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Letter from the Editors

Gynecological cancers are important causes of women death worldwide and comprise a varied group of malignancies with diverse clinical presentations and prognosis. In gynecologic cancer, an early identification of malignant lesions and a precise and complete staging at diagnosis are crucial for deciding the subsequent therapeutic approach. A tailored approach is based on the overall extent of the disease, and several imaging modalities can contribute to the diagnosis, staging, pretreatment evaluation, assessment of treatment response, prognosis, and restaging. FDG PET/CT is widely used in gynecologic malignancies and plays an important role in their clinical management. There is an increasing need to determine noninvasively the tumor's distinct biological features in order to select the most appropriate therapy. Like in other malignancies, continued PET tracer development and incorporation into clinical practice will help personalize treatments, increasing tumor control, and reducing unintended toxicities. Furthermore, development and introduction of hybrid PET/MR systems have resulted in the use of PET/MR in gynecologic cancers. Radionuclide lymphoscintigraphy is another imaging technique used in gynecologic malignancies. It is important for gynecologists, oncologists, specialists in nuclear medicine and radiology, and other colleagues to be updated on the recent advances in imaging of gynecologic malignancies. Therefore, we have dedicated the November 2019 Issue of *Seminars in Nuclear Medicine* to "The Role of Nuclear Medicine in Gynecologic Cancer: Overview".

The first review focuses on cervical cancer that represents a major global health challenge. Treatment depends on disease extent at diagnosis. FDG PET/CT is widely used in the staging and therapy planning, particularly for the assessment of nodal disease and distant metastases. Furthermore, FDG PET/CT is increasingly used 3 months after chemo and radiation therapy for response assessment and prognosis. Barwick et al present a nice overview of the role of FDG PET/CT in cervical cancer with focus on primary staging, baseline-derived prognostic factors, response assessment, detection of relapse, and finally also comments on future directions.[1]

Endometrial cancer is a common type of cancer that affects the female reproductive organs. Although endometrial cancer still occurs more commonly in older women, for whom the mortality rate is increasing, it is also seen in younger women. Patients with endometrial cancer often present with abnormal uterine bleeding. In contrast, vulvar cancer is a relatively rare disease. Most patients with vulva malignancies are diagnosed at an early stage when the disease is confined to the perineum without metastases. In both endometrial and vulvar cancer FDG PET/CT is widely used in the clinical management of the patients. Kilcoyne, Chow, and Lee review the use of PET/CT in the management of endometrial and vulvar cancer.[2]

Ovarian cancer is a challenging disease. It is difficult to diagnose in early stages and it has high relapse rate after initial treatments. The reason for the high death rate is the late presentation in most cases, due to its silent nature early in the course of disease. Thus, patients often present with advanced metastatic disease in the absence of specific signs or symptoms. One of the most important factors influencing survival is the disease stage at diagnosis. Kemppainen et al give an update on the current clinical role of PET/CT for evaluation of ovarian cancer with respect to characterization of adnexal masses, staging, extra-abdominal spread, treatment prognostication and response evaluation, disease recurrence, and finally comment on future perspectives.[3]

FDG PET/CT is not only used for staging and restaging of cervical cancer but is also increasingly used for radiotherapy planning and response assessment. The review by Grigsby et al review and discuss the current literature on the use of FDG-PET in deciding treatment alternatives, treatment planning, and response assessment for cervical cancer.[4] Examples of protocols and the authors own experiences are described. Tumor heterogeneity in FDG-uptake is part of a radiomics approach to potentially escalate treatment to radiation-resistant tumors. As stated by the authors, the future of molecular imaging in cervical cancer will require development of novel PET tracers to personalize treatments based on tumor biology. Ultimately, novel radiopharmaceuticals and/or PET-adaptive radiotherapy planning may help generate improved outcomes for the most advanced cervical cancer patients.

In gynecologic malignancies, FDG PET/CT is the most commonly used functional imaging for staging, treatment planning and therapy response evaluation. Ponisio and Dehdashti present an excellent overview of the key PET biomarkers other than FDG that have been used for imaging of the three most common gynecological malignancies (Cervical, endometrial, and ovarian cancers).[5] The authors anticipate that the future use of novel radiotracers in these patients to characterize

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the molecular, genetic and clinical phenotype complexities involved in disease progression may lead to advancements in targeted therapies and precision medicine.

MRI provides excellent soft tissue contrast especially in the pelvis and has been proven very useful for imaging female genital pathologies. Integrated PET/MR scanners have now become available and PET/MRI-systems have been successfully introduced into scientific and clinical applications within the past decade. Hybrid PET/MR enables the simultaneous acquisition of PET- and MR-datasets, providing complementary metabolic, functional and morphologic information of malignant tissue. Utmulu et al offer an update on the clinical role of PET/MR in cervical, endometrial, and ovarian cancers. Patient preparation and protocols are described.[6]

The sentinel lymph node concept was first introduced for penile cancer but later the technique was introduced in selected cancers such as breast cancer, melanoma, and some gynecological cancers. In gynecology, radionuclide lymphoscintigraphy is increasingly used in early stages of cervical or vulvar cancer. In this issue of Seminars, Skanjeti, Giammarile et al provide an excellent and comprehensive review of techniques used to determine the status of sentinel lymph nodes in women with gynecological malignancies.[7] As stated by the authors, there are still questions without a clear answer, in particular for endometrial, ovarian and vaginal neoplasms.

This November issue of *Seminars in Nuclear Medicine* contains a selection of important clinically relevant reviews with focus on the role of nuclear medicine in gynecologic malignancies. All the reviews are provided by colleagues and esteemed experts in the field, and we would like to thank all the contributors of this issue for sharing their important knowledge with the readers of *Seminars in Nuclear Medicine*.

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References

1. Gandy N, Arshad MA, Park WE, et al: FDG-PET imaging in cervical cancer. Semin Nucl Med 49:461-470, 2019
2. Kilcoyne A, Chow DZ, Lee S: FDG-PET for assessment of endometrial and vulvar cancer. Semin Nucl Med 49:471-483, 2019
3. Kemppainen J, Hynninen J, Virtanen J, et al: PET/CT for evaluation of ovarian cancer. Semin Nucl Med 49:484-492, 2019
4. Lin AJ, Dehdashti F, Grigsby PW: Molecular imaging for radiotherapy planning and response assessment for cervical cancer. Semin Nucl Med 49:493-500, 2019
5. Ponisio MR, Dehdashti F: A role of PET agents beyond FDG in gynecology. Semin Nucl Med 49:501-511, 2019
6. Umutlu L, Antoch G, Herrmann K, et al: PET/MR imaging of the female pelvis. Semin Nucl Med 49:512-520, 2019
7. Skanjeti A, Dhomps A, Paschetta C, et al: Sentinel node mapping in gynecologic cancers: a comprehensive review. Semin Nucl Med 49:521-533, 2019