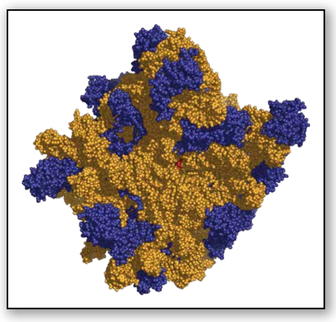
At National User Facilities, scientists study how to overcome drug resistance and develop new materials for the treatment of disease.

HEALTH SCIENCE & MEDICINE at National User Facilities

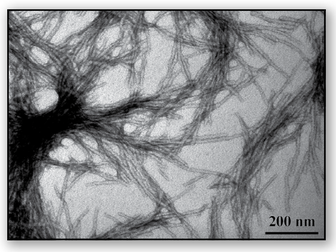
Advanced Photon Source



Award-Winning Science

All three recipients of the 2009 Nobel Prize in Chemistry carried out research at the APS (and at other U.S. Department of Energy research facilities) that led directly to understanding the structure and function of the ribosome. At present, more protein structures have been solved at the APS than at any other synchrotron light source. Knowledge of these structures has significantly enhanced the fight against diseases.

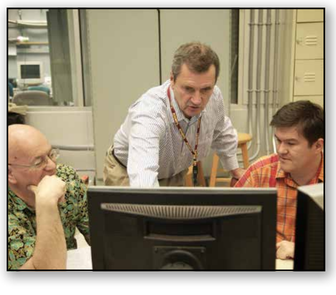
High Flux Isotope Reactor



Cures for Diseases

Neutron measurements can determine how proteins form on a minute scale, making it possible to see when and how disease-causing abnormalities develop. At HFIR, researchers are examining the molecular structures of proteins and how they change over time. This work is helping scientists develop more effective treatments for debilitating diseases such as Alzheimer's and Huntington's.

National High Magnetic Field Laboratory



Addressing Human Problems

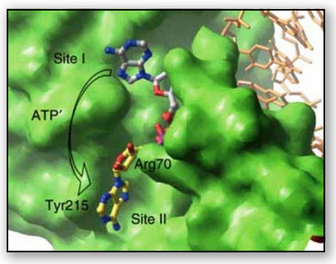
The Magnet Lab is home to some of the most sophisticated MRI and magnetic measurement equipment in the world. The 21-Tesla Ultra-Wide-Bore magnet (pictured) is used for animal imaging that provides insight into human problems such as cancer, migraine, and stroke. The laboratory enables investigations of the mechanics of disease (i.e. HIV, flu, and tuberculosis) and the action of stem cells in the treatment of brain and spinal cord injuries.

NASA Space Radiation Laboratory

Current Areas of Study

Subjects currently under investigation at NSRL include Cancer (morbidity and mortality risk), acute and late Central Nervous System risks (immediate or late functional changes), Chronic & Degenerative Tissue Risks (cataracts, heart-disease, etc.) and Acute Radiation Sickness (Prodromal risks).

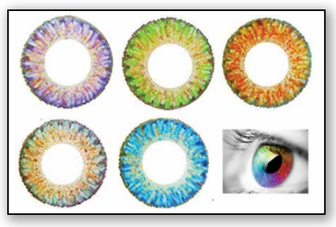
Cornell High Energy Synchrotron Source



New Treatments for AIDS

AIDS, caused by the HIV virus, affects millions of people worldwide. There are treatments for this terrible disease, but they often stop working after a time because the virus changes (mutates) rapidly. Eddy Arnold of Rutgers University uses CHESS to look at the structure of "reverse transcriptase", an essential protein in HIV which is the target of many anti-AIDS drugs. He is learning how the drugs function, why they stop working in mutated HIV, and how they can be improved to create more effective treatments.

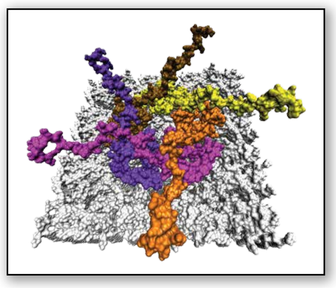
Lujan Neutron Scattering Center at LANSCE



A Better Contact Lens

The Lujan Center is collaborating with a major manufacturer of eye care products to improve the comfort and performance of contact lenses. Neutron scattering techniques are being used to probe the nano-scale structure of ophthalmic materials. The experiments provide insights for future improved eye-care products.

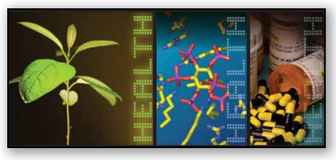
Argonne Leadership Computing Facility



Curing Parkinson's Disease

Scientists are leveraging the high-end computation power of the Blue Gene/P supercomputer at the ALCF to examine in greater detail about the molecular basis of Parkinson's disease and explore ways to treat it. This work is making possible the design of drug candidates for the cure of Parkinson's and other diseases.

Advanced Light Source



Drugs Designed to Work

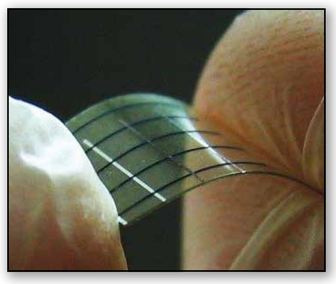
To rationally design new drugs to be their most effective with the least amount of side effects, we must first describe the molecular structure and behavior of proteins and understand how drug molecules interact with and modify the behavior of these proteins. Pharmaceutical and bio-technology companies, as well as academic researchers, use ALS facilities to aid drug discovery in many therapeutic areas, including cancer, autism, antibiotic resistance, yeast infection, cholera, HIV, and bird flu.

National Synchrotron Light Source

Two Nobel Prizes

The 2009 and 2003 Nobel Prizes in Chemistry were awarded, respectively, to NSLS users Venkatraman Ramakrishnan and Thomas A. Steitz, and Roderick MacKinnon. These prizes — for discovering the inner workings of the ribosome and for explaining how ion channels help to generate nerve impulses in the human body — have led to targeted drug developments.

Center for Nanophase Materials Sciences



Carbon Nanotube-Based Materials Hold Promise for Prosthetics

Researchers are developing a revolutionary artificial skin using flexible polymers that contain thin layers of carbon nanotubes. These materials seek to mimic skin's properties, allowing the prosthetic wearer to feel heat, cold, and touch.

NATIONAL USER FACILITY ORGANIZATION