

**Molecular Oncologic Imaging**

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**68Ga PSMA PET-CT in Peritoneal Carcinomatosis**

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**Keywords**

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Staging

**ABSTRACT**

Imaging plays an important role in the evaluation of prostate cancer patients. In recent years, much attention has been focused on 68Ga-PSMA PET-CT in prostate cancer patients and has been widely used for staging, especially biochemical relapse-restaging and therapy response for these patients. We hereby, report the rare case of a prostate cancer patient with peritoneal carcinomatosis demonstrated on Ga-68 PSMA PET-CT imaging.

**Research Article**

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**1. Introduction**

68 Gallium Prostate Specific Membrane Antigen Positron Emission Tomography-Computed Tomography (68 Ga PSMA PET-CT) imaging is the most exciting used imaging modality in prostate cancer patient in recent years. It has gained acceptance as a highly sensitive and specific imaging modality for evaluating extent of the disease (10). Due to the low sensitivity of radiological examinations, used routinely in the clinical imaging of prostate cancer, expected success can not be reached in staging and restaging (4). In Nuclear Medicine applications, while PET-CT with 18-F Fluorodeoxyglucose (FDG) was successful in imaging most solid tumors, it did not show the same success in prostate cancer (7). Ga-68 PSMA PET/CT has recently gained acceptance as a highly sensitive and specific imaging modality for restaging in the settings of biochemical recurrence. The aim of the current case report was to evaluate the potential added value of 68 Ga PSMA PET-CT imaging in a patient with prostate cancer and demonstrate the 68 Ga-PSMA PET-CT images of rare peritoneal carcinomatosis case.

**2. Case Report:**

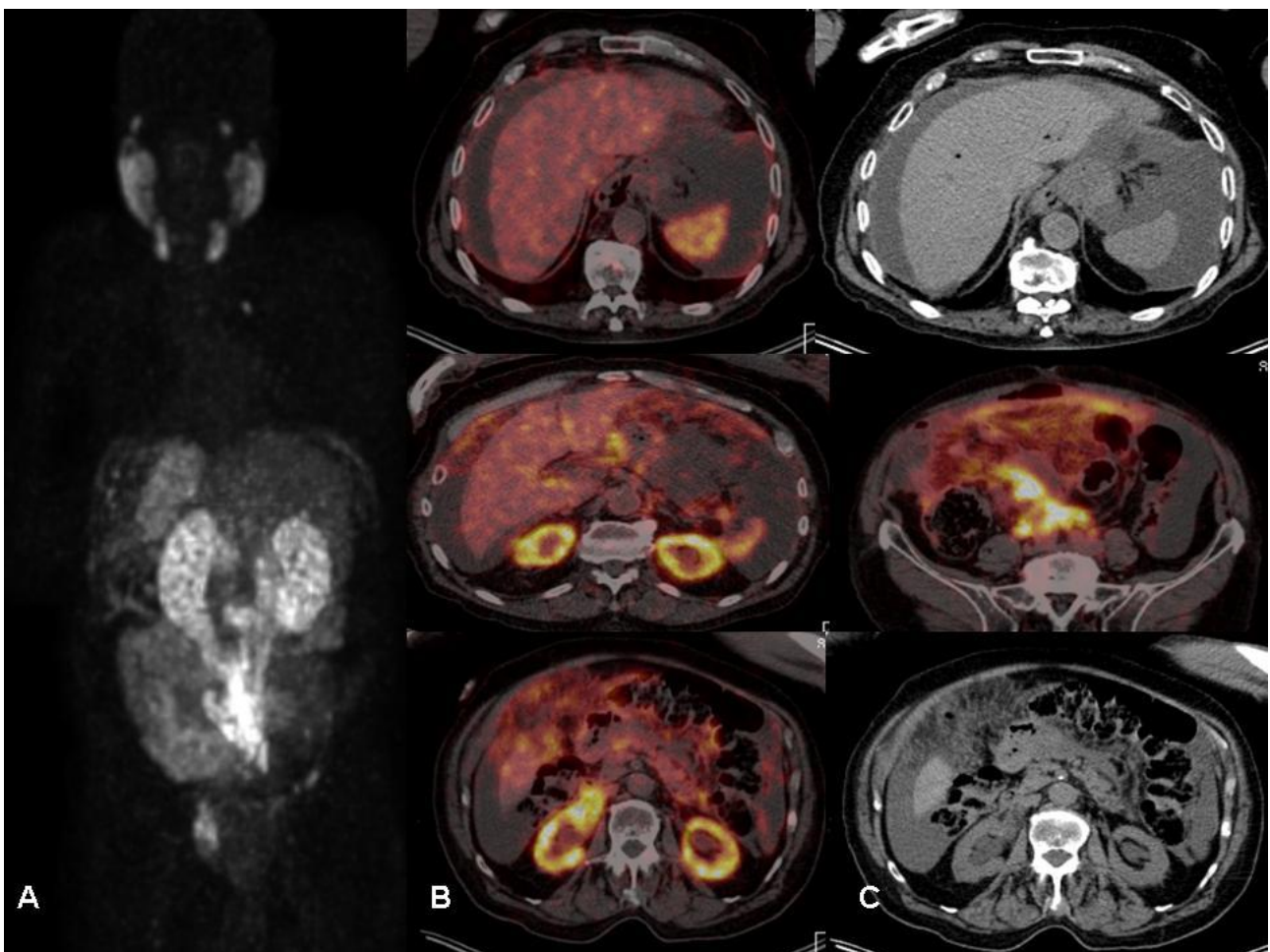
A 84 year old man on follow-up with prostate cancer presented with an elevated prostate-specific antigen (PSA) underwent Ga-68 PSMA PET-CT imaging for re-staging. He had a radiotherapy history previously. The patient underwent a Ga-68PSMA PET/CT scan for evaluation of the metastasis and biochemical recurrence after injection of 140 MBq activity (60 minutes of uptake time). On PET-CT imaging the patient had perihepatic, perisplenic, interloop and pelvic diffuse abdominal fluid. The scan showed disseminated pathological high Ga-68 PSMA uptake in intraabdominal and pelvic peritoneal surfaces with SUVmax: 21 (maximum standardized uptake value). Additionally, multiple conglomerated lymphadenopathies with high Ga-68 PSMA uptake (SUVmax value 42.9) in right infraclavicular, peripancreatic, retroperitoneal, aortocaval, bilateral paraaortic, parailiac and pelvic regions. He had no bone, lung, liver or pleura metastasis. Peritoneal carcinomatosis and omental cake appearance on Ga-68 PSMA PET-CT images of the patient as a rare entity in prostate cancer patients is demonstrated on Figure 1.

### 3. Discussion

Prostate cancer is one of the most commonly diagnosed cancers in men and one of the leading cause of cancer death. Accurate staging for effective therapeutic options is critical for patient management. Staging of patients with prostate cancer using conventional imaging methods such as Magnetic Resonance imaging (MRI), Computed Tomography (CT) and bone scintigraphy is limited because of low sensitivity for metastatic disease, especially in low PSA levels.

Ga-68 PSMA PET/CT is a new, very sensitive and non-invasive imaging method in prostate cancer patients targeting transmembrane protein called PSMA. PSMA (glutamate carboxypeptidase II) is a cell surface glycoprotein. The specific presence of this enzyme in the prostate gland, has made it an ideal theronostic target in the diagnosis and treatment of prostate cancer (4). The results of studies with 68 Ga PSMA are exceptionally good compared to other imaging methods. There are many labeled PSMA antibody derivatives developed for use in the diagnosis and treatment of prostate cancers by targeting the PSMA antigen in nuclear medicine applications (5,6).

The likelihood of locoregional, abdominopelvic lymph node or bone metastases increases in patients with especially high-risk disease. Imaging with Ga-68 PSMA (Prostate specific membrane antigen) has more sensitivity than other conventional methods especially in biochemical relapse. The most common metastatic region is bone with a 90 % frequency. Visceral metastasis is less common (7) such as lung (46%), liver (25%), pleura (21%) and adrenals (13%). Peritoneal carcinomatosis and omental cake appearance is a very rare finding in patients with prostate cancer. There are only few reports in the literature of prostate cancer with omental metastasis (8-13). Kehinde et. al. suggested that the mucinous adenocarcinoma of the prostate is reported to be characterized by rarity of bone metastases, lesser degree of response to local radiation therapy and much of hormone dependence (14). Peritoneal spread and omental cake appearance with widespread metastatic lymphadenopathies without any other bone and visseral metastases in a patient with prostate cancer is presented in this case report with interesting and exciting Ga-68 PSMA PET-CT images.



**Figure 1:** MIP-Maximum intensity Projection (A), axial fusion and BT (B,C) images demonstrate peritoneal metastases, intraabdominal fluid and conglomerated metastatic lymphadenopathies.

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