostate cancer, for which bone

scintigraphy may still be indicated. Each patient is unique, as is each clinical presentation, and therefore this document cannot replace clinical judgment. Bone scintigraphy can also be used for other malignant and benign conditions for which assessment of osteoblastic activity is important for patient management. These other scenarios are beyond the scope of this document.

Prostate cancer does not require bone scintigraphy in all patients at the time of diagnosis. Neoplastic disease discovered at an early stage is unlikely to include bone metastases; therefore, unless there are signs or symptoms suggesting metastasis in early-stage disease, bone imaging is often not necessary. If bone scintigraphy is felt necessary, imaging of pregnant patients requires special consideration. Recommendations for the appropriate use of bone scintigraphy in prostate cancer are described in this AUC.

## TABLE 1 PROSTATE CANCER: SUMMARY OF RECOMMENDATIONS

Bone scintigraphy is usually appropriate for initial staging in patients with intermediate-risk disease (stage T2, PSA level  $\geq 10$  ng/mL, or Gleason score  $\geq 7$ ); for initial evaluation of patients with high-risk disease (stage T3, PSA level  $> 20$  ng/mL, or Gleason score  $> 8$ ); for evaluation of patients with symptoms referable to the bones regardless of stage or risk; for evaluation of patients in whom a change in treatment is anticipated; for evaluation of patients presenting with a pathologic fracture; and for evaluation of patients who are to undergo radium or other radionuclide bone therapy. Bone scintigraphy is usually not appropriate for initial staging in patients with a low risk of metastatic disease (PSA level  $< 10$  ng/mL, Gleason score  $< 6$ , and no other clinical signs or symptoms of disease).

**TABLE 1**  
Clinical Scenarios for Prostate Cancer

| Scenario no. | Description   | Appropriateness    | Score |
|--------------|---|--------------------|-------|
| 1            | Initial staging for asymptomatic patient with normal alkaline phosphatase level, PSA $< 10$ , and Gleason score $\leq 6$  | Rarely appropriate | 2     |
| 2            | Initial staging for asymptomatic patient with elevated alkaline phosphatase level, PSA $< 10$ , and Gleason score $\leq 6$  | May be appropriate | 4     |
| 3            | Initial staging for asymptomatic patient with PSA = 10–20 or Gleason score = 7  | May be appropriate | 6     |
| 4            | Initial staging for asymptomatic patient with PSA $\geq 20$ or Gleason score $\geq 8$ or $\geq T3$ prostate cancer  | Appropriate        | 8     |
| 5            | Initial staging for asymptomatic patient with PSA $< 10$ , Gleason score $\leq 6$ , and T2 prostate cancer  | Rarely appropriate | 3     |
| 6            | Initial staging for asymptomatic patient with PSA $\geq 10$ , Gleason score $\leq 6$ , and T2 prostate cancer   | May be appropriate | 6     |
| 7            | Initial staging for asymptomatic patient with PSA $< 10$ , Gleason score = 7, and T2 prostate cancer  | May be appropriate | 6     |
| 8            | Initial staging for asymptomatic patient with PSA $\geq 10$ , Gleason score = 7, and T2 prostate cancer   | Appropriate        | 8     |
| 9            | Initial staging for symptomatic patient with normal alkaline phosphatase level, PSA $< 10$ , and Gleason score $\leq 6$   | Appropriate        | 8     |
| 10           | Initial staging for symptomatic patient with elevated alkaline phosphatase level, PSA $< 10$ , and Gleason score $\leq 6$   | Appropriate        | 8     |
| 11           | Evaluation of patient (at any clinical stage) presenting with new pathologic fracture   | Appropriate        | 9     |
| 12           | Initial staging for patient with bone pain  | Appropriate        | 8     |
| 13           | Restaging for asymptomatic patient when change in treatment is planned  | Appropriate        | 7     |
| 14           | Restaging for patient with bone pain when change in treatment is planned  | Appropriate        | 8     |
| 15           | Restaging for patient with bone pain  | Appropriate        | 8     |
| 16           | In patient with remote history of prostate cancer who has undergone imaging for another clinical reason, evaluation of incidental findings equivocal for osseous metastatic disease | Appropriate        | 7     |
| 17           | Evaluation of patient before radionuclide bone therapy  | Appropriate        | 9     |

PSA levels are in ng/mL.



Adequate and appropriate staging is of paramount importance in decision making for initial and subsequent treatment of prostate cancer. Overuse of imaging in patients with a low probability of having metastases results in unnecessary additional expense, not only for bone scintigraphy but for studies such as CT and MRI. At the same time, underuse of imaging studies such as bone scintigraphy in high-risk patients results in misdiagnosis and the resultant morbidity from ineffective local therapies. Bone scans are used to stage and determine the appropriate therapy for early disease or whether the therapy needs to be changed in advanced disease. A change in therapy is contemplated based on changes in the patient's symptoms, changes in prostate-specific antigen (PSA) doubling time, rapid rises in serum PSA level, and a new appearance of or change in visceral metastases. The purpose of this AUC is to evaluate the appropriate use of bone scintigraphy in patients with prostate cancer both at initial diagnosis and during the subsequent course of their disease.

*This AUC was developed by the Society of Nuclear Medicine and Molecular Imaging with participation from experts affiliated with the European Association of Nuclear Medicine and the American Society of Clinical Oncology.*

For the complete manuscript and listing of references, visit: [http://snmmi.files.cms-plus.com/ACNM/Documents/inm191429\\_v8.pdf](http://snmmi.files.cms-plus.com/ACNM/Documents/inm191429_v8.pdf)