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The WCC Note™

Presented by Stephen J. Pomeranz, M.D.

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MRI SARCOMA

MRI Shows Effect of Treatment in Patients with Soft-Tissue Sarcoma

In a study by German researchers, magnetic resonance imaging (MRI) was performed on 23 patients with soft-tissue sarcomas before and after initiation of chemotherapy. The MRIs performed included diffusion-weighted sequences (DWI), to assess the accuracy of DWI in determining treatment response. The average interval between the two MRIs was 56.9 days. Tumor volumes were measured on both scans, and the apparent diffusion coefficient (ADC) – a measure of the diffusivity of water in the tumor – was also calculated for both scans. The research team found that changes in ADC values after treatment highly correlated with changes in tumor volumes. **Conclusion: Diffusion-weighted MRI imaging can supplement morphologic measures on MR imaging to evaluate the response of soft-tissue sarcomas to therapy. The authors write: "As cellular changes are expected to precede morphologic changes in treated tumors, DWI performed at an early stage of fractionated therapy may provide unique prognostic information of its effectiveness."**[1]

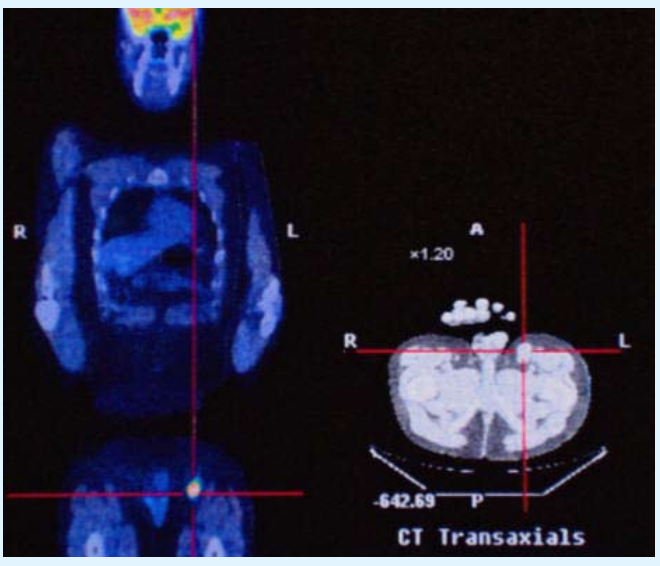
PET CANCER

Chemotherapy Drug Used as Probe in PET Scans May Allow Assessment of Immune System and Tumor Response to Therapy

In a new study from The University of California – Los Angeles, researchers created a new probe for PET scans by using a slightly altered version of the common chemotherapy drug gemcitabine, tagging it with a radioactive label to make it visible to the PET scanner. This drug is involved in the "DNA salvage pathway," a mechanism that is used at high levels in the cells of the immune system. By using this new probe with PET scanning in mice, researchers were able to see early antitumor activity in the immune system. In addition, it allowed assessment of early changes in the immune system in autoimmune diseases, as well as evaluation of immunosuppressive therapy.[2, 3] **Conclusion: A new PET probe based on a common chemotherapy drug may allow monitoring of the immune system, with applications involving early assessment of tumor response to therapy.**

PET Scanning: A Review

- Positron emission tomography, or PET scanning, is a form of nuclear medicine imaging.
  - PET differs slightly from other nuclear medicine tests in that it detects pairs of gamma rays emitted in opposite directions.
  - For this reason, PET scans are best performed on dedicated PET scanners.
  - The gamma rays are produced by a positron-emitting radionuclide (the radiotracer), which is injected into the body and localizes to specific areas.
  - After the radionuclide localizes to the areas where it is supposed to go, three-dimensional images of the body can be obtained by the PET camera, indicating exactly where in the body the molecules went.
  - When PET is coupled with CT scanning, this allows much more detailed anatomic evaluation of the location of the radionuclide.



F18-FDG PET CT images of the left inguinal node.

- The most common form of PET scanning is F18-FDG PET (FDG stands for fluorodeoxyglucose, a type of sugar).
  - This sugar concentrates in any area of the body that is highly metabolically active (that is, areas that use a lot of glucose). These body parts include:
    - The brain, the heart, and the liver in a normal person
    - Most tumors, particularly lymphoma and lung cancer
    - Areas of infection or inflammation
- Common uses of F18-FDG PET are:
  - Diagnosis, staging, and treatment monitoring of tumors
  - Evaluating dementias – patients with Alzheimer's disease show decreased metabolism in certain parts of the brain
  - Identifying chronically ischemic heart tissue
  - Evaluating new drug therapies – by radiolabeling a new drug and injecting it, a PET scanner can show where the drug concentrates in the body

SOURCES:

1. Dudeck O, Zeile M, Pink D, Maciej *et al.* "Diffusion-Weighted Magnetic Resonance Imaging Allows Monitoring of Anticancer Treatment Effects in Patients with Soft-Tissue Sarcomas." *Journal of Magnetic Resonance Imaging* 2008; 27:1109-1113.
2. Radu CG, Shu CJ, Nair-Gill E, *et al.* "Molecular Imaging of Lymphoid Organs and Immune Activation by Positron Emission Tomography with a New [18F]-Labeled 2'-deoxycytidine Analog." *Nature Medicine 2008*; published online June 8, 2008.
3. http://www.sciencedaily.com/releases/2008/06/080608131218.htm; accessed June 9, 2008

NEXT ISSUE: MORE BREAKING NEWS AND STUDIES IN CLINICAL TRIAL IMAGING

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