

**SICCR****Comparative Cancer Research**

The Sprecher Institute for Comparative Cancer Research provides cancer education, research, and clinical cancer management for the benefit of all species. Research programs integrate basic, preclinical, and clinical investigations through intercollegiate and multi-institutional collaborations. The clinical program provides the highest quality cancer treatment and care for more than 1000 patients each year through the Cornell University Hospital for Animals. The institute's faculty supports many educational opportunities for professional students at the College of Veterinary Medicine and graduate students across campus. The institute maintains a data warehouse and educational program for public and scientific use on cancer and the environment. [www.vet.cornell.edu/cancer](http://www.vet.cornell.edu/cancer) [envirocancer.cornell.edu](http://envirocancer.cornell.edu)

**LEPP****Elementary-Particle Physics**

The Laboratory for Elementary-Particle Physics (LEPP) is the only particle physics accelerator laboratory in the U.S. that is housed on a university campus. Cornell's LEPP facility, funded by the National Science Foundation, hosts the Cornell Electron Storage Ring—an accelerator that collides high energy electrons and antimatter positrons and allows physicists to study the building blocks of the universe. Providing resources to the scientific community, LEPP has more than 100 physicists from twenty universities around the country who use a massive, three-story detector to observe these collisions, which produce forms of matter that existed predominately in the early stages of the universe. By studying these particles and their interactions, physicists hope to build a complete model of the constituents of matter and forces that govern their dynamics.

LEPP shares the excitement of scientific research and discovery with the community, expanding our understanding of the universe in which we live and conveying the principles and ideas of scientific research.

**LSE****Life Science Enterprise**

The New York State Center for Life Science Enterprise, newly designated, reflects more than a name change for the Center for Advanced Technology in Biotechnology. For the past 20 years, the center has been a major source of technology fueling regional economic development. More than 30 startup companies and hundreds of new jobs have been added to New York State based on research from the center. With the new designation, the center will be even more closely aligned with future economic development needs, providing research in life science technology and education for workforce development.

**CCMR****Materials Research**

The Cornell Center for Materials Research (CCMR) is the pathfinder for interdisciplinary centers. Created in 1960, the center was the first of its kind at Cornell and has continued to accumulate firsts in research as well as complementary outreach programs. Over the years, the center has remained at the cusp of current materials research by supporting more than 100 top-flight researchers (including several Nobel Prize winners). Built upon a richness of interdisciplinary connections and collaborative innovation, the center's advances in materials improve technology and benefit society directly. For example, CCMR researchers have shown that tiny particles below a certain size can be transformed into low vapor pressure liquids, allowing the safe handling of many nanoparticles that ordinarily could be easily dispersed into the air. Furthermore, nanoparticles in liquid form could replace the current practice of suspending nanoparticles in organic solvents. The elimination of organic solvents will enable "green" manufacturing processes. [www.ccmr.cornell.edu](http://www.ccmr.cornell.edu)



Maury Tigner directs LEPP.

Stephen Kresovich (top), Plant Breeding and Plant Biology, directs the New York State Center for Life Science Enterprise.

Frank DiSalvo, Chemistry and Chemical Biology, directs CCMR.



CNF

### NanoScale Science and Technology

The Cornell NanoScale Science and Technology Facility, for the past 25 years, has provided advanced technology resources to the national research community across the whole spectrum of nanotechnology. Staff knowledge and expertise coupled with over \$100 million dollars worth of advanced equipment bring the power of nanotechnology to users from any field and any institution. More than 700 users from Cornell, other universities, small and large companies, and government, use CNF's resources annually. With the opening of CNF's new facilities in Duffield Hall, the center is prepared to give another 25 years of dedicated service. [information@cnf.cornell.edu](mailto:information@cnf.cornell.edu)

CHES

### X-ray Synchrotron

The Cornell High Energy Synchrotron Source (CHES) is one of five national hard x-ray synchrotron user facilities and the only one located on a central university campus. As such, CHES serves a unique role in training synchrotron scientists who then go on to serve at other facilities. CHES serves intense x-ray beams to 600–1000 visits per year by user scientists and engineers from across the U.S. and abroad. The experiments performed by CHES users range broadly across the physical and environmental sciences and the arts. Examples include the determination of the structures and properties of proteins, viruses, biomaterials, polymers, electronic materials, and metals. Examples in the arts include the identification of archaeological specimens and the composition of works of art.

Weill Cornell

### Stem Cell Therapeutics

Weill Cornell's Ansary Center for Stem Cell Therapeutics, created with a \$15 million grant from Shahla and Hushang Ansary, takes a synergistic approach to stem cell research and brings together scientists from different areas of biomedical research to treat human illness. The researchers hope to identify the cellular and molecular pathways that support proliferation and differentiation of embryonic and adult stem cells into blood vessels, into insulin-producing cells in the pancreas (which are damaged in diabetics), and into neurons of the brain and nervous system.

Shahin Rafii, the Arthur Belfer Professor of Genetic Medicine at Weill Cornell and a noted authority in the field, directs the new center. Rafii has made a number of advances in stem cell research, including the discovery of vascular stem cells that are present in the adult bone marrow and that can contribute to wound healing and tumor revascularization. Also, his group has found that stem cells in bone marrow must move from one location to another before they can mature and begin

regenerating new cells. The Rafii research team also identified the growth factors that facilitate this movement, which could help cancer patients recovering from the severe blood- and immune-suppressing effects of chemotherapy.

In other innovative research, Neeta Roy, Neuroscience, recently isolated neural progenitor cells from fetal spinal cord tissue, which could one day be used to treat damaged nerves and brain tissue. Jay Edelberg, Medicine, in the Greenberg Division of Cardiology and in Cell and Developmental Biology, studies the potential use of bone-marrow precursor cells to mend damaged and aging hearts. The center functions in accordance with all federal regulations regarding the use of adult, fetal, and embryonic stem cells.

CU



The CNF hosts a Research Experience for Undergraduates Program each summer. Here, the 2004 CNF REU receive training on the EV620 Contact Aligner.

Charles Harrington, CU



Sol Gruner directs CHES.

Amelia Panico



Shahin Rafii, the Arthur Belfer Professor of Genetic Medicine at Weill Cornell Medical College, directs the Ansary Center for Stem Cell Therapeutics.

## Valvular Heart Diseases

Weill Cornell's Howard Gilman Institute for Valvular Heart Diseases is in the forefront of basic and clinical research, evaluation, and treatment of valvular heart diseases. Codirected by Jeffrey Borer, the Gladys and Roland Harriman Professor of Cardiovascular Medicine at Weill Cornell, and O. Wayne Isom, Chairman and the Terry Allen Kramer Professor of Cardiothoracic Surgery, the institute conducts fundamental research to increase our understanding of the cells and genes of the heart, and their complex interactions with heart valve function and muscle. A recent study by Borer, for example, illuminated the mechanisms behind cardiac scarring and their critical role in heart failure. While physicians have long known that a leaking aortic valve will lead to the formation of scar tissue in the heart muscle, it was thought that the scarring occurred as a secondary effect of changes in other parts of the heart. New research shows, instead, that the scar tissue results directly from the stretching of the scar-forming cells of the heart that occurs as large volumes of blood enter the organ through the leaking valve.

The research also identifies several of the genes responsible for this abnormal scar formation. It shows that when the aortic valve leaks, the resulting scar tissue is unusually rich in certain proteins that prevent a normal pumping of the heart—thereby leading to heart failure. The research also identifies some of the specific chemical reactions in heart cells responsible for scar formation, leading to the possibility of creating new drugs to inhibit this process. Clinically, the evaluation of these same chemical reactions may be useful in determining the need for valve surgery in asymptomatic patients. In addition to fundamental research at the cellular and molecular level, the institute also conducts a robust program of clinical and translational research, defining the standards for applying currently available treatments to patients with valve diseases and evaluating the effectiveness of these strategies. Research funding is approximately \$1.5 to \$2 million per year.

Amelia Panico



### For more information:



Contact individual faculty members, using the Cornell Electronic Directory at <http://cuinfo.cornell.edu> or (607) 255-2000; or find directory information for specific centers at <http://www.research.cornell.edu/vpr/CentersIndex.html>