To the Editor: Extraosseous uptake of technetium-99m methylene diphosphonate ($^{99m}$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 $^{99m}$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 salpingoopherectomy 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-deoxyglucose positron emission tomography/computerized tomography ($^{18}$F-FDG/PET-CT) performed with 503.2MBq of $^{18}$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 $^{18}$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 $^{99m}$Tc-MDP scan also showed increased accumulation at some of the above lesions (Fig. 3).

There are numerous papers reporting extraosseous uptake of $^{99m}$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 $^{99m}$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 $^{99m}$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 $^{99m}$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-

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

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


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