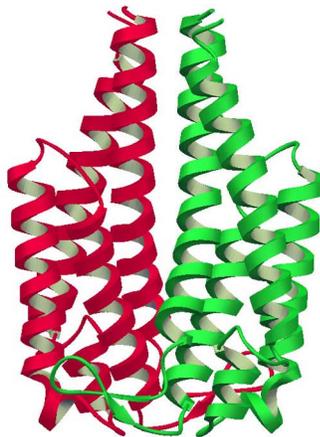


Unlocking the Secrets of Life

Basic research in the biomedical sciences helps to improve our understanding of living systems and often leads to promising treatments for disease.

Lyme Disease Protein

Spring often brings an abundance of deer ticks, which spread Lyme disease. The potentially debilitating illness is the most common vector-borne disease in the U.S. The current vaccine for the disease is based on OspA, an outer surface protein of the Lyme disease bacterium. This protein's structure was deciphered at Brookhaven's National Synchrotron Light Source. Recently, a Brookhaven research team determined the three-dimensional structure of OspC, another key protein of the Lyme disease bacterium. This research may lead to a second-generation vaccine that would be more effective than the current one.



The OspC protein from the Lyme disease bacterium.

New Breast-Imaging Technique

Scientists are investigating a new technique called diffraction enhanced imaging (DEI), which was developed and tested at Brookhaven's National Synchrotron Light Source, to detect and study calcifications of breast tissue. Using DEI, the scientists looked at a sample of breast tissue with at least ten calcifications and made computer models of the new imaging process to study its contrast mechanisms. This new method reduces x-ray scattering and significantly improves pictures of breast tissue when compared to x-rays used in mammography. Calcifications are associated with breast cancer, and their early detection is crucial for diagnosis and treatment. The new patented DEI method may one day replace mammograms.



Zhong Zhong works to improve breast-cancer imaging.

Pain Relief for Bone Cancer Patients

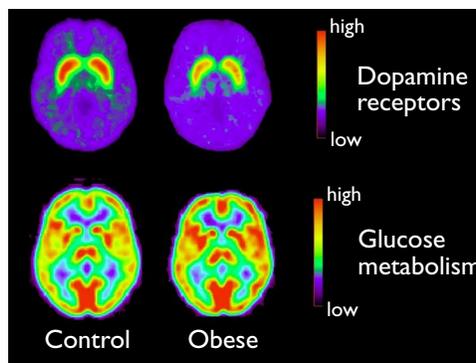
About 75 to 80 percent of patients with prostate, breast, and lung cancer find that their cancers spread to bone, causing severe pain in the later stages of illness. Improving on their earlier work, Brookhaven medical researchers have refined the formulation as well as the

method for making a tin compound that can be applied to pain management. The compound targets only the bone, sparing the marrow and soft tissue, but still delivers a highly localized dose of electrons to the tumors to ease pain without sedation.

Dopamine and Obesity

Dopamine, a brain chemical associated with addiction to cocaine, alcohol, and other drugs, may also play an important role in obesity,

Brookhaven researchers have found. In a recent study using positron emission tomography (PET) imaging technology, the scientists found that obese people, compared with normal subjects, have fewer receptors for dopamine, a neurotransmitter that helps produce feelings of satisfaction and pleasure. The findings imply that obese people may eat more to try to stimulate the dopamine "pleasure" circuits in their brains, just as addicts do by taking drugs. The results also suggest that strategies aimed at improving dopamine function might be beneficial in the treatment of obese individuals.



PET scans show that obese and control subjects have similar metabolic rates, but obese subjects have fewer receptors for dopamine, a brain chemical that transmits feelings of pleasure and reward.