Ewing Sarcoma Challenge

The University of Texas MD Anderson Cancer Center has the privilege of caring for more than 1,100 patients with sarcoma each year, including 60 patients with Ewing sarcoma—approximately a third of them younger than 18 years of age — more than any other place in the world. Our opportunity to help patients with rare diseases comes with the tremendous responsibility to discover innovative treatments that improve their survival.

While we have made great progress in curing patients with localized Ewing sarcoma, our multidisciplinary team of physicians and researchers remains challenged by patients with disease that has spread. The five-year survival rate for patients with metastatic Ewing sarcoma still is less than 30 percent, and curative therapies have remained elusive.

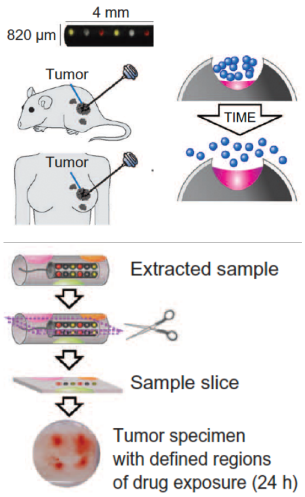

Figure 1. Microdevice schema

A New Idea: Microdevice Drug Delivery

A significant impediment in the development of new treatments for all uncommon cancers, including Ewing sarcoma, stems from the slow clinical trial accrual rate that is inherent in treating patients suffering from rare tumors. Because there are so few patients with the disease, a single clinical trial can take more than a decade to complete. Our MD Anderson team, led by **Joseph A. Ludwig, M.D.**, is working with engineers at Massachusetts Institute of Technology (MIT) to devise a potential solution to this problem — a device that could completely alter how anti-cancer drug development occurs in the future. If early tests establish its viability, this microdevice eventually could allow scientists to directly study drug efficacy within actual human tumors, eliminating the costly and time-consuming step of completing preclinical research in animal models. Plus, the microdevice could simultaneously assess tumor response to 18 different drugs or therapeutic combinations in the same amount of time traditionally needed to evaluate just one drug. Thus, we can more quickly identify the best novel therapies and advance them quickly to clinical trials, offering new hope to patients who face life-threatening disease.

The microdevices are the size of rice grains and contain 18 tiny reservoirs sufficient size to hold small doses of single drugs or drug combinations. Once implanted into tumors, the drugs diffuse from their respective reservoirs along a finite and non-overlapping path into the surrounding tumor tissue during the next 24 hours. Then the microdevices and tissue are removed and sent to the lab for a powerful analysis to gauge how well each drug impacted the tumor. Food and Drug Administration guidelines support this innovative testing approach. The doses provided by the microdevices would be less than one-millionth of the dose normally given to a patient during systemic treatment. Plus, the device, drug and tumor tissue would be removed from the patient after 24 hours.

Figure 2. The microdevice located to the right of a penny has 18 reservoirs used to dispense drugs.

Once perfected, this powerful technology promises to revolutionize the drug discovery pipeline by quickly identifying the most effective drugs based upon their effects in real patient tumors rather than preclinical laboratory models that all too often bear little resemblance to the human tumors they attempt to model. Promising drugs will still require testing in early phase clinical trials but the microdevice data will aid physician-scientists by advancing only those drugs and/or drug combinations that have proven effective in the microdevice.