

# Visualizing Better Care: PET for Colorectal Cancer

**A**ccording to the Centers for Disease Control (CDC), colorectal cancer is the second-leading cause of cancer death in the United States. The American Cancer Society estimates that nearly 150,000 men and women will be diagnosed with colorectal cancer in 2005, making it the third most common form of cancer in the United States. Fortunately, improvements in screening techniques, treatment approaches, and imaging technologies have helped to decrease the mortality rate from colon and rectal cancers over the past 15 years.

Positron emission tomography (PET) has played a significant role in improving outcomes for colorectal cancer patients.

An imaging technology, PET detects metabolic or chemical changes in body tissues—versus the structural changes evident on a CT or MRI scan. Before undergoing a PET scan, patients receive an injection of a *tracer* that attaches to glucose (sugar) in the body. To feed their rapid growth, tumors consume more glucose than healthy tissues. Areas of increased glucose consumption appear on a PET scan as “hot spots.”

## STAGING

As with most forms of cancer, selecting the best treatment approach for colorectal cancer depends upon accurate staging of the disease. With early stage disease, surgery alone may successfully remove the tumor site. If the disease has spread (metastasized) to the lymph nodes or other organs, radiation therapy and chemotherapy is required.

A study presented at the 2003 American Roentgen Ray Society Annual meeting found that PET is significantly more accurate at detecting colon cancer metastases than CT alone. PET scans identified 93% of metastases in 35 patients between the ages of 40 and 83—versus only 46% identified with CT scans. In addition, CT had a false positive rate of 27% versus no false positives with PET.

“PET helps us to determine whether or not someone is a surgical candidate, by revealing whether the disease has spread elsewhere,” reports **Tracey D. Arnell, MD**, *Assistant Professor of Surgery*, Columbia University College of Physicians and Surgeons. “We often use PET to investigate suspicious findings on a CT or chest X-ray.”

## RESPONSE TO THERAPY

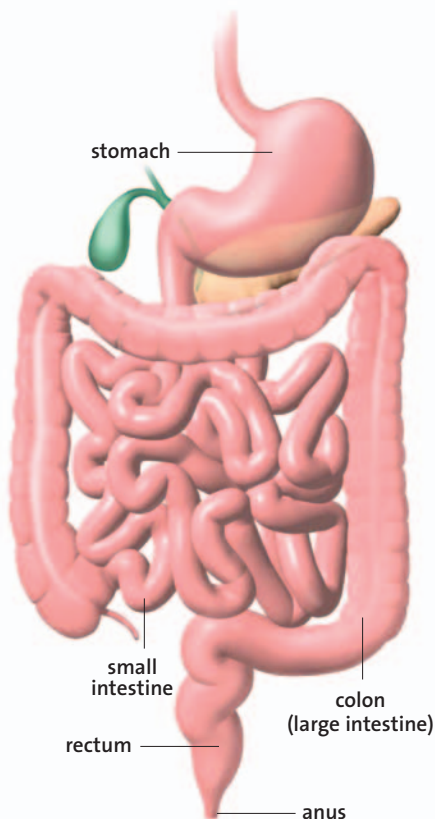
PET also plays a role in monitoring the progress of patients who are not considered candidates for surgery. “For patients with metastatic disease, chemotherapy has the potential to reduce the size and number of metastases and also to shrink the remaining primary tumor. We can use PET to visualize this response to chemotherapy, letting us know whether surgery is now an option,” says **Ronald L. Van Heertum, MD**, *Professor of Radiology*, Columbia University College of Physicians and Surgeons and *Director*, Columbia Kreitchman PET Center.

“Say a CT scan or blood test indicates that the patient is successfully responding to chemotherapy,” explains **Martin Oster, MD**, *Associate Professor of Clinical Medicine*. “PET lets us know whether we are indeed doing well, or whether some residual cancer remains undetected and we need to continue chemotherapy.”

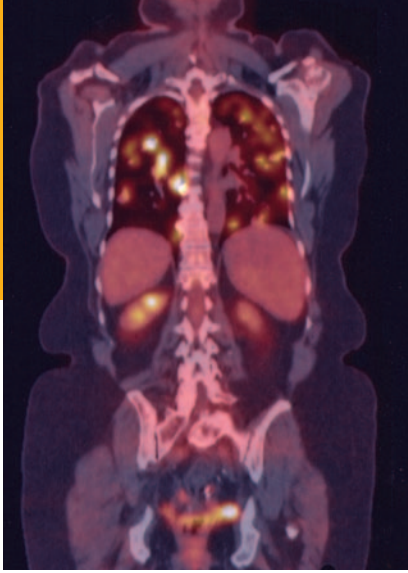
## RECURRENCE

For patients with suspected recurrences, PET plays a particularly key role. Since CT scans look for physical changes, they are not ideal for distinguishing between areas of scar tissue from previous surgeries and active tumor sites. As a result, scarring can result in false positive readings. With PET, the focus on glucose uptake means the differentiation is much clearer.

“I’ve had patients where it looked like the cancer had recurred on CT, but a PET scan revealed scar tissue instead,” Dr. Oster says. “I’ve also had patients we thought were cured where the PET



Nancy Heim




**PET/CT scan of colorectal cancer patient with multiple metastases.**

showed active tumor sites. It's a very helpful and successful evaluation tool."

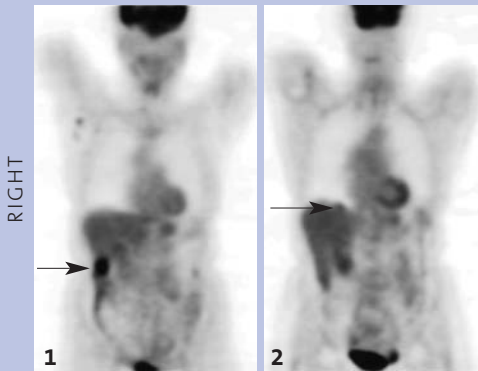
### PET/CT

Recently, PET imaging has been combined with CT within a single PET/CT scanner. The individual scans are taken virtually simultaneously and can be presented separately or as a single, "fused" image. While the PET scan highlights glucose consumption, the CT scan reveals precise anatomical details, such as the size and location of a tumor mass. According to Dr. Oster, "PET/CT basically offers us two for the price of one. Each tool has its particular pluses and minuses, and by combining both, PET/CT gives us extra information."

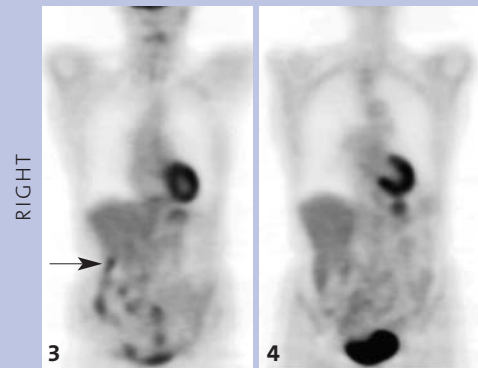
"Currently we can't image metastases to the lymph nodes because they're too small. We can only detect them surgically," Dr. Arnell says. "In the future, if PET/CT can be refined to show lymphometastases of less than one centimeter, then it may serve as an initial guide to therapy. We will know which colon patients might benefit from pre-operative chemotherapy." 

**For more information on PET for colorectal cancer, please contact the Columbia Kreitchman PET Center at [info@columbiapet.org](mailto:info@columbiapet.org) or 212.923.1555.**

## CASE STUDY



In spring 2003, a 73-year-old female with a history of colorectal cancer was referred for a PET scan for suspected recurrent disease. After her initial diagnosis in 2002, she underwent chemotherapy and an ileocectomy—the partial removal of her colon. The 2003 PET scan revealed recurrences in the inferior aspect of the right hepatic lobe of the liver (*image 1*) and at the dome of the left hepatic lobe (*image 2*). A second round of chemotherapy was ordered.



A follow-up PET scan taken 10 months later demonstrated a significant partial response to therapy in the inferior right hepatic lobe of the liver (*image 3*) and complete resolution in the dome of the left hepatic lobe (*image 4*).

*Note: Areas of increased glucose uptake in the brain, heart, and bladder correspond to healthy body processes.*

## SCREENING FOR COLORECTAL CANCER

The Centers for Disease Control (CDC) launched a *Screen for Life* campaign to inform men and women, aged 50 years or older, about the importance of having regular colorectal cancer screening tests. Ninety-three percent of cases of colorectal cancer occur in people age 50 and older. Screening tests can find polyps that can be removed before they turn into cancer. The CDC estimates that "if everyone age 50 and older had regular screening tests, more than one-third of deaths from cancer could be avoided." Common screening techniques include:

- **Fecal Occult Blood Test:** A test for blood in the stool.
- **Flexible Sigmoidoscopy & Colonoscopy:** Tests that use a thin, flexible tube with a camera on the tip to visualize, and potentially biopsy, the intestinal lining. A sigmoidoscopy reaches the rectum and lower colon, while a colonoscopy accesses the entire colon.
- **Double Contrast Barium Enema:** A special X-ray of the rectum and colon that first requires "cleaning" the colon and then filling it with air.

<http://www.cdc.gov/cancer/screenforlife/>