UNIVERSITY of CALIFORNIA, SAN DIEGO
MEDICAL CENTER MOORES CANCER CENTER

Highlight:

UCSD Radiology Helps Advance Cancer Detection, Treatment and Research

Powerful new radiology technology is available now for patients and researchers at the newly opened Moores UCSD Cancer Center, and more is planned in the coming months.

"Using state-of-the-art equipment, we are increasingly able to perform tests and procedures that are faster, more accurate and less invasive. This means we can find and treat cancers earlier, with less discomfort for patients and greater hope of recovery," said William G. Bradley, M.D., Ph.D., professor and chair of the UCSD Department of Radiology. "We use medical imaging such as PET (positron emission tomography), CT (computerized tomography) and MR (magnetic resonance) to pinpoint cancers and create a precise map for the surgeon or radiation oncologist to remove or destroy the tumor. We also use MR, PET and CT imaging to follow the response to treatment, whether it is radiation therapy, chemotherapy or surgery."

Examples of new radiology equipment in the Cancer Center:

- UCSD's **Trilogy™ linear accelerator made by Varian Medical Systems** is currently one of only 12 nationwide. It offers virtually unmatched precision, power and speed in pinpointing and destroying tumors anywhere in the body, including tiny lesions in the brain. It even allows the radiation to be turned on and off as the patient breathes and as the targeted tumor moves in and out of the treatment field, which happens particularly with lung and abdominal cancers. With this image-guided radiation therapy system, benefits for patients include less damage to healthy cells, fewer complications and quicker treatments. UCSD plans to begin treating patients within the next month with the Trilogy and a second state-of-the-art Varian linear accelerator. (Details attached)
- The **InSightec ExAblate® 2000** is the first system to combine MRI with high-intensity focused ultrasound to thermally ablate (destroy) tissue without making any incisions. UCSD is currently one of nine sites nationwide to have the machine, which will be installed in June. The non-invasive technology, called "MR-guided focused ultrasound," has received FDA approval initially for treating uterine fibroids, which are benign growths. Bradley anticipates that UCSD will be involved in clinical research to treat cancer patients over the next several years. Potential applications include breast, liver, bone and brain cancers. "Imagine surgery where you never cut the skin, or treating a brain tumor without opening the skull," he says. (Details attached)
- The **General Electric 3 Tesla Ultrahigh Field MRI system** has a magnetic field strength 60,000 times greater than that of the Earth. "The highest field clinical MRI scanners in San Diego right now operate at 1.5 Tesla. At our higher field strengths, we will be able to make earlier diagnoses." This MRI system is used in conjunction with the ExAblate 2000.

- A **full-field digital mammography unit** will be available for screening and diagnostic mammograms at the Cancer Center. In January 2005, UCSD's Breast Imaging Center in Hillcrest introduced full-field digital mammography to San Diego; that first unit is dedicated for screening mammograms only.

Many but not all of the cancer-related clinical and research facilities will now be housed under one roof at the Moores UCSD Cancer Center. The Cancer Center is the hub of the wheel, says Bradley, but there are other machines involved in cancer therapy and research that are the spokes of the wheel.

Next door, at UCSD's Thornton Hospital, a new **multidetector CT scanner** provides detailed, three-dimensional views inside the body to help radiologists screen for and track cancers throughout the body.

"For example, we can use it for CT colonography, which for some patients can replace colonoscopy to detect colorectal cancers. In the future, patients will have a noninvasive CT colonography study first and only go to colonoscopy (which requires sedation and inserting a scope with a camera) if there's a suspicious lesion that needs a biopsy," Bradley says.

Five minutes away from campus in UCSD's Radiology Imaging Laboratory in Sorrento Valley, is a **PET scanner and cyclotron**, which creates the PET tracers, or 'contrast agents'. Within the next month the most advanced **magnetoencephalography (MEG)** unit should be installed there. If a patient has seizures as a result of a brain tumor, the MEG can tell exactly where in the brain the seizure started. UCSD has recruited one of the nation's leading authorities in MEG and has retained as a consultant the scientist who invented MEG. This machine will be used for clinical studies as well as for basic research into how the brain works.

Other Examples of radiology-based cancer research:

- **Molecular imaging studies** allow physicians and scientists to examine biological changes that may occur at the molecular level before cancer symptoms become apparent at the anatomical (structural) level. To enhance research into 'personalized medicine' – that based on the patient's own genetic predisposition – UCSD has a full spectrum of rodent molecular-imaging modalities – CT, PET, MR and optical.
- Using molecular imaging, Cancer Center researchers are developing **smart contrast agents** that can find cancers better and can tell if a particular treatment is working before there is any change in the size of a tumor or in a specific molecular process within the tumor. This research includes optical contrast agents, magnetic resonance contrast agents and radiopharmaceuticals.
- **Functional MRI (fMRI)** enables researchers to see what part of the brain is involved in particular activities – such as hearing, sight, and moving the right or left hand – and plan surgery, such as removal of a brain tumor, to avoid and preserve those eloquent parts of the brain.

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