Molecular Imaging and Ovarian Cancer

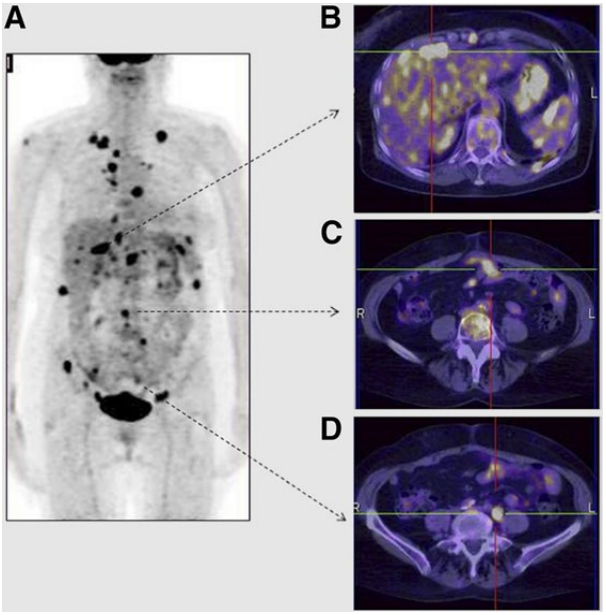
SNMMI SOCIETY OF NUCLEAR MEDICINE & MOLECULAR IMAGING

Ovarian cancer occurs when certain cells within ovaries, the egg-producing female reproductive organs, grow in an uncontrolled, abnormal, manner. The cause of ovarian cancer, the fifth most common cancer among women, is unknown.

The American Cancer Society estimates that in 2023, 19,710 women in the United States will be diagnosed with ovarian cancer. A woman's risk of getting ovarian cancer during her lifetime is about 1 in 78.

Ovarian cancer is highly curable when treated at an early stage. However, because there is no effective screening test for the disease and symptoms are often vague, the majority of women are diagnosed at a late stage when survival rates are very low. Early detection and accurate diagnosis are the key to increasing ovarian cancer survival rates.

Sample Scan



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18F-FDG PET/CT images of recurrent ovarian cancer 10 months after treatment with radical surgery and adjuvant chemotherapy: maximum-intensity projection (A) and transaxial images delineating uptake of radiotracer in liver (B), peritoneum (C), and locoregional lymph nodes (D).

Researchers believe molecular imaging holds promise for evaluating ovarian cancer. Studies also show that hybrid imaging, such as a combined PET-CT scan, is highly accurate for detecting recurrent ovarian cancer and for determining the best possible treatment plan.

The molecular imaging technologies currently being used for ovarian cancer are positron emission tomography (PET) scanning and PET in conjunction with computer-aided tomography (PET-CT).

What is PET?

PET involves the use of an imaging device (PET scanner) and a tiny amount of radiotracer that is injected into the patient's bloodstream. A frequently used PET radiotracer is fluorodeoxyglucose (FDG), which the body treats like the simple sugar glucose. It usually takes between 30 and 60 minutes for the FDG distribution throughout the body to become fixed. PET-CT is a combination of PET and computed tomography (CT) that provides detail on both the anatomy and function of organs and tissues. This is accomplished by superimposing the precise location of abnormal metabolic activity (from PET) against the detailed anatomic image (from CT).

How is PET used for ovarian cancer?

- **Stage**: by determining the location of the cancer and where the cancer has spread in the body.
- **Plan treatment**: by determining a site that is appropriate for biopsy and in research studies helping select the best therapy based on the unique biology of the cancer and of the patient.
- **Evaluate how the cancer responds to treatment.**
- **Manage ongoing care**: by early detection of the cancer coming back

Advantages of PET

PET-CT is highly accurate at detecting recurrent ovarian cancer and more accurate than CT imaging alone. Information provided by PET-CT scans:

- often results in a change in patient management
- may determine the effectiveness of therapy after just one cycle of treatment
- may eliminate unnecessary surgeries after treatment by differentiating between tumors and benign residual masses.

On the Horizon

There are many new and emerging molecular imaging technologies that may benefit people with ovarian cancer, including:

- hybrid imaging systems, such as combined PET-MR, which may improve accuracy and allow physicians to see how cancer is affecting other systems in the body
- the use of new molecular technologies, such as optical imaging for detection and targeted ultrasound for differential diagnosis
- the use of new PET radiotracers to image critical cancer processes, such as fluorothymidine (FLT), to show tumor proliferation
- molecular radiotherapy (MRT).

About SNMMI

The Society of Nuclear Medicine (SNMMI) is an international scientific and medical organization dedicated to raising public awareness about nuclear and molecular imaging and therapy and how they can help provide patients with the best health care possible. With more than 18,000 members, SNMMI has been a leader in unifying, advancing and optimizing nuclear medicine and molecular imaging since 1954.

The material presented in this pamphlet is for informational purposes only and is not intended as a substitute for discussions between you and your physician. Be sure to consult with your physician or the nuclear medicine department where the treatment will be performed if you want more information about this or other nuclear medicine procedures.

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