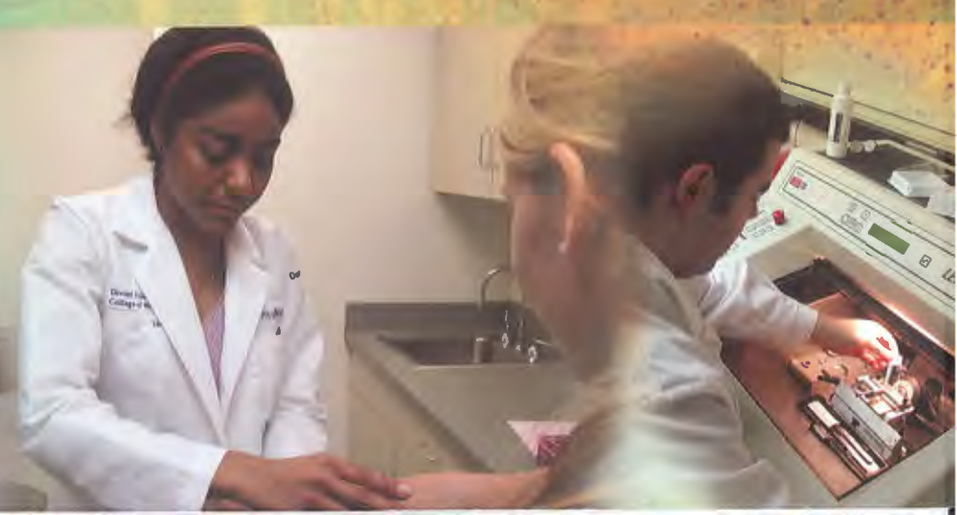
DREXEL UNIVERSITY
COLLEGE OF MEDICINE

Linking Technology to a Tradition of Caring



The science and practice of healthcare are advancing dramatically, making this an exciting time to be involved in medicine. Drexel University College of Medicine is helping to lead the way forward, leveraging our unique combination of strengths in medicine, technology, and collaborative research to develop new therapies and approaches to education.

The College is an important regional and national resource, educating one in every 71 medical students in the United States. We have built a state-of-the-art medical simulation center to provide students and residents with the most advanced clinical skills training and assessment. In addition, we have launched almost a dozen new graduate programs to meet the demands of the rapidly changing healthcare environment.

We take pride in our tradition of diversity and, in particular, our heritage of advancing women in medicine, which began in 1850 with our predecessor school the Female Medical College of Pennsylvania. The Institute for Women's Health and Leadership continues this legacy through its core programs, including the new Center for Women's Health Research.

We also carry forward the commitment of Hahnemann Medical College to explore innovative approaches to research and treatment. Our scientists are discovering answers to the critical health issues of the day such as HIV/AIDS and Alzheimer's disease. Our clinicians are pioneering therapies in those and other areas, like cardiology, and developing new personalized models for primary care.

Every day we renew our dedication to innovative biomedical education, research and patient care to improve the lives of people in our community and beyond.

Richard V. Homan, M.D.
President and Annenberg Dean

EDUCATION: INNOVATORS TRAINING THE NEXT GENERATION

In a world where technology is so integral to scientific discovery and the delivery of healthcare, Drexel University College of Medicine is uniquely prepared to train the next generation of physicians and research scientists. Combining the legacy of advanced technology forged by Drexel University with the College of Medicine's tradition of academic and clinical excellence, we have earned national recognition as innovators in education.

MEDICAL EDUCATION

From Day 1, our medical students are immersed in clinical reasoning on one of two curricular tracks – Interdisciplinary Foundations of Medicine or the Program for Integrated Learning. Both tracks focus on case-based problem solving, teaching our medical students to consider each patient's needs in a comprehensive, integrated manner. Professionalism, lifelong learning and self-care skills are also taught throughout all four years. The clinical rotations during third and fourth years include exposure to urban, rural and community medical centers, and the unique fourth-year Pathway program provides discipline-specific advising as students move toward the specialty of their choice.

The most advanced technology enhances our curriculum at all levels, whether students are online or in our classrooms, labs, or state-of-the-art clinical skills and simulation center.

NEW RESIDENCIES AND FELLOWSHIPS

Already the academic partner for 18 residency programs at Hahnemann University Hospital, the College recently became the sponsor for residencies in internal medicine, and obstetrics and gynecology at Saint Peter's University Hospital, New Brunswick, N.J., our newest regional medical campus. There are 23 fellowship programs on the Drexel-Hahnemann roster. The newest are in endocrinology, approved to begin in 2011; minimally invasive gynecologic surgery, one of two such programs in the state and the only one in the Philadelphia area; and female pelvic medicine and reconstructive surgery, one of only two programs in the city.

A CONTINUUM OF LEARNING

For doctors returning to clinical practice after working in industry or a prolonged leave of absence, the College offers the innovative Drexel Medicine Physician Refresher/Re-Entry Course. One of a handful of formal re-entry programs nationwide, it features an online clinical skills component that can be accessed by physicians anywhere in the world. The American Medical Association has cited this kind of program as a way to address the country's growing need for doctors, which is expected to increase with the implementation of healthcare reform.

Transdisciplinary Experience: Learning to Collaborate

Transdisciplinary healthcare teams are considered best practice for delivering patient care and achieving the best patient outcomes nationwide. To teach collaboration and teamwork among healthcare professionals from various disciplines, the College of Medicine partners with Drexel's College of Nursing & Health Professions to offer the "Transdisciplinary Experience." Leveraging the advanced technology in the College of Medicine's Simulation Center, real clinical situations are portrayed with actors playing patients. Senior medical students, clinical nursing students, and nurse practitioner students learn how to communicate and work together as a team to deliver the most efficient, highest quality care in a challenging medical situation.

Translational Research in Medicine: A Competitive Edge

Most residency and fellowship programs today require publishable research. To help fourth-year medical students acquire the tools for clinical research, the College of Medicine offers the Translational Research in Medicine elective. Students learn how to convert clinical problems into hypothesis-driven investigations and receive formal training in the design of clinical studies that meet scientific, ethical, and regulatory standards. This knowledge offers significant advantages during residency and fellowship training, and in clinical practice.

NIDA and College of Medicine Collaborate on Substance Use Education

Named a Center of Excellence for Physician Information by the National Institute on Drug Abuse, the College is working with NIDA to improve substance use screening and referral in the primary care setting through the education of medical students and trainees. To support this goal, Barbara A. Schindler, M.D., vice dean of educational and academic affairs, co-authored a training module, *The Clinical Assessment of Substance Use Disorders*, developed in collaboration with NIDA and the University of Pennsylvania School of Medicine. The media-rich curriculum uses proprietary web-based tools developed by the College, including WebOSCE (see opposite page).

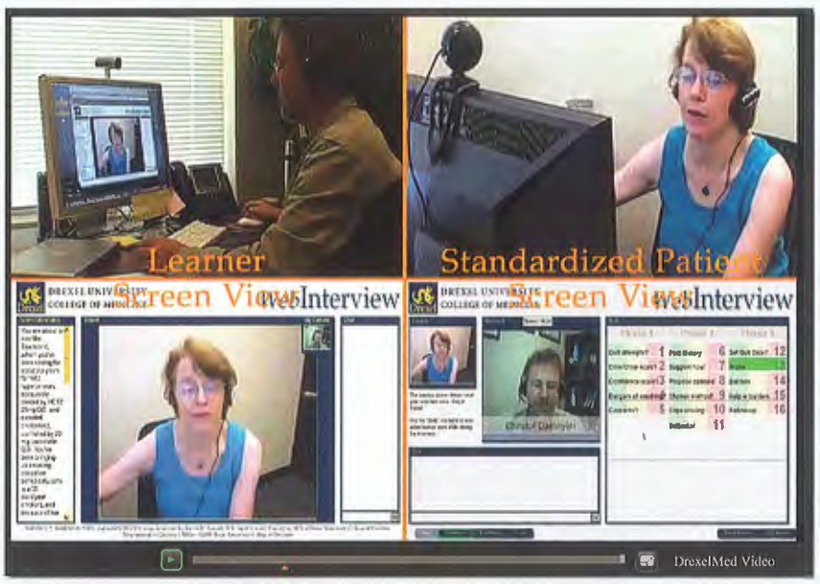
Schindler is now co-principal investigator on an $800,000 grant to study the impact on students and residents of training with the module.

SIMULATION CENTER: HIGH TECH LEARNING

Our longstanding reputation for excellence in the teaching and assessment of clinical skills has been further enhanced by the state-of-the-art Independence Blue Cross Medical Education Simulation Center, which opened in 2010. The center features lifelike robots, screen-based simulation programs and standardized patient encounter rooms. Robotic mannequins, known as patient simulators, exhibit lifelike vital signs and body and eye movements. They can be programmed to display a variety of conditions and to respond realistically to medical interventions such as intubation, drug injection or cardiac defibrillation.

In addition to the adult patient simulator, the center has a birthing simulator, an OR simulator and two infant simulators. The College plans to add a "junior" simulator (representative of a child about age 9) when they become available.

While teaching medical students and residents clinical skills across all four years of study, the Simulation Center also serves as a focal point for research and development of simulation techniques for medical education. Faculty and students from the College of Medicine collaborate with researchers at other Drexel schools in the design of new simulation technologies. The development of a simple digital teaching ophthalmoscope, led by Deborah Ziring, M.D., of the Department of Medicine, is one such project.



WEBOSCE: INVENTING THE FUTURE OF CLINICAL ASSESSMENT

The gold standard for assessing clinical skills competence and performance is an OSCE (Objective Structured Clinical Exam). During such exams, students perform on standardized patients, who then grade the students using a checklist. The College of Medicine has developed WebOSCE technology (patent pending) that allows this to be done online. This unique system includes online practice, assessment, mentoring and assignment of individualized learning tasks. The student participates in online video encounters with standardized patients (SP). Immediately following the encounter, the SP gives individualized, structured feedback on the student's performance. The student is also provided with a link to the recording of the encounter and guided to specific resources to enhance skills. WebOSCE was developed at the College by Dennis Novack, M.D., Christof Daetwyler, M.D., and Gregory McGee.

BIOMEDICAL GRADUATE STUDIES: MEETING THE DEMANDS OF DISCOVERY

Our research training programs in Biomedical Graduate Studies are expanding in response to the growing demand for individuals trained to work in the rapidly evolving pharmaceutical and biotechnology industries. Complementing our doctoral programs, new master's programs have been introduced in biotechnology; drug discovery and development; and molecular medicine.

A dual M.D./Ph.D. degree in bioengineering was launched in 2009 for medical students who have an engineering background and a desire to incorporate research into their career plans. These doctoral candidates learn to apply engineering principles to medical problems and biological systems in order to develop new biomedical devices and therapies. The neuroengineering Ph.D. program also breaks the tradition of conventional training in the biomedical sciences by applying engineering principles to fundamental problems in clinical and basic neuroscience. The College also recently created a master's program in academic medicine for medical residents and junior clinical faculty.

LAUNCHING PROGRAMS IN PROFESSIONAL STUDIES

In 2010, the College of Medicine launched the only master's program in histotechnology in the United States, helping to meet a tremendous need for professionals in this crucial field. The hands-on course includes practicums at area hospitals. In addition, the College has one of very few master's degree programs to train pathologist's assistants.

Our master's in forensic science is the only such program in the country that offers a concentration in *clinical* forensic science (with courses in autopsy, for example). We also offer a master's in criminalistic science for students without a science background, comprising crime scene analysis, fingerprints, ballistics, legal aspects, and other preparation for law enforcement related professions.

This year, the College launched an online master's program for clinical research in the health professions, which has attracted residents and newly appointed clinicians, nurses and technicians from all over the U.S. Also new is a nine-credit online certificate program, Quantitative Principles for Clinical Research, the first and only such program in the country designed to help residents and fellows meet increasing requirements for coursework in epidemiology and biostatistics.

As part of her studies in Medical Humanities, medical student Michelle Paff, class of 2012, drew this portrait of the cadaver she was dissecting in anatomy lab.

MEDICAL HUMANITIES: UNDERSTANDING THE EXPERIENCE OF ILLNESS, DEATH & DYING

The College of Medicine's Medical Humanities Program was at the forefront of the movement to bring the study of medical ethics and humanities into medical education. One of the first such programs to be established in the country, it remains the only medical humanities program among medical schools in Philadelphia today, and one of few nationwide. The Medical Humanities are disciplines that better equip medical students to respond to and relieve suffering, understand the experience of illness and disability, and find deeper value in the practice of medicine. They include the arts, philosophy, religious and spiritual thought, history and cultural studies, among others. Students also gain a greater ability to resolve ethical dilemmas, address the social dimensions of disease, and understand the biases and limitations of science. The Humanities Scholars Certificate is awarded to students who design and complete a four-year, individualized course of study in consultation with program faculty.

The master's program in histotechnology is the first of its kind in the United States.

MEDICINE:
MERGING THE POWERS OF TOUCH & TECHNOLOGY

The importance of primary care in medicine can only grow as health research sheds new light on wellness and disease states, and advertisements tout procedures and new therapies directly to the patient. One may need a procedure, but a primary care doctor is the first line of defense against illness and injury. Our faculty physicians offer primary care through several practices, including Drexel Family Medicine, Drexel Internal Medicine, and the Drexel Center for Women's Health. We also have a specialized primary care program devoted to the needs of HIV/AIDS patients, the Partnership Comprehensive Care Practice.

COMPLETE CARE FOR WOMEN

The Drexel Center for Women's Health is a multidisciplinary practice that provides comprehensive care specifically for women. This center serves as the "medical home" – the first contact for a complete history and physical, wellness plan and any health-related issues. The primary care team then coordinates any specialist care that may be needed in breast health, dermatology, digestive disorders, gynecology and obstetrics, sleep medicine and other specialties. Katherine Sherif, M.D., an internist and director of the center, has special expertise in cardiovascular disease in women, menopause and polycystic ovary syndrome.

The Center for Women's Health works closely with Drexel Obstetrics & Gynecology, which offers care through a dedicated cadre of physicians, nurse-midwives and nurse practitioners. In addition to specialists in pelvic floor disorders and reconstructive surgery, Drexel Ob/Gyn is renowned for its work in vaginitis and sexually transmitted diseases.

DREXEL VAGINITIS CENTER

Each year, more than 500 new patients seek out the Drexel Vaginitis Center, an internationally recognized practice specializing in the diagnosis and treatment of women with chronic vaginal infections. The majority have already sought help from several care providers without success. In addition to an active referral base including New York City, New Jersey and Delaware, patients come from an average of 10 states and three foreign countries in any given year. Paul Nyirjesy, M.D., center director, estimates that they are able to resolve the problems of more than 90 percent of the women they see.

Our medical building at 219 N. Broad Street, the Berman Building, was completely renovated to incorporate the latest technology in a comfortable environment.

Experts in Polycystic Ovary Syndrome

Polycystic ovary syndrome (PCOS), a hormonal disorder characterized by multiple small cysts on the ovaries, is a leading cause of undiagnosed infertility. Most women with PCOS have insulin resistance, which requires the body to produce more insulin to metabolize food. The high insulin, in turn, causes the ovaries to produce excess testosterone. Symptoms include irregular periods, weight gain, excessive hair growth, and cystic acne. PCOS can also negatively affect blood pressure and cholesterol levels, and lead to diabetes. The Center for Women's Health sees 1,500 PCOS patients each year. Referrals come from 33 states, as well as Canada, Puerto Rico and the Virgin Islands. Treatment combines nutrition, physical activity, medications and supplements. A team with expertise in internal medicine, dermatology and infertility works with each patient to tailor the treatment to her individual goals.

The team at the Drexel Center for Women's Health

CONVENIENT CARE FOR SIMPLE CONDITIONS

Many simple medical exams are delayed and many minor medical conditions – such as strep throat and urinary tract infections – go untreated because people don't have the time or access to care during the workday. In response, the College of Medicine opened a walk-in medical center – the Drexel Convenient Care Center – in the heart of Center City.

Unlike the retail clinics proliferating in pharmacies and supermarkets, the Drexel Convenient Care Center is the first to be started by a nonprofit in Philadelphia and one of few in the country to be operated by an academic medical center. The Drexel CCC in The Shops at Liberty Place provides fast, high-quality medical care for working professionals, busy residents and tourists from 7 a.m. to 7 p.m. Monday through Friday.

STATE-OF-THE-ART HIV CARE

State-of-the-art medical care for HIV patients is the cornerstone of Drexel Medicine's Partnership Comprehensive Care Practice, the largest HIV practice in the Greater Philadelphia region, with more than 1,900 patients last year. Highly experienced physicians and nurse practitioners deliver primary and specialty HIV medical care. Other services include nutritional assessment, support groups, and referrals for mental health and dental care. Providers at the center are also engaged in HIV research, and patients have access to clinical studies evaluating new treatments.

One current study involves the development of a therapeutic vaccine to control HIV in already infected individuals. Since HIV mutates very readily, thereby evading the body's immune response, each infected person has slightly different strains of HIV. Therefore, the vaccine would have to be personalized for the individual, according to Jeffrey Jacobson, M.D., chief of the Division of Infectious Diseases and HIV Medicine, and principal investigator. To create the vaccine, a sample of the virus is taken from the infected individual's blood before HIV drugs are started. Investigators then take the RNA of the person's virus, load it onto the person's own immune cells, and give it back as a vaccine to try to stimulate a new, more potent response against HIV. The ultimate goal of this research, which is funded by the National Institutes of Health, is a "functional cure" of the infection – that is, control of HIV without the need for any HIV medications.

EXPERTISE IN COLORECTAL SURGERY

Drexel Medicine has a distinguished colorectal surgery program. David Stein, M.D., chief of the Division of Colorectal Surgery, was named 2011 Physician of the Year by the Delaware Valley chapter of the Crohn's & Colitis Foundation of America. An expert in the laparoscopic treatment of colorectal cancer and inflammatory bowel disease, Stein is a strong advocate for colorectal cancer awareness and screenings. He serves as director of education and a member of the board of directors of the Susan Cohan Kasdas Colon Cancer Foundation, and also participates in educational programs sponsored by the Colon Cancer Alliance and the American Society of Colon and Rectal Surgeons.

AFFAIRS OF THE HEART

Left ventricular assist devices (LVADs), which help the heart pump oxygenated blood throughout the body, have been a real game-changer in caring for the patient with advanced heart failure, according to Howard Eisen, M.D., chief of Drexel Medicine's Division of Cardiology. Once viewed as a bridge to transplant, the life-saving instruments are now approved for use as a destination therapy. Eisen, who completed a clinical trial of the devices in 2009, has patients who have been supported by LVADs for over three-and-a-half years. "This is a very important advance because there will never be enough donor hearts for transplant," he said.

Eisen is engaged in several important research projects, including a national study to evaluate a specific stem cell therapy for patients following heart attack. The formulation of adult stem cells, administered intravenously, may have the ability to reduce inflammation and promote heart cell regeneration. Results of the double-blind, placebo-controlled study could have far-reaching implications. "If stem cells can effectively prevent or repair heart muscle damage, there is potential to meaningfully reduce long-term complications such as repeat heart attacks and heart failure," Eisen said.

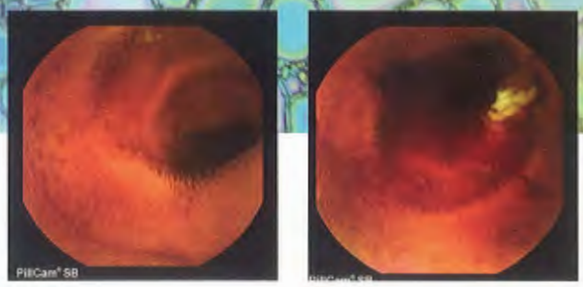
Drexel cardiologists are attending physicians at Hahnemann University Hospital, which ranked number 35 nationwide for heart and heart surgery in *U.S. News & World Report*'s Best Hospitals for 2010-11.

Howard Eisen, M.D., a transplant cardiologist, and chief of the Division of Cardiology, is involved in several clinical trials of therapies to prevent heart disease, treat heart failure, or prevent transplant rejection.

The subcutaneous ICD (S-ICD System) by Cameron Health is being tested in a clinical trial.

Under My Skin

Implantable cardioverter defibrillators (ICDs) are a proven therapy for sudden cardiac arrest in the heart failure patient. When an ICD detects a harmful arrhythmia, it delivers a life-saving shock. Traditional ICDs are linked to leads that are threaded through the veins and placed in or near the heart. Although the treatment is effective, both the surgery to place the ICD and the ongoing presence of the transvenous leads, which can break or cause infection, are associated with complications. Steven Kutalek, M.D., a specialist in cardiac electrophysiology, is involved in a clinical study to evaluate the safety and effectiveness of the first minimally invasive, subcutaneous ICD. Wireless, and smaller than the wired version, the entire subcutaneous ICD is implanted just under the skin, with an electrode running parallel and slightly to the left of the sternum.



The Pillcam capsule transmits images like those above, showing normal small bowel (left) and small bowel bleeding.

SCOPING OUT THE NEW TOOLS

When standard diagnostic endoscopy cannot determine the cause of a gastrointestinal disorder, the test of choice is capsule endoscopy. Joyann Kroser, M.D., has the latest generation of Pillcam technology right in her office. The "pill" is a capsule the size of a large multivitamin, which contains a tiny camera. The patient swallows the capsule with water, and it moves painlessly through the gastrointestinal tract, just like food. The patient wears a data recorder on a belt, but is otherwise free to go about normal activities, while the capsule transmits images from its travels onto the recording device.

A much tinier camera – just 3 mm – occupies an important place in the toolkit of Daniel Ringold, M.D., director of therapeutic endoscopy. The SpyGlass cholangiopancreatoscopy system uses a miniature fiber-optic probe that attaches to a camera head, allowing the physician to see, diagnose, and potentially treat inside a biliary or pancreatic duct all in one procedure. The probe is inserted through a single-use catheter that has additional channels through which to pass accessories. For example, Ringold can take a biopsy of a suspicious lesion through the scope under direct visualization. Or he can insert a lithotripsy catheter to break up a bile duct stone that can't be removed by conventional means.

SPORTS MEDICINE: TREATING AND STUDYING CONCUSSION

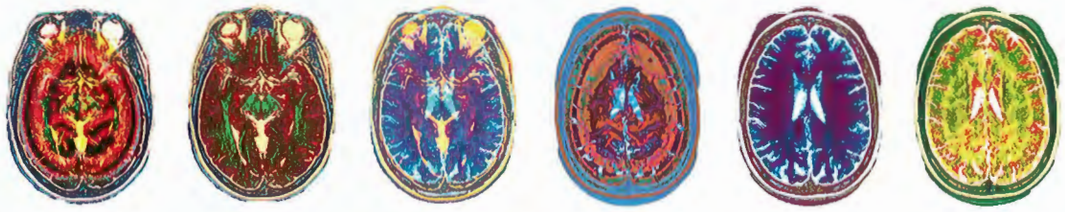
A virtual reality driving simulator may elucidate the impact of concussion on driving skills.

Gene Hong, M.D., chair of the Department of Family Medicine and chief of the Division of Sports Medicine, treats many high school and college athletes who have suffered concussions. Sometimes referred to as mild traumatic brain injuries, concussions are a significant public health issue in this country. More than two million sports- and recreation-related concussions are sustained annually, according to the Centers for Disease Control and Prevention. Research findings have reliably shown that cognitive processes, including attention, information processing speed, and working memory can all be impaired by concussion.

Those are the same cognitive domains involved in driving a car. In fact, Hong is co-principal investigator with Maria Schultheis, Ph.D., of the Department of Psychology in a study funded by the National Institutes of Health to define the relationship between cognitive impairment resulting from concussion, and driving skills as measured by a virtual reality driving simulator. Understanding the impact of concussion on driving capacity could help physicians make clear clinical recommendations and minimize the risk of impaired driving in this population.

RESEARCH: COLLABORATION DRIVES DISCOVERY

The focus of our research varies in scope – from investigating a viral envelope protein to testing a drug in large-scale clinical trials – but as a medical school, we never lose sight of the people whose health we hope to benefit. This perspective is enhanced by the high value placed on interdisciplinary collaboration within our College and across Drexel University. We are proud that the research environment at the College of Medicine embraces opportunities for students in all of our programs as well as their teachers and mentors. We not only produce excellent research, we train our students to be excellent researchers.



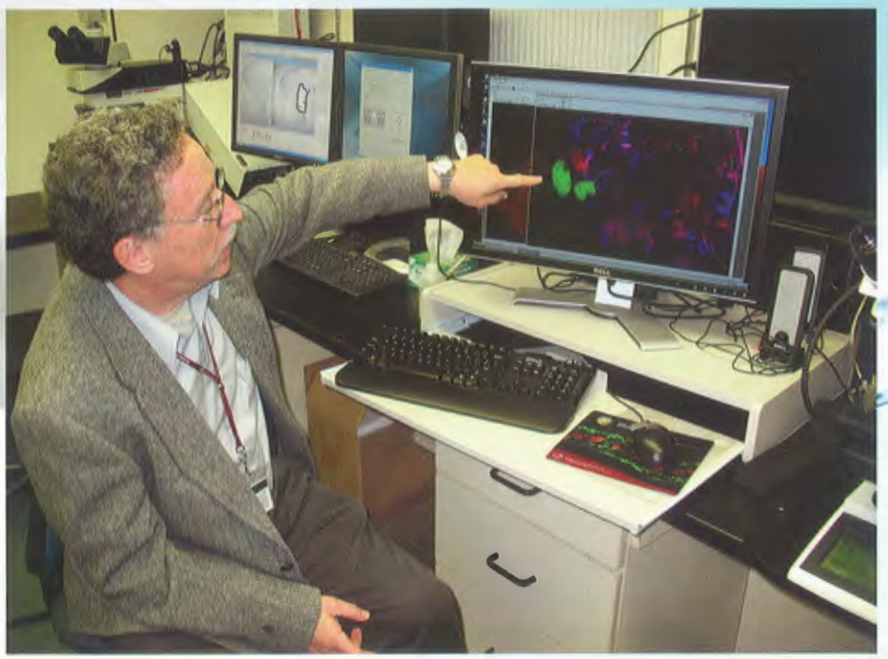
BRAIN POWER UNLEASHED: THE HUMAN COGNITION ENHANCEMENT PROGRAM

Cutting-edge research into brain and behavior relationships is sharpened through the Human Cognition Enhancement Program (HCEP), an incubator for collaborations across the College of Medicine and Drexel's other schools and colleges. HCEP research explores brain dysfunction and impaired cognition, and the development of strategies to enhance cognition and skilled motor performance in normal and disabled individuals. A special area of interest is cognitive performance under high-stress, high-fatigue conditions, with application to aviation and aerospace, as well as education, design, and business.

Led by Barry Waterhouse, Ph.D., of the Department of Neurobiology & Anatomy, and Sreekant Murthy, Ph.D., of the Department of Medicine, the HCEP is currently sponsoring graduate student research related to the treatment of attention deficit hyperactivity disorder, decision making in business, and anxiety in public speaking, among other studies.

College of Medicine faculty are engaged in a number of HCEP research projects. Waterhouse, who is HCEP scientific director, has received National Institutes of Health funding to study the impact of methylphenidate, or Ritalin, and other psychostimulant drugs on the processing of sensory signals. He notes that society now faces a number of ethical issues related to the off-label use of Ritalin for enhancing cognitive function and gaining a competitive edge in otherwise healthy individuals from all walks of life and age groups.

Research fostered by the HCEP also has implications for improving medical treatment for brain concussions, autism, neuroAIDS, schizophrenia, and other cognitive disorders.



SPINAL CORD RESEARCH: EXPLORING NEW AVENUES

Since the Spinal Cord Research Center was established more than 25 years ago, it has evolved into one of the premier research centers in the nation in the study of spinal cord injury, with focus on transplantation, regeneration and repair. The center remains the only one of its kind in the mid-Atlantic region and the only one funded by a program project grant on spinal cord injury from the National Institutes of Health, which supports the work of three principal investigators, including Itzhak Fischer, Ph.D., department chair of Neurobiology & Anatomy. Additional individual grants come from the National Science Foundation, the U.S. Department of Defense, and the Christopher Reeve Paralysis Foundation, among other sources. Researchers in the center apply recent advances in stem cell and peripheral nerve transplantation, rehabilitation protocols, drug therapy and robotics to open new avenues for more effective treatments and recovery of motor, sensory and autonomic function.

EMERGING TECHNOLOGIES FOR NONINVASIVE CERVICAL CANCER DETECTION

Cervical cancer is the second most common cancer in women worldwide and the leading cause of cancer mortality in women in developing countries. Both the screening and detection of cervical cancer could be vastly improved. Michele Follen, M.D., Ph.D., in the Department of Obstetrics & Gynecology, is principal investigator of a study to assess the technologies of fluorescence and reflectance spectroscopy, and quantitative cytology and histopathology for the early detection of cervical neoplasia. All of these technologies should decrease mortality, morbidity and the cost of treating cervical cancer. Supported by $12.5 million in funding from the National Institutes of Health, this multinational, multisite study includes several participating U.S. institutions, as well as the University of Ibadan in Nigeria.

Itzhak Fischer, Ph.D., chair of the Department of Neurobiology & Anatomy, is examining spinal cord tissue. The tissue has been labeled with antibodies that identify specific cell types and the digital image is visualized by fluorescent tags of different colors.

REMOVING ROADBLOCKS TO SPINAL CORD REGENERATION

Unlike axons in the peripheral nervous system (PNS), axons in the central nervous system, such as those in the spinal cord, fail to regenerate after they are severed by an injury. One major reason for this is that the environment after an injury in the PNS is much more supportive for regrowth. When one grafts a segment of peripheral nerve to fill a spinal cord injury site, injured axons are able to grow into the graft. However, very few axons are able to make it out of the graft, which is a necessary step if this regeneration is to result in recovery of function. The failure of these axons to grow back into the spinal cord is likely due to growth inhibitors that are found at the injury site, which essentially serve as "roadblocks." Veronica Tom, Ph.D., and colleagues in the Department of Neurobiology & Anatomy found that they could remove these roadblocks and achieve better axonal regeneration by treating the interface between the peripheral nerve graft and spinal cord tissue with an enzyme called chondroitinase ABC that digests one class of these growth inhibitors.

Since the vast majority of the approximately 1.3 million Americans who are currently living with a spinal cord injury sustained their injuries long ago, it is important to determine if potential therapies can treat chronic spinal cord injuries. The investigators demonstrated that significant axonal regrowth is possible after a relatively new spinal cord injury and, perhaps more importantly, a more established, chronic spinal cord injury. Their research also showed that the axonal regeneration that results from this treatment strategy results in some functional recovery.

BLOCKING HIV VIRUS–CELL INTERACTION

HIV infection is initiated by entry of the virus into a host cell, a process that depends on the fusion of the viral membrane with the membrane of the target cell. One very effective approach to preventing and potentially treating infection would be to inhibit this fusion. Researchers in the laboratory of Irwin Chaiken, Ph.D., in the Department of Biochemistry & Molecular Biology, have found a class of compounds – peptide triazoles – that block the virus-cell interaction. What's more exciting, some of these compounds also have the ability to "break," or destroy, the virus. In discussing the concept of breaking the virus, Chaiken cites the lab's collaborations with Drexel engineers. In both virus-cell interference and cell-independent virus rupture, the inhibitor binds to the viral pathogen, leaving the human cell undisturbed. The peptide triazoles have broad specificity – that is, they have the ability to inhibit the virus from many families of HIV that are globally important. So far they appear to work in all families of the virus that have been tested.

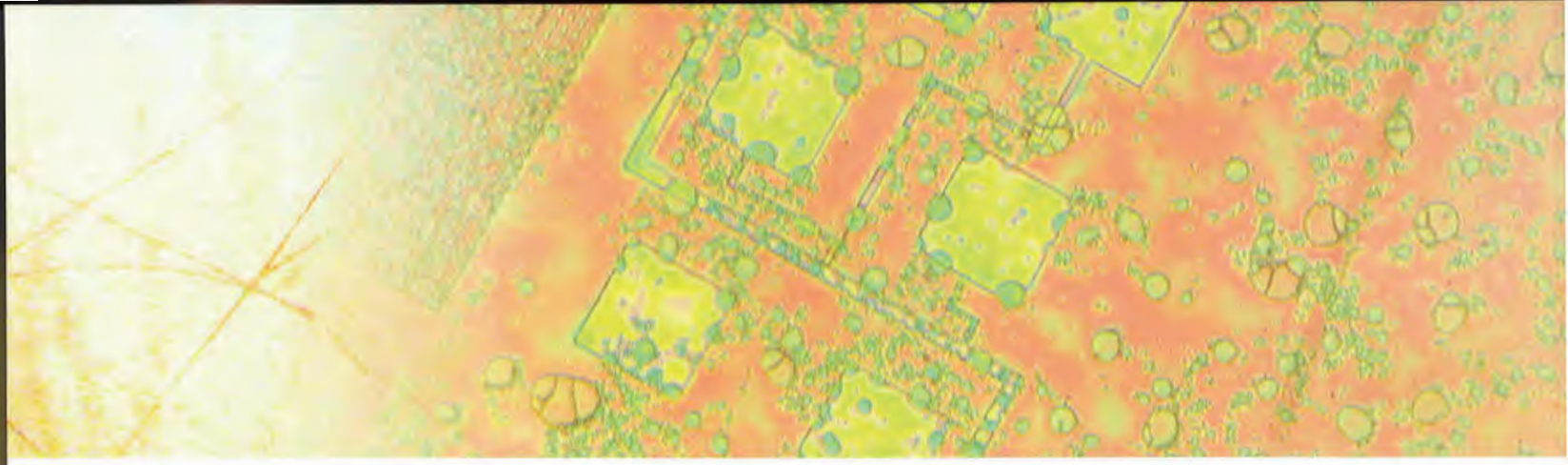
EARLY BIOMARKERS FOR LIVER CIRRHOSIS AND CANCER

The incidence of liver cancer in Americans under age 65 has surged over the past decade, and diagnosis usually comes so late that there are no hopeful treatment options. Identifying new methods for early detection is a priority. Timothy Block, Ph.D., and Anand Mehta, Ph.D., in the Department of Microbiology & Immunology, have discovered early markers of liver cirrhosis and cancer that have already advanced to human testing. Ongoing studies will reveal new biomarkers and determine which of a broad range of candidates are clinically useful. The ideal marker would be sensitive but specific, sampled by noninvasive means, and quantified objectively.

HIGH SPECIFICITY MARKERS PREDICTIVE OF NEUROAIDS

The standard of care for the majority of HIV patients focuses on therapeutic agents (anti-retrovirals) designed primarily to prevent replication of HIV in activated T-cells and other secondary target cells. However, virus replication is only one part of the disease. Virus replication can also lead to bystander cell damage that has a particularly negative impact within the central nervous system, ultimately leading to neurocognitive impairment, commonly referred to as neuroAIDS. Brian Wigdahl, Ph.D., chair of the Department of Microbiology & Immunology and director of the Institute for Molecular Medicine & Infectious Disease, is principal investigator of a $3.5 million five-year grant from the National Institute on Drug Abuse to identify very specific viral genetic markers to predict HIV patients who would be at higher risk for developing neurocognitive impairment. The research goal is to enable clinicians to identify the most appropriate patients to receive neuroprotective therapy before the onset of impairment.

Wigdahl and co-investigators Jeffrey Jacobson, M.D., Michael Nonnemacher, Ph.D., and Julio Martin-Garcia, Ph.D., are also studying the impact of substance abuse on the development of neuroAIDS in a cohort of 500 HIV-infected patients who have been identified as preferential users of either cocaine or cannabinoids. One of the largest longitudinal studies of its kind in the United States, this project will help researchers understand how substance abuse alters the course of HIV disease and the genetic structure of the virus. It will also allow researchers to understand what impact these genetic changes will have on the response of HIV to currently available antiretroviral therapeutic strategies. These studies may be critical to the development of the next generation of anti-HIV drugs.



ALZHEIMER'S DISEASE AND MEMORY DISORDERS: VACCINES AND EARLIER DIAGNOSIS HOLD PROMISE

Carol Lippa, M.D., director of the Memory Disorders Program in the Department of Neurology, is among an elite national group of investigators participating in clinical trials for Alzheimer's immunotherapy (vaccines). These studies evaluate and monitor the progress of patients being administered therapeutic antibodies that reduce brain levels of beta-amyloid, an abnormal protein associated with Alzheimer's disease.

In addition to vaccine development, memory disorders research focuses on ways to better understand the underlying mechanisms in Alzheimer's and other dementias. Rational therapies to prevent these diseases or slow their progression are the long-term goal. In parallel, better biomarkers that enable diagnosis at an earlier point are critical. More sensitive and specific neuroimaging and biochemical studies to distinguish normal aging from Alzheimer's, frontotemporal dementia and the Lewy body dementias will be crucial, said Lippa.

For example, epidemiological studies show that the risk factors for vascular disease – high cholesterol and type 2 diabetes – are the same as for Alzheimer's. How do vascular factors interact with the process for Alzheimer's? One type of neuropathology may be influencing the other.

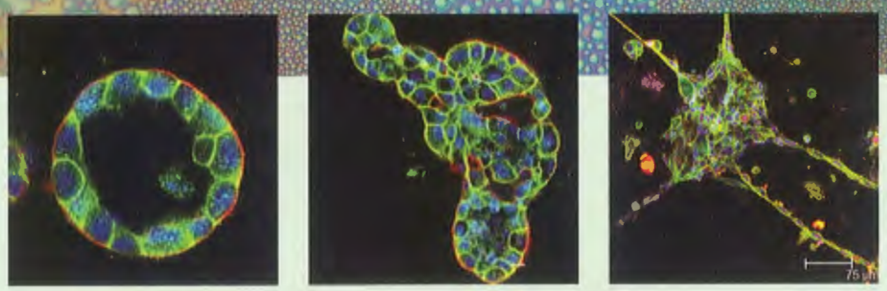
Neurologist Carol Lippa, M.D., is testing immunotherapy for Alzheimer's disease.

"We need to start looking at cognitive functioning by age 50 or 55," said neuropsychologist David Libon, Ph.D., who is interested in developing better cognitive tests that distinguish between the various forms of dementias and mild cognitive impairment. "If there is a link between vascular disease and Alzheimer's disease, we could treat those factors 20 years before Alzheimer's would be diagnosed," he said.

Indeed, as public awareness focuses more on cognition, the Memory Disorders Program is seeing patients at earlier ages, Lippa said.

SUGAR-BASED PROTEIN SUGGESTS NEW BREAST CANCER TREATMENT

Scientists have known for years that cancer cells are addicted to sugar. Compared to neighboring normal cells, cancer cells take up nearly ten times more glucose. The cancer cells use the increased sugar levels to fuel rapid cell growth. Mauricio Reginato, Ph.D., and colleagues in the Department of Biochemistry & Molecular Biology studied a particular sugar-based protein modification known as O-GlcNAc. Alterations in this modification had been linked to diabetes and Alzheimer's disease, but not to cancer. When the researchers reduced and normalized the levels of this sugar, they were able to slow the growth of the cancer cells and block invasion. The findings represent a potential new therapeutic target for treating aggressive forms of breast cancer.

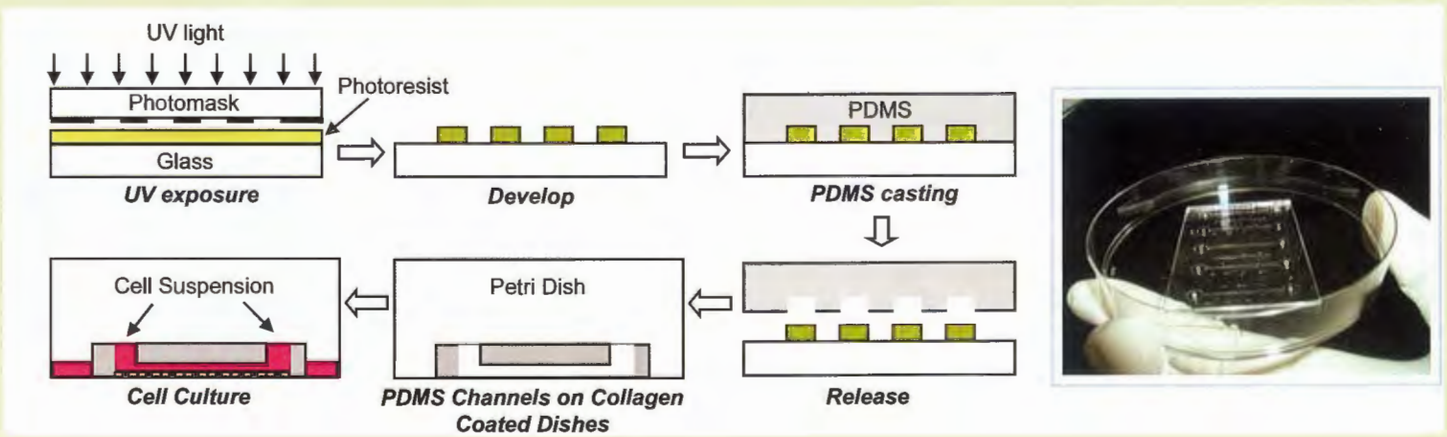


Normal *Pre-cancer* *Malignant*

3D In Vitro Breast Cancer Model: Dr. Mauricio Reginato and colleagues study breast cancer using human mammary epithelial cells in an in vitro three-dimensional cell culture model that allows organization of cells into structures similar to mammary ducts.

LIVER ON A CHIP

In order to study the effects of viral infections and drug, toxin, or alcohol exposure on liver physiology, Michael Bouchard, Ph.D., in the Department of Biochemistry & Molecular Biology and Moses Noh, Ph.D., an engineer at Drexel University, are using recent advances in microfabrication and microfluidic technologies to develop a miniaturized human liver system. The model uses small numbers of primary liver cells that are maintained in layered cultures in microchannels (see below). This type of system facilitates the long-term maintenance of liver cells and mimics the microenvironment of the liver.



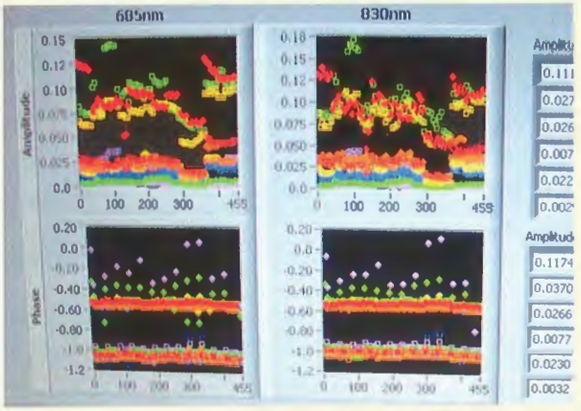
Conventional photolithography and soft lithography techniques were used to fabricate polydimethylsiloxane (PDMS) microchannels for the miniaturized liver system. PDMS is optically transparent, easy to fabricate, biocompatible and permeable to gases.

FIGHTING DRUG-RESISTANT MALARIA

With almost a million deaths each year, malaria remains one of the most significant public health problems in the world today. Emergence of resistance to commonly used antimalarial drugs is a grave concern. Investigators in the Center for Molecular Parasitology have discovered highly potent novel antimalarial compounds that work against drug-resistant parasites. The discovery was initiated by a computer-based virtual screening developed by Sandhya Kortagere, Ph.D., in collaboration with Bill Bergman, Ph.D., and Akhil B. Vaidya, Ph.D., all in the Department of Microbiology & Immunology. Vaidya is the leader of the project, supported by a $750,000 grant from the Medicines for Malaria Venture, to optimize this series of compounds and identify a potential candidate for preclinical studies.

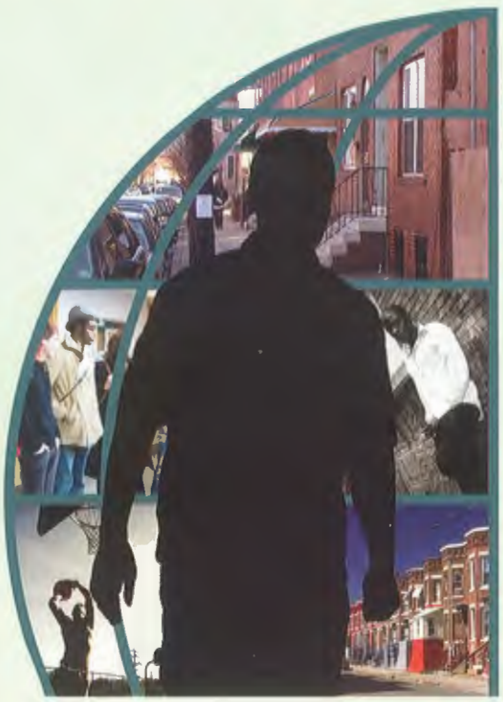
BREAKTHROUGH FOR CHRONIC WOUND MANAGEMENT

Complex wounds affect more patients in the United States than heart attack and stroke combined, and each year result in about 150,000 amputations. Until now, wound size has been the only accepted indicator of healing, although accurate measurements are difficult to take, and a decrease in size does not ensure the wound is healing properly below the surface. Michael S. Weingarten, M.D., in the Department of Surgery, collaborated with scientists at Drexel University's School of Biomedical Engineering, Science & Health Systems in developing a prototype device that could change chronic wound management. Since the wounds are constantly inflamed, they typically have higher levels of blood oxygen. The device uses diffuse near-infrared spectroscopy to measure the level of oxygenated and deoxygenated hemoglobin within and under a wound and compares it to a non-wound site on the same patient. Based on study results, the time course of oxygenated hemoglobin change is a strong indicator of wound healing. This noninvasive device could help physicians to predict the effectiveness of wound healing therapy at least 50 percent earlier than conventional methods, so they can make appropriate treatment changes sooner.



The NIR wound monitor is controlled by software from a laptop. Blood oxygen levels can be measured in seconds at any spot within or around the wound and results are displayed on the screen almost instantly. Knowing the trend of changes in these values helps predict healing.

BEING A NEIGHBOR—LOCALLY AND GLOBALLY



HEALING HURT PEOPLE

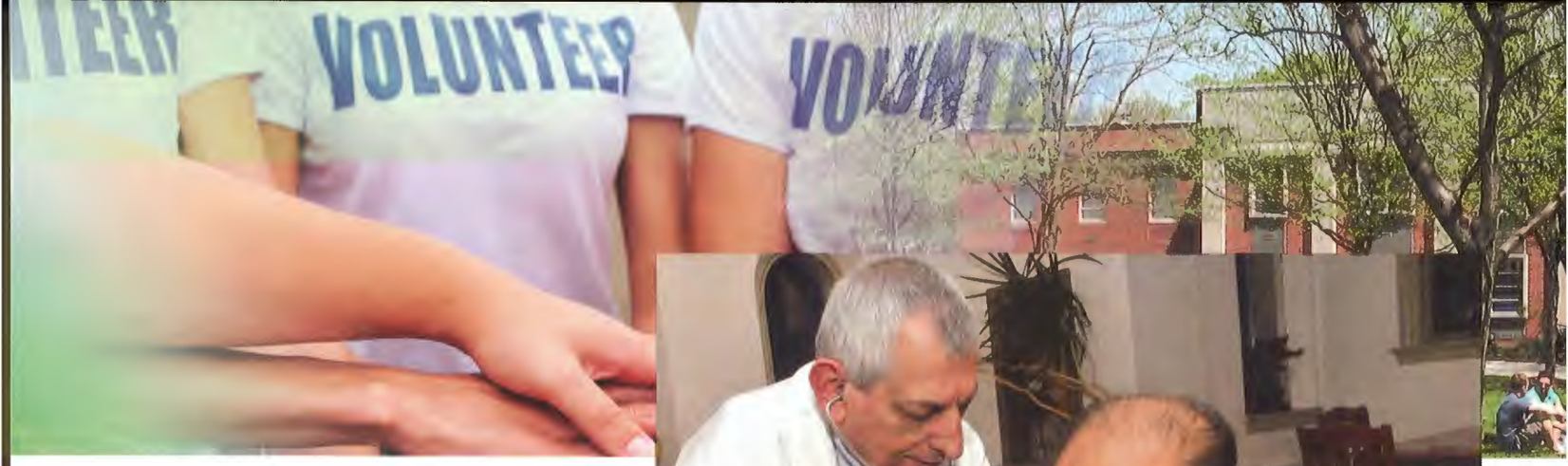
When victims of intentional violence come into the emergency department at Hahnemann University Hospital, they are introduced to Healing Hurt People, a violence intervention program founded by physicians Theodore Corbin of Drexel Emergency Medicine and John Rich of Drexel's School of Public Health. The program offers to connect the patient, typically a young man, to resources for advocacy, anger management, job readiness, substance abuse treatment, legal services – whatever he needs – and mentor him through the process.

The desire to serve runs wide and deep. Each year faculty members volunteer their time and expertise around the globe – performing surgery in Haiti, teaching nutrition in Cameroon, giving medical care in Tibet. Students collect, ship, and sometimes accompany medical supplies – or medical textbooks – overseas. Somehow they also find the time during the school year to engage in, and even launch, their own charitable efforts. But two things the College does as a community merit special mention: the annual Pediatric AIDS Benefit Concert and the Health Outreach Project.

Since 1993, second-year medical students have banished the winter doldrums by organizing medical students, graduate students and faculty in an extraordinary talent show known as the Pediatric AIDS Benefit Concert. The money raised goes to the pediatric AIDS program at St. Christopher's Hospital for Children, helping to finance the services of a dietician and a child-life specialist and providing emergency funds for affected families who need assistance with transportation and other expenses. In 2011, about 500 people attended the concert, and the event raised more than $29,000, bringing to $425,000 the total collected since the first concert.

Under the umbrella of the Health Outreach Project, students are responsible for four community clinics in Philadelphia, managing the operations and recruiting physicians. Clinic sessions take place at the Eliza Shirley House, an emergency shelter for women and children; the Chinatown Clinic, which serves uninsured patients who face language or cultural barriers; and the Salvation Army Adult Rehabilitation Center. Technology allows the Streetside Clinic – a mobile clinic in a van – to bring free basic primary care to people who would otherwise fall outside the healthcare system. Each week, about 50 students and 10 physicians participate in the clinics. Many of the physicians who volunteer their time are alumni who first attended the clinics as students – a tradition that's sure to continue.

Doctor's Note, an a cappella group composed of medical students who sing many of their own arrangements, performs at the Pediatric AIDS Benefit Concert each year.



Vincent Zarro, M.D., Ph.D., who founded the all-volunteer Chinatown Clinic, was honored by the Pennsylvania Immigration and Citizenship Coalition as a "Hero of Our Community" in 2010.

Dr. Michael S. Weingarten, chief of vascular surgery, volunteered to treat wounded troops at Landstuhl Regional Medical Center in Germany when he learned of a shortage of vascular surgeons there. Weingarten handled four or five cases in the O.R. each day, spending enough time to get the patient stabilized so that he or she could be flown back home on specially designed C-17s known as Critical Care Air Transport flights.

Drexel medical students volunteered to train Philadelphia teachers in CPR techniques so they in turn could train their students, using American Heart Association CPR Anytime kits. Medical student Marci Laudenslager worked with an eighth-grader during a demonstration at school district headquarters to kick off the project.

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