MEDICAL APPLICATIONS OF NON-MEDICAL RESEARCH

APPLICATIONS DERIVED FROM BES-SUPPORTED RESEARCH AND RESEARCH AT BES FACILITIES

OFFICE OF BASIC ENERGY SCIENCES
OFFICE OF ENERGY RESEARCH
U.S. DEPARTMENT OF ENERGY

The Office of Basic Energy Sciences. The Basic Energy Sciences (BES) program within the U.S. Department of Energy's Office of Energy Research is one of the Nation's foremost sponsors of fundamental research in materials sciences, chemical sciences, geosciences, plant and microbial sciences, and engineering sciences. The program funds more than 2,400 researchers at 200 institutions nationwide and supports 17 major national user facilities. The BES program underpins the DOE missions in energy and the environment, advances energy-related basic science on a broad front, and provides premier national user facilities for researchers from academia, industry, and government laboratories.

The results of BES research and the availability of major user facilities also impact other research areas of importance to the Nation. One such research area of increasing importance is that of medical sciences. The following stories illustrate how BES research and major user facilities have impacted the medical sciences in the selected topical areas of disease diagnosis, treatment (including drug development, radiation therapy, and surgery), understanding, and prevention.

1. DISEASE DIAGNOSIS

Thin-Film Lithium Batteries for Biomedical Applications (ORNL). Through its BES program, the Oak Ridge National Laboratory (ORNL) has developed high-performance thin-film lithium batteries for a variety of technological applications. These batteries have high energy densities, can be recharged thousands of times, and are only 10 microns thick. They can be made in essentially any size and shape. Recently, Teledyne licensed this technology from ORNL to make batteries for medical devices including electrocardiographs. In addition, new "textured" cathodes have been developed which have greatly increased the peak current capability of the batteries. This greatly expands the potential medical uses of the batteries, including transdermal applications for heart regulation.

Positron Emission Tomography (BNL). The February 19, 1996, issue of *Chemical and Engineering News*, a publication of the American Chemical Society, featured Positron Emission Tomography--a medical imaging technique--as its cover story. The technique can track chemical reactions in living tissues and merges chemistry with biological imaging. Its strength has been in studies of the brain where there has been significant progress in investigations of drug addiction,