

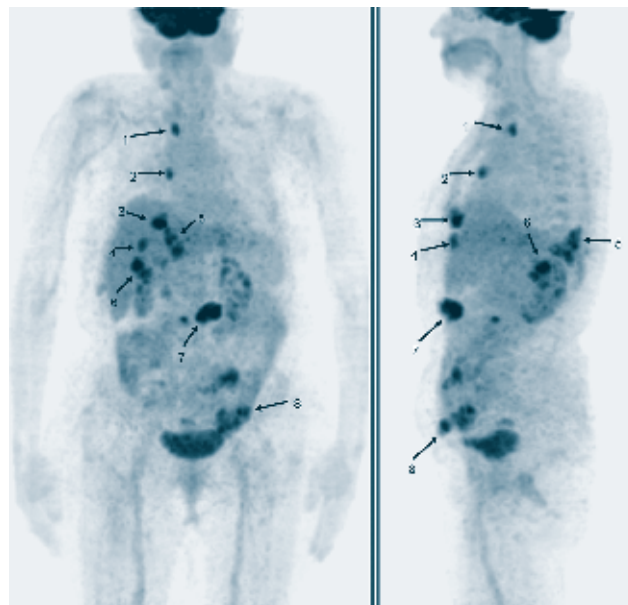
## $^{99m}\text{Tc}$ -MDP and $^{18}\text{F}$ -FDG uptake in calcified metastatic lesions from ovarian papillary serous adenocarcinoma

**To the Editor:** Extrasosseous uptake of technetium-99m methylene diphosphonate ( $^{99m}\text{Tc}$ -MDP) can occur in a variety of conditions either benign or malignant. Ovarian papillary serous adenocarcinoma (PSAC) may have metastatic calcifications shown by the  $^{99m}\text{Tc}$ -MDP scan as we have seen in a seventy eight years old female patient who had ovarian PSAC and had undergone total abdominal hysterectomy and bilateral salphingoophorectomy 2 years ago. Histopathology revealed PSAC with psammoma bodies within papillary tumor cells. Her serum tumor marker CA-125 was 110.9 units (normal 0-35 units) and a calcified lesion at 6th segment of liver suspicious for metastasis was detected on CT. Fluorine-18 fluoro-deoxyglycose positron emission tomography/computerized tomography ( $^{18}\text{F}$ -FDG/PET-CT) performed with 503.2MBq of  $^{18}\text{F}$ -FDG using a full-ring HI-REZ LSO PET camera and a 6-slice CT (Siemens Biograph 6, Chicago, USA) also showed additional calcified lesions with pathologically increased  $^{18}\text{F}$ -FDG uptake at the right superior mediastinal, paracardiac, anterior diaphragmatic, mesenteric fatty tissues and subcutaneous tissues, all of which were consistent with metastatic lesions (Fig. 1 and Fig. 2). The CT portion of the study was done without an intravenous contrast medium, for defining anatomical landmarks and making attenuation correction on PET images. A whole body  $^{99m}\text{Tc}$ -MDP scan also showed increased accumulation at some of the above lesions (Fig. 3).

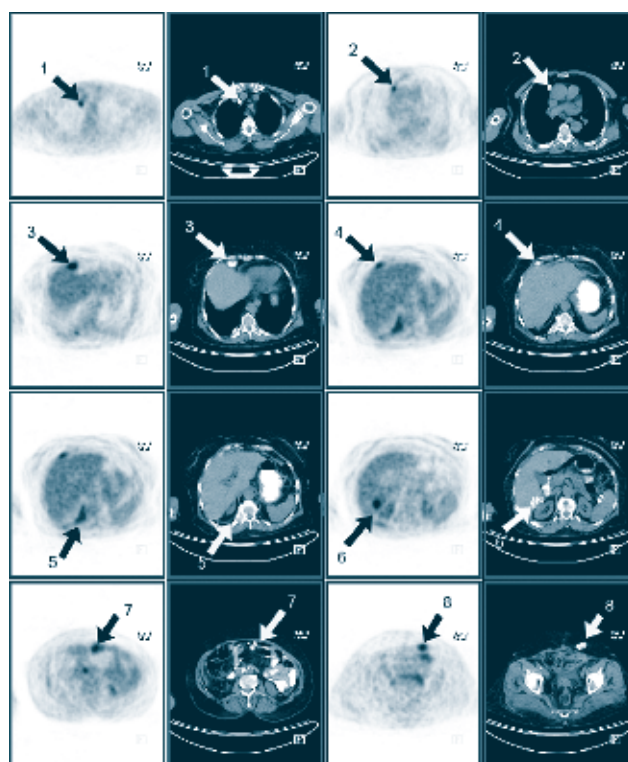
There are numerous papers reporting extrasosseous uptake of  $^{99m}\text{Tc}$ -MDP compounds in primary or metastatic neoplastic diseases and benign conditions as, in bladder carcinoma [1], ureteral cancer [2], non-Hodgkin's lymphoma [3], osteosarcoma [4], astrocytoma [5], lung cancer [6], colon cancer [7], ovarian carcinoma [8-10], ganglioneuroblastoma [11] and also in benign cystic teratoma [12], hemangiomas [13] and angiomyolipomas [14].

The exact mechanism of tissue uptake of  $^{99m}\text{Tc}$ -MDP is not well established. It can be due to altered regional extracellular fluid and tracer handling dynamics [15] or altered sympathetic tone causing opening of local vascular plexus, or after taking vasoactive compounds that change normal capillary permeability or after neovascularization [16]. The  $^{99m}\text{Tc}$ -MDP uptake is proportional to the calcium content of the tissue [17]. The reactivity of diphosphonates to a calcium deposition is also determined by the calcium phosphate molar ratio, crystalline surface area, and the presence of other metallic ions like iron [17]. Tissue hypoxia and tissue infarction also result in the deposition of hemosiderin and calcium with increased  $^{99m}\text{Tc}$ -MDP uptake [17].

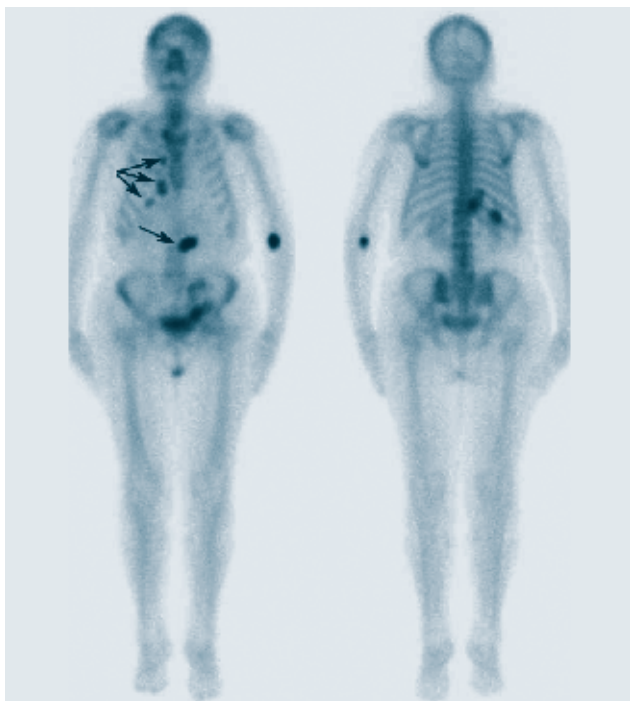
Extensive calcification of PSAC is also shown in plain radiographs and CT due to high content of nearly spherical, concentrically laminated psammoma bodies [18]. Soft tissue me-



**Figure 1.** Anterior and left lateral maximum intensity projection images of the  $^{18}\text{F}$ -FDG-PET/CT study of the patient showing foci of increased  $^{18}\text{F}$ -FDG uptake in soft tissues consistent with metastases (arrows).



**Figure 2.** Transaxial images of  $^{18}\text{F}$ -FDG-PET/CT clearly show abnormal  $^{18}\text{F}$ -FDG uptake at calcified masses in corresponding CT images (arrows).



**Figure 3.** Anterior and posterior whole body bone scan images of the patient showing increased  $^{99m}\text{Tc}$ -MDP uptake at the above metastatic sites (arrows).

tastases of PSAC can be visualized on WBBS because of their high avidity for  $^{99m}\text{Tc}$ -MDP [8-10]. Papillary serous adenocarcinoma accounts for approximately 40% of all cancers of the ovary and is the most common malignant ovarian tumor [19]. In our case,  $^{18}\text{F}$ -FDG/PET-CT study was performed at optimum room temperature and the patient was kept warm before and during the study, so the pathologically increased  $^{18}\text{F}$ -FDG uptake sites referred to calcified lesions on the CT images and were interpreted as metastases. Brown fat uptake was ruled out. Patient is still being followed up with Tamoxifen treatment.

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