A wealth of research activities make a daily impact on human health.

The four AMCs & Optometry make up 60% of all SUNY's federal research dollars.

Examples of Current Research, continued

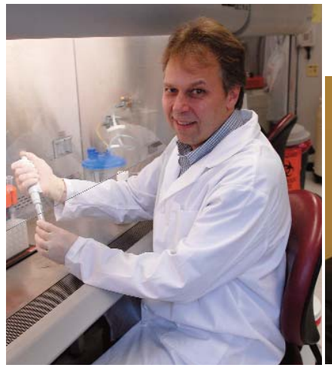
Teenage Mood Swings

Why do formerly easy-going and agreeable children become moody and unpredictable teenagers? Research by **Downstate's** Sheryl Smith, PhD, Professor of Physiology and Pharmacology, shows that adolescents' brain cells are covered with a unique kind of receptor, called GABAa, that appears at puberty and disappears as adulthood sets in – and causes teens to become more anxious in the face of stress than do either children or adults. Her work indicates that adolescence is an important stage of human development, and may also explain why anti-depressant medications that effectively treat adults may backfire when treating teenagers. Dr. Smith has been featured on CBS News with Katie Couric, on the BBC World News, and ABC News in primetime.

Developing a Treatment for a Deadly Cancer

Interest in pancreatic cancer has been running high, with public figures such as actor Patrick Swayze and Supreme Court Judge Ruth Badar Ginsburg revealing their disease. **Downstate** researchers Matthew R. Pincus, MD, PhD, Chair of Pathology at NY Harbor VA Medical Center and Professor of Pathology at Downstate, and Josef Michl, MD, Associate Professor of Pathology, Microbiology & Immunology, and of Anatomy and Cell Biology, have been developing a peptide, PNC-28, that in animal models appears to successfully destroy pancreatic tumor cells. Drs. Pincus and Michl are seeking funding to commence clinical trials; a related peptide, PNC-27, has been optioned through the SUNY Research Foundation to a company called Innomab for commercialization and shepherding through clinical trials. If the PNC-27 performs as expected, its commercial value could top $500 million.

A Jump Start for Stem Cell Research



As director of **SUNY Upstate's** Stem Cell Processing Laboratory, Gerold Feuer, PhD, is poised to take a lead role in the nation's renewed focus on stem cell research now that federal restrictions have been lifted. Feuer directs SUNY Upstate's Humanized SCID Mouse Center and Stem Cell Processing Laboratory, which recently received $6.2 million in grants from New York State. About $5 million of that will help expand the stem cell research program. Feuer, associate professor of Microbiology and Immunology, uses humanized SCID (severe combined immune deficient) mice – genetically engineered and without immune systems – in his efforts to find treatments for leukemia. Feuer received $1.07 million to further his research using SCID mice, which can accept transplants of human stem cells that develop into parts of the human immune system.

Combating Diabetes By Improving Health of At-Risk Patients

Ruth S. Weinstock, MD, PhD, director of the Joslin Diabetes Center at **SUNY Upstate**, co-leads a $3.2 million NIH study to combat a disease that has become more common in the western world. Weinstock and SUNY Upstate's Paula Trief are co-principal investigators of a study that will try to determine if patients at increased risk for diabetes can lose weight and improve their health through a telephone education program. A similar study by the Joslin Center, supported by $500,000 in federal funds, showed promising results in children with diabetes. The adult patients in the new study will have regular phone consultations with nurses, nutritionists and other professionals from their primary provider's office. More than one million New Yorkers have been diagnosed with diabetes, and thousands more are living with undiagnosed diabetes.

Pinpointing When Alcohol Exposure Causes the Most Harm

Michael W. Miller, PhD, Chair of the Department of Neuroscience and Physiology at **SUNY Upstate**, is at the forefront of research into fetal alcohol syndrome (FAS), which is caused by drinking during pregnancy. At his research center, Dr. Miller developed a novel way to observe cells during gestation. In fact, he pinpointed the time when the impact of alcohol exposure is most profound—during days 27-28 of human fetal development. At this point, alcohol exposure has a long-term effect on the hippocampus (contributing to learning and memory deficits) and reduces the size of cranial nerve nuclei in the brain stem and affects the composition of the cerebral cortex. His findings have real world applications to help reduce FAS.

Exploring Fundamental Brain Functions

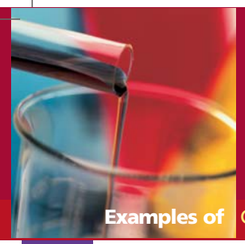
Gabriela Popescu, PhD, is assistant professor of biochemistry in the School of Medicine and Biomedical Sciences at **University at Buffalo**, where she leads a lab that studies N-methyl-D-aspartate (NMDA) receptors involved in such fundamental brain functions as learning, memory and behavior. Her expertise in protein chemistry and biophysics earned her a National Institutes of Health (NIH) training grant to fund her work in NMDA kinetic behaviors and extrasynaptic responses, which were published in Nature, Nature Neuroscience and Trends in Neuroscience. Popescu has since been funded by NIH to investigate the mechanisms that control NMDA receptor functions, specifically damaging functions that can lead to such neurodegenerative diseases as Alzheimer's, Parkinson's and Huntington's.

Treatment for Children With ADHD

William E. Pelham Jr., PhD, is a **UB** Distinguished Professor in the Department of Psychology in the College of Arts and Sciences and professor of pediatrics and psychiatry in the School of Medicine and Biomedical Sciences. A nationally recognized authority on attention deficit/hyperactivity disorder (ADHD). Dr. Pelham developed a highly regarded summer treatment program for children with ADHD centering on positive reinforcement of appropriate behavior. He directs UB's attention deficit disorder program and the university's interdisciplinary Center for Children and Families. Pelham has conducted several funded clinical trials on long-acting ADHD medications, including Ritalin.

Findings Shed Insight on Improved Cardiac Function

John M. Canty Jr., MD, is Albert and Elizabeth Rekate Professor of Medicine and chief of the Division of Cardiovascular Medicine in the Department of Medicine in the School of Medicine and Biomedical Sciences. He also directs the Center for Research in Cardiovascular Medicine and heads the Cardiovascular Disease Group at **UB's** NYS Center of Excellence in Bioinformatics and Life Sciences. A nationally recognized expert on sudden cardiac death, Dr. Canty holds several major grants at UB's cardiovascular research center, most recently co-author of a paper reporting on his four-year study that a common cholesterol-lowering drug, pravastatin, mobilizes bone marrow progenitor cells—blood stem cells that are able to transform into many different types of cells—to develop into cardiac muscle cells, improving cardiac function.



Corneal Epithelial Cell Regeneration: 10 – 13% of Wounded Iraqi War Veterans Sustain Eye Damage

Peter Reinach, PhD, Distinguished Teaching Professor at the **SUNY College of Optometry**, and Maj. Jose Capo-Aponte, OD, PhD, Adjunct Research Associate Professor, recently received a grant from the US Department of Defense to identify novel strategies to reduce ocular injury-induced persistent and severe corneal inflammation and restore tissue transparency. Transparency is essential for normal vision, and to be maintained, the corneal epithelial layer must undergo continuous renewal from corneal stem cells. This process is controlled by a variety of growth factors released by the corneal epithelium. Dr. Reinach's research will identify novel drug targets for use in a clinical setting to hasten corneal wound healing induced by injury. Their use is expected to reduce the likelihood of corneal infection, inflammation and hasten the restoration of its transparency.

Pharmacology of Lens Cells and Neuronal Gap Junction Channels

Miduturi Srinivas, PhD, of **SUNY College of Optometry** studies the multi-gene family of proteins called connexins that form intercellular gap junctions that directly mediate signaling between adjacent cells. The gap junctions that are formed by connexins play a wide variety of roles in a number of different cell types and tissues, including the eye, and mutations in human connexins underlie a variety of disorders, including deafness, skin disease, demyelinating neuropathies, and cataracts. A major goal of the laboratory is to determine the physiological roles of connexin channels in the eye, specifically the lens. Using electrophysiological recordings and cellular/molecular techniques, collaborative studies with Dr. Thomas White at SUNY Stony Brook, indicate that factors that influence lens growth and transparency (e.g. growth factors and oxidative stress) have potent effects on connexin channel function.

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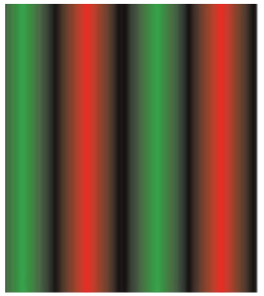
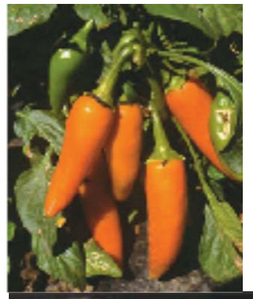




From Visual Information to Perceptual Performance

Dr. Barry Lee of the **SUNY College of Optometry** records from retinal neurons and models retinal processing to understand how signals leaving the retina via ganglion cells form the basis for perceptual performance. His research concentrates on the anatomy and physiology of color vision in the primate retina and its function in health and disease. Dr. Lee's laboratory has made unique advances in linking cell behavior in primate retina with human perception on psychophysical tasks, ranging from the perception of form and movement to the discrimination of different colors. His research has helped explain the physiological basis for several clinical tests for retinal diseases allowing more accurate interpretations of clinical results. Dr. Lee is a recipient of the Rank Prize for Optoelectronics (2004) and the Verriest Medal of the International Colour Vision Society.

State University of New York

STONY BROOK

UPSTATE MEDICAL UNIVERSITY

SUNY *College of Optometry*

SUNY's four academic medical centers — **Downstate, Upstate, University at Buffalo, and Stony Brook**— and its **College of Optometry** offer a wealth of research activities that are making a daily impact on human health. Of the 64 campuses in the SUNY system, the four AMCs and Optometry make up 60 percent of all SUNY's federal research dollars. In addition to the activities detailed on these pages, SUNY academic medicine is looking to build on its collective research strength and initiate these plans in the near future:

- Statewide Clinical Research Organization that would support pharmaceutical and device manufacturers;
- Collaborative Institutional Review Board to strengthen access to clinical trials;
- Neuroscience consortium, building on current research strengths;
- Translational Research collaborative;
- Next level of funding for the well-established SUNY Eye Institute.

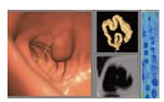
Examples of Current Research

Fabricated Skin Cultured in Lab

Stony Brook University's School of Dental Medicine houses a Living Skin Bank, a laboratory dedicated to producing human skin allografts and autografts for patients whose skin has been too badly damaged to repair itself. An allograft is skin created from a donor, while an autograft is created using the patient's own skin. The skin is created from a small biopsy which is used to create sheets of skin layers. The process takes 17 to 21 days.

The cultured epithelial autografts and allografts are used to treat burn victims. The skin bank can gear up on short notice in response to disasters and other tragedies.

Painless Colonoscopy Could Improve Compliance



Research done at **Stony Brook** University led to the "Virtual Colonoscopy," a screening tool that can detect colon cancer. The technology was used to start up Viatronix, Inc., the first virtual colonoscopy company to receive federal Food and Drug Administration approval. Three-dimensional virtual colonoscopy detects about 94 percent of polyps larger than eight millimeters, outperforming invasive conventional colonoscopy by four percent.

The 3-D process is based on images constructed from a CT scan, which requires a few minutes and no sedation, in contrast to about one hour (with sedation strongly advised) for the conventional procedure. Patient compliance may be the most important impact. Colon cancer is the second largest cause of cancer-related death but has a 92 percent cure rate if identified early. Less than 40 percent of at-risk Americans are screened because they say the procedure is unpleasant.

NewYorkBlue Harnesses Power for Biomedical Application

The **Stony Brook**-Brookhaven NewYorkBlue supercomputer is the 28th most powerful in the world. Conceptually, the design is very simple: 20,000 PCs, connected by wires and a switch, work in unison on a single problem. The host of applications includes design of pharmaceuticals for use in combating Human Immunodeficiency Virus (HIV).

The Memory Molecule

In a discovery that may one day lead to the ability to erase debilitating painful memories and addictions, **SUNY Downstate** researchers Todd C. Sacktor, MD, Professor of Physiology and Pharmacology, and Andre Fenton, PhD, Associate Professor in the same department, have identified a molecule that preserves complex memories – PKMzeta. Their work demonstrates that this molecule stores many different forms of memory, previously viewed as controlled by separate mechanisms. Hailed by Science magazine as "one of the top ten research breakthroughs of the year" in 2006, Drs. Sacktor and Fenton's research has been widely featured in the media [NOVA, Showtime, New York Times-article pending], and could lead to therapies for a host of diseases, including Alzheimer's. A drug screen to treat neurological disorders, based on their work, is available for licensure.