

Calcification as a cause of potential false-positive findings on bone scintigraphy verified with ^{68}Ga -PSMA-11 PET/CT: a case report

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Prostate cancer (PCa) is the second most common cause of cancer deaths among men in Poland. It is usually a slowly growing tumor, but sometimes it can metastasize early, most often to lymph nodes and bones.

Despite various imaging methods used in suspected cancer recurrence or bone metastases, such as scintigraphy, contrast enhanced computed tomography, or whole-body magnetic resonance, positron emission tomography/computed tomography (PET/CT) targeted at the prostate-specific membrane antigen (PSMA) expressed on PCa cells is the best solution for PCa imaging. It showed a higher detection rate than other imaging modalities for disease recurrence with detection rates of 33%, 45%, 59%, 75%, and 95% for prostate-specific antigen (PSA) levels 0 to 0.19, 0.2 to 0.49, 0.5 to 0.99, 1 to 1.99, and ≥ 2 ng/ml, respectively.^{1,2}

A 76-year-old man with prostate adenocarcinoma, the initial PSA level of 8.5 ng/ml, 1 year after robotic assisted laparoscopic prostatectomy with Gleason score 3 + 3 = 6, and with biochemical recurrence with the PSA level of 0.446 ng/ml (PSA doubling time of 3 months) underwent bone scintigraphy. It showed an intense diffuse "hot" lesion in the left femur (FIGURE 1A and 1B). Single-photon emission computed tomography (SPECT) also revealed an intense uptake around the femoral head (FIGURE 1C and 1D). Due to an atypical uptake pattern for bone metastasis on the SPECT image and in order to exclude other metastatic lesions before planned radiotherapy, the patient was referred for Gallium 68 (^{68}Ga) PSMA-11 PET/CT. Surprisingly, it did not show any abnormal uptake. No uptake was seen near the bone on PET in the transverse section corresponding to SPECT. The CT image

of the same plane showed degenerative changes in the left hip with calcifications in the surrounding soft tissue (FIGURE 1E–1H).

Bone scintigraphy is the first-choice method in case of a suspicion of bone metastasis caused by PCa as well as other types of cancer. The increased uptake ("hot" lesions) on technetium 99m methylene diphosphonate scintigraphy ($^{99\text{m}}\text{Tc}$ -MDP) could be seen in all processes (benign and malignant) which activate osteoclasts. Our case was a false-positive finding owing to the fact that the activated osteoblast in the calcification of soft tissue resembled a metastatic lesion in the whole-body image. In the literature, there are a few cases describing unusual calcifications on $^{99\text{m}}\text{Tc}$ -MDP, for example, in vascular disease, physical exertion, cold exposure, or specific lesions after liver transplantation.^{3,4} The majority of them are associated with hypercalcemia after kidney transplantation or calcification after bone fracture. Our patient had neither a history of bone trauma nor an elevated calcium level.

Based on the recent European Association of Urology recommendations, a patient with biochemical recurrence with PSA exceeding 0.2 ng/ml could be offered ^{68}Ga -PSMA-11 PET/CT.⁵ According to the reimbursement rules in Poland, it could be offered only to patients with a suspicion of bone metastasis and uncertain findings on bone scintigraphy. The false-positive findings on bone scintigraphy could have strong clinical implications for treatment recommendation. This case showed that nowadays, hybrid images combining functional and anatomical images are required in case of any unclear picture.

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Received: January 6, 2021.

Revision accepted: March 19, 2021.

Published online: March 26, 2021.

Pol Arch Intern Med. 2021;

131 (5): 473–475

doi:10.20452/pamw.15897

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FIGURE 1

A, B – whole body scintigraphy in the anterior (**A**) and posterior (**B**) views showing an intense diffuse “hot” lesion in the left femur (arrows); **C, D** – single-photon emission computed tomography (SPECT) in the coronal (**C**) and axial (**D**) planes showing intense uptake around the femoral head and neck (arrows point to the focal uptake corresponding to the tissue near the left femoral neck)

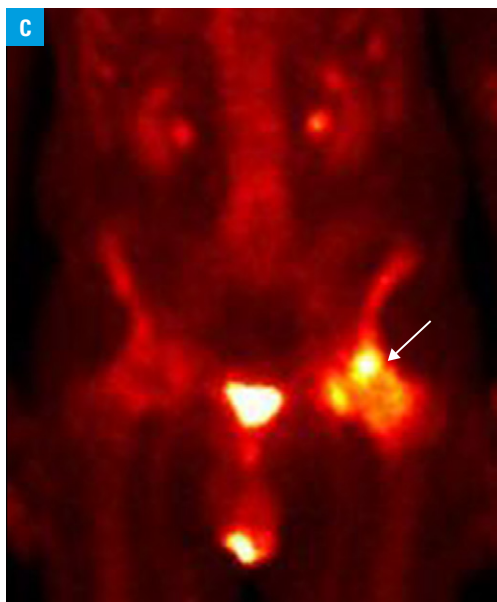
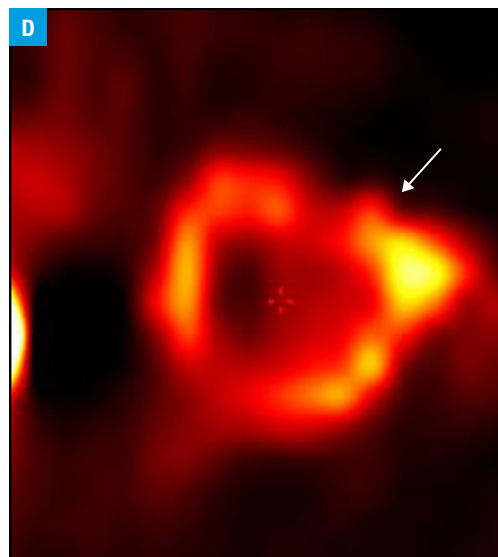
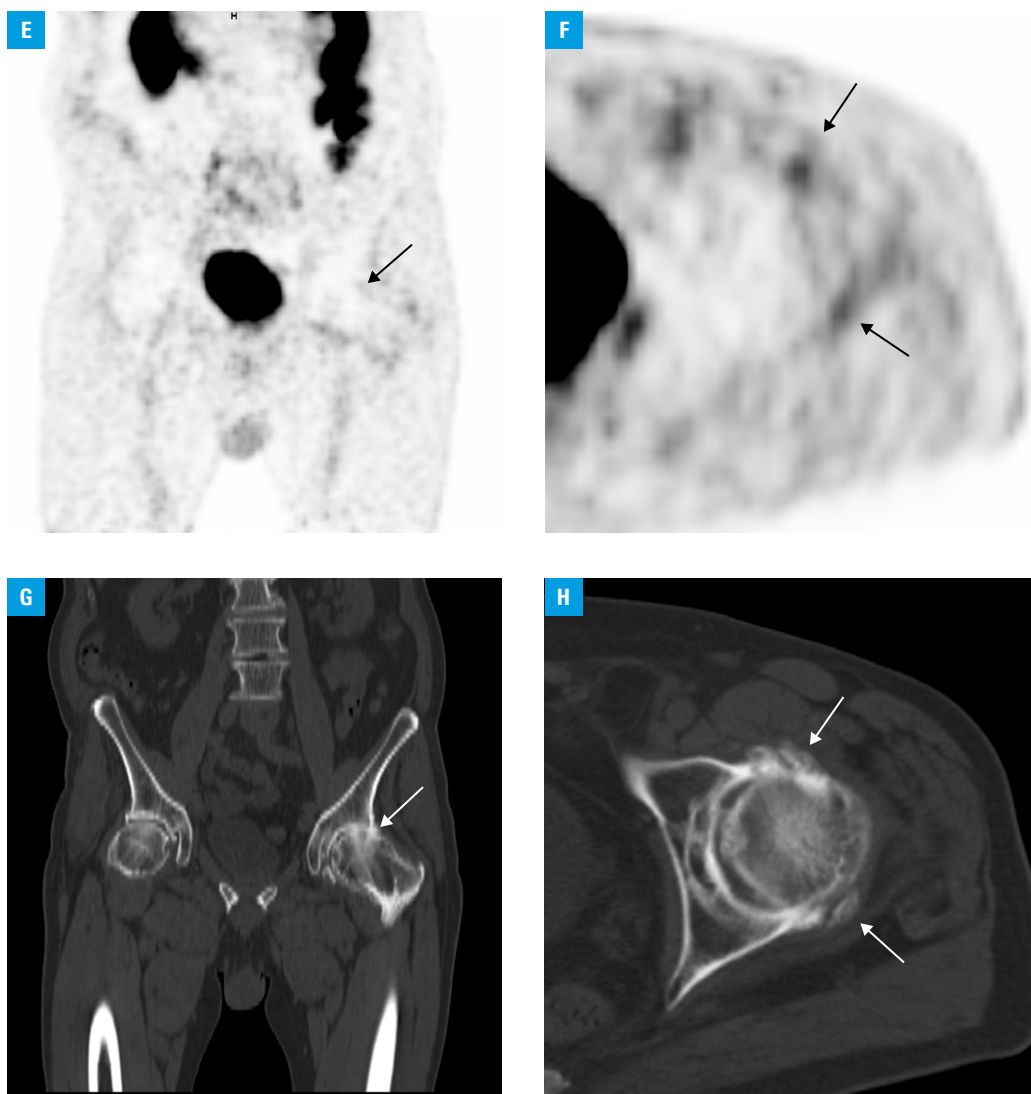
A**B****C****D**

FIGURE 1

E–H – Gallium 68 prostate-specific membrane antigen 11 positron emission tomography/computed tomography (^{68}Ga -PSMA-11 PET/CT) in the coronal (**E, G**) and axial (**F, H**) planes; PET images (**E, F**) showed no abnormal uptake near the bone on the transverse section corresponding to SPECT (black arrows); however, CT (**G, H**) showed degenerative changes in the left hip with calcifications in the surrounding soft tissue (white arrows)



ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

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HOW TO CITE Kunikowska J, Pelka K, Budlewski T, et al. Calcification as a cause of potential false-positive findings on bone scintigraphy verified with ^{68}Ga -PSMA-11 PET/CT: a case report. *Pol Arch Intern Med.* 2021; 131: 473-475. doi:10.20452/pamw.15897

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