

FDG-PET/CT imaging can help guide treatment strategies for patients with soft tissue sarcomas



To ensure patients with soft tissue sarcoma receive the most effective therapy possible, UCLA clinicians use FDG-PET/CT scans (positron emission tomography/computed tomography using radio-labeled [18F]-fluorodeoxyglucose) to identify the most effective treatment strategies and to direct patient care.

Each year, about 14,000 Americans — including 1,200 children — are diagnosed with sarcoma, a diverse group of malignant tumors that develop in the soft tissues or bones. Both bone and soft tissue sarcomas are relatively rare, comprising just 1 percent of adult and 7 percent of child cancer diagnoses. Although patient prognosis depends on a variety of factors including tumor grade, size, depth, margins and metastasis, soft tissue sarcomas are among the deadliest of cancers. These tumors can develop in the muscles, nerves, blood vessels, cartilage or fat, where they can escape early detection, contributing to an overall five-year survival rate of about 50 percent.

Treatment for aggressive soft tissue sarcoma often involves chemotherapy and radiation to shrink tumors prior to surgical resection. For more than a decade, clinicians have relied on Response Evaluation Criteria in Solid Tumors (RECIST) — internationally developed criteria that measure changes in tumor size — to determine the effectiveness of a particular therapy. But even when tumors are

Gauging effectiveness after one round of therapy

Patients with soft tissue sarcoma often undergo an aggressive course of combination therapy including chemotherapy, radiation and surgery. While chemotherapy regimens for these patients tend to be highly toxic with significant side effects, the therapy is only marginally effective on sarcomas, with only 20 to 30 percent of patients showing a significant response.

Two UCLA studies show that FDG-PET/CT scans — which measure a tumor’s metabolic activity — can help identify how well chemotherapy is working following a single cycle of treatment. UCLA clinicians use this information to guide disease management, sparing non-responsive patients the side effects and costs of an ineffective treatment, while encouraging responsive patients to continue with the therapy.

“These scans allow us to assess whether a chemotherapy regimen is working, so patients don’t waste their time with a difficult and ineffective treatment,” says Fritz Eilber, MD, director of UCLA’s Jonsson Comprehensive Cancer Center’s Sarcoma Clinical/Translational Research Program and associate professor of Surgery and Molecular and Medical Pharmacology.

responding to therapy, their size may not begin to decrease right away. It is not uncommon for a tumor to demonstrate no change in size by conventional imaging, but show a significant response to therapy upon pathologic assessment at resection. As a result, RECIST is often not very accurate at identifying response to therapy in soft tissue sarcoma.

Imaging glucose consumption to direct therapy

FDG-PET/CT, an imaging tool that measures a tumor's metabolic activity, may be more useful than RECIST for assessing a therapy's effectiveness and predicting patient survival. The technology, which takes advantage of the fact that aggressive tumors consume high levels of glucose to fuel their growth, uses radio-labeled glucose to measure a tumor's metabolic activity. While FDG-PET/CT scans are becoming an established component of cancer follow-up care, two recent UCLA studies provide evidence that the scans can be an effective tool for directing treatment strategies early in the patient's care.

In both studies, the most recent one published in February 2012 in the journal *Clinical Cancer Research*, sarcoma patients underwent FDG-PET/CT scans before and after chemo or chemo-radiation therapy. The first study showed that PET-CT scans could determine a tumor's pathological response after just one cycle of chemotherapy drugs. The second study, which included 39 patients with primary, high-grade soft tissue sarcomas, investigated whether this early FDG-PET response was predictive of long-term survival. The study found that patients with tumors whose metabolic activity decreased by at least 26 percent following one cycle of chemotherapy had one-, two- and five-year survival rates that were significantly better than those whose tumors were less responsive. In addition, UCLA researchers recently demonstrated that FDG-PET/CT can accurately stage sarcomas in children and are conducting trials to see if it can also determine early response to therapy, as it can in adults.

Being able to assess a patient's early response to chemotherapy can potentially guide cancer management decisions. The chemotherapy agents used to treat advanced sarcomas tend to have high toxicity compared to other chemotherapeutic regimens, and produce side effects that are not easily tolerated by many patients. A patient who is not responding to chemotherapy can be spared the side effects and costs of ineffective treatments and switched to an alternative therapy or treated immediately with surgery. Those patients whose tumors show a significant drop in metabolic activity after one cycle of chemotherapy may be encouraged to continue the treatment despite difficult side effects.

Sarcoma expertise

At one of the nation's largest comprehensive cancer centers, UCLA's Jonsson Comprehensive Cancer Center clinicians diagnose and treat about 1,200 patients with bone and soft tissue sarcoma each year. The center houses more than 240 researchers and clinicians who conduct research in cancer prevention, detection, control and treatment. UCLA has consistently been ranked among the top cancer centers in the nation by *U.S. News & World Report*.

UCLA Health

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