In the pages that follow, the College of Pharmacy reports its contributions during Academic Year 2010-2011 to the mission of the university to improve life for the people of Arizona and beyond. This report is structured around the four strategic directions set forth by the University of Arizona Strategic Plan for FY 2011-2015. Each section also includes a statement about the challenges involved in achieving goals.

Expanding Access and Enhancing Educational Excellence

Accomplishments

As a health sciences professional college, the College of Pharmacy’s academic emphasis is on educating students in doctoral degree programs, including the doctor of pharmacy and the doctor of philosophy. During 2011, the university conferred 86 PharmD degrees, one master of science degree and eight PhD degrees to graduates from the College of Pharmacy.

The college also is an active participant in a number of activities that contribute to the university’s role as an educational partner with P-14 organizations to prepare students for university success and support education in Arizona. Examples of College of Pharmacy efforts in this area follow.

- For more than a decade, the college annually has hosted PharmCamp, which introduces middle-school students to careers in pharmacy through interactive activities designed to teach the many aspects of pharmacy. This year, for the third time, there were two PharmCamp sessions, one in Tucson and one in Yuma, increasing to 50 the number of middle-schoolers introduced to health careers. Students are recruited to PharmCamp through schools with high concentrations of Hispanic and ethnic minority students, and there is no fee to participants.
- The college continues to receive and welcome student visitors from local schools such as WildCat Charter, Amphitheater and Tucson Unified School Districts as well as from Yuma and Phoenix schools. Students have been given tours and participated in health fairs, such as the Germ Fair and the WildCat Health Fair, to increase their awareness of all aspects of the field of pharmacy.
- The college for many years has through its student services office provided an adviser and other staff support to the University of Arizona Prepharmacy Club, one of the largest undergraduate organizations on campus, with a 2010-2011 membership of 517 students from UA and other colleges and universities. The Prepharmacy Club is open to any undergraduate with an interest in pharmacy as a career; in Fall Semester 2010, 343 students declared themselves as prepharmacy majors, and many other majors are interested in entering pharmacy as a profession.
- The college’s academic advisers served 3,949 people during the year, including the recruiting and advising of high school students and community college and university students in Arizona and other states.
- To increase access opportunities for students seeking admission into a college of pharmacy, professors help Arizona prepharmacy students to prepare for the Pharmacy College Admissions Test (PCAT) by providing free review sessions that aid applicants in enhancing PCAT scores.
- The college launched a series of videos on its website and through the UA channel of YouTube to raise awareness of the multiple facets of pharmacy practice among middle and high school students.
- The Southwest Environmental Health Sciences Center implements a wide breadth of environmental health educational programs involving Arizona middle- and high-school science teachers and students. For more information, refer to the included summary of the Southwest Environmental Health Sciences Center.
- Faculty in the Department of Pharmacology and Toxicology participate in the Undergraduate Biology Research Program (UBRP), a program that exposes University of Arizona undergraduate students to the research enterprise.
Another element of this strategic direction is increasing enrollments and financial aid for UA students. In an effort to keep financial aid available to as many student pharmacists as possible, the college set aside 15 percent of differential tuition funds for need-based scholarships and increased the amounts available in the merit and other need-based scholarships managed by the college. During 2010-2011, the college awarded scholarships totaling $848,754 to 375 students. The average amount distributed was 20 percent greater than in the previous year.

Challenges
Partnering with the College of Medicine and the College of Nursing, the College of Pharmacy has provided several events to bring awareness of the health professions to underserved populations. The challenge is to sustain the number of participants and the time commitment from the different colleges as well as the resources to hold such events. A second challenge is that for nearly a decade the interest in pharmacy has been reflected in the number of incoming undergraduate students declaring prepharmacy as their area of study. Interest in prepharmacy is trending down, indicating the need for rigorous recruiting and the funding and personnel to do so.

A comprehensive program that works with underrepresented youth over an extended period of time would likely bring more measurable results than current efforts to increase diversity of applicants. Finding the resources for this level of commitment seems highly unlikely in today’s environment.

Increasing Achievements in Research, Scholarship and Creative Expression

Accomplishments
Total R & D (research and development) expenditures by the College of Pharmacy, as recorded by UA, during FY 2011 were $15,052,494. In figures released early in 2011 based on 2010 funding, our college ranked ninth in total National Institutes of Health grant awards to colleges of pharmacy across the nation (73 schools) and fifth in grant awards per full-time equivalent PhD level faculty. These placements represented a drop by one in the first category from the previous year and stasis in the second. In another category, the percent of PhD faculty with NIH funding, the college moved from fifth position to third. The research work of college investigators directly or indirectly improves the human condition in Arizona and beyond. Areas of activity in the Department of Pharmacy Practice and Science include direct patient care, medication safety and efficacy, biomedical and behavioral health, drug delivery systems, and health and economic outcomes. Several faculty members from this department practice in healthcare settings where they participate in interdisciplinary and collaborative research designed to improve patient care. The department’s PI grant funding in 2010 exceeded $3.2 million, a three-fold increase in funding since 2006.

Major areas of research in the Department of Pharmacology and Toxicology continue to address health issues associated with exposure to environmental factors, including the presence of arsenic in drinking water and exposure to UV light in the hot and arid climate of the desert Southwest. Some of these studies include collaboration with Mexican colleagues along and beyond the border. Of particular relevance to Arizona residents are the efforts of faculty to develop novel therapies for the treatment of cancer and of chemo-preventive agents to combat photo-aging of the skin to prevent skin cancer. The drug discovery efforts of the department were relocated to the BIO5-Oro Valley facility following purchase by the university of the sanofi-aventis building. The department remains home to three large peer-reviewed, extramurally funded, multidisciplinary centers. Members of the department are also key collaborators in other campus and statewide multidisciplinary programs, including BIO5, TGen, the Arizona Respiratory Center, and the Arizona Cancer Center. Finally, members of the department are important contributors to the ongoing Clinical and Translational Sciences Application. Even in these times of decreased research support from federal and private sources, the department has maintained its strong base of research funding. Each faculty
member is funded and the department’s total grant funding for 2010 exceeds $10 million, which is equivalent to preceding years.

**Challenges**

**External:**
- A limited number of qualified individuals are available to recruit as translational scientist faculty or as qualified pharmacy practice faculty.
- Lack of state support and the overall political climate combine to make the state a choice-of-last-resort for talented and much-sought-after young faculty.

**Internal:**
- Unfunded mandates (e.g., expansion into Phoenix) by necessity will weaken support for ongoing research initiatives.
- The infrastructure (space, competitive salaries to hire and retain faculty, etc.) is insufficient to sustain a world-class research program.
- The Arizona Health Sciences Center does not have centralized research themes; the perception of aimlessness held by some is weakening our reputation in the state and nation.

**Expanding Community Engagement and Workforce Impact**

**Accomplishments**

The College of Pharmacy, through both its education of student pharmacists and the professional responsibilities of its clinical faculty, provides patient care services throughout Arizona. Approximately 650 adjunct faculty, located in all Arizona counties, staff pharmacy operations in clinics, hospitals, chain pharmacies, Indian Health Services, veterans’ facilities, specialty pharmacies, regulatory agencies, and a variety of other settings. Doctor of pharmacy students learn and provide care under the guidance of these faculty at sites throughout the state and nation. Faculty from the Department of Pharmacy Practice and Science serve as clinicians, consultants, and researcher collaborators within healthcare and research facilities in the state and nation. We also have partnerships to teach pharmacy residents or provide pharmaceutical care services with University Medical Center, Veterans Affairs and El Rio Community Health Center; in 2010-2011, our pharmacy residency program added a specialty in emergency medicine and trained 14 residents. In July 2011, the college welcomed 18 residents, a 29 percent increase.

During the reporting period, annual recruitment for the college’s Rural Health Professions Program (RHPP) grew from the statutorily mandated number of four to 14 and student retention in the program increased from 60 to 90 percent. Arizona Area Health Education Centers funding also has enabled the college to double the number of students who are not in the Rural Health Professions Program but who complete an early, rural externship. Evaluation of these two rural programs reveals that RHPP students have statistically more positive perceptions of rural practice and rural communities. The College of Pharmacy, with funding and support from the AzAHEC program, also finished the strategic planning stages of developing and implementing an innovative community pharmacy practice in San Luis, Arizona.

Through their professional organizations and service clubs, students enrolled in the PharmD program provide many volunteer hours of free health screening and education events to the citizens of both the Tucson and Phoenix areas. During Spring Semester 2011 students provided free services to more than 1,400 people, including nearly 100 children at the Children’s Health Fair. The 200-plus students who volunteered during the semester screened about 475 people for conditions such as diabetes, cholesterol, asthma and hypertension; referred more than 85 people for further testing and follow-up because the results of their screening tests indicated possible health problems; and raised approximately $3,000 in cash and textbooks for charities through fundraising events.
Several centers at the College of Pharmacy also have extensive community outreach components. Please review the executive summaries of these centers for more information in this regard.

The college contributes to the economic well-being of Arizona by serving as an incubator and magnet for talent, new industry and research for the state. The Pharmacology and Toxicology graduate program, which trains MS and PhD students in state-of-the-art approaches in basic research in pharmacology, toxicology, environmental toxicology, chemical pharmacology, proteomics and closely related subdisciplines, provides top pharmaceutical scientists for the state and nation. Students graduating from this program are well prepared and in demand nationally. Further contributing to workforce preparation are College of Pharmacy faculty who participate in interdisciplinary training programs in toxicology, genes and the environment, cancer and biological chemistry.

Some of our college faculty have strengthened the economy and are meeting the needs of citizens through the creation of new businesses and development of new medicines. Pharmacy faculty have established two drug development companies (Cylene, Inc. and Niadyne, Inc.) and have licensed technology to a third (Montigen).

The college continues to place more of its PharmD students in clinical settings in the greater Phoenix area as part of their experiential learning. During 2010-2011, 50 percent of the graduating class (48 students) completed at least one clinical rotation at a Phoenix site, with a total of 158 learning rotations taking place there. Twenty students completed half of their required rotations in Phoenix. Approximately 100 preceptors in the Phoenix area helped train pharmacy students during this period.

**Challenges**

Though there has been improvement during the past year, the college’s ability to effectively partner with constituencies within Arizona in developing new research collaborations and commercial enterprises remains hampered by compliance to bureaucratic processes. A major challenge to expanding the college’s clinical partnerships and increasing our role in healthcare delivery is the limited funding available for co-funded positions between the college and medical institutions, which greatly restricts us from negotiating more clinical faculty positions.

Even though expanding the College of Pharmacy degree programs at Phoenix Biomedical Campus has been cited as a major workforce development initiative for the university, the expansion of pharmacy programs into Phoenix remains largely unfunded. The lack of investment by the state for programs in Phoenix prevents us from taking advantage of the many opportunities there to expand and innovate. There remains a major disconnect between what is envisioned and what is supported with resources.

**Improving Productivity and Increasing Efficiency**

**Accomplishments**

Leaders of the Arizona Health Sciences Center developed a strategic vision during the past year and made significant progress in aligning clinical enterprises to the academic health center’s mission, including merging University Medical Center and University Physicians Healthcare into a new organization. Increasing the efficiency of operations, the quality of patient care and the financial security of the health sciences colleges are among the goals behind the organizational changes. The College of Pharmacy dean participated fully in the executive discussions and planning around these issues and, shortly after the period covered by this report, was named as senior vice president for health sciences, replacing the retiring vice president.

The college's investment in 2009 of increased development and alumni affairs staffing is producing results. During 2010-2011, the college conducted a successful annual giving campaign, developed a matching gift program for large scholarships, increased endowment funds, obtained some important estate gifts and
renewed key relationships that have resulted so far in a large unrestricted gift and in major endowed faculty support in the second half of 2011.

**Challenges**

As with all of the university, budget cuts and hiring freezes have meant that in some areas of the college, fewer people are available to perform our educational, research and outreach missions. These have not been strategic decisions but rather forced limitations. This is particularly taxing in light of the significant increase in compliance issues being required of faculty and the demands of new accreditation standards related to early experiential learning. Although to date we have been able to sustain critical activities with few people and reduced funding, the college is close to the tipping point, where even a comparatively small additional reduction in the budget will result in potentially catastrophic consequences. Additionally, the guides affecting the eligibility of new employees for health and retirement benefits hinder faculty recruitment, making a significant challenge even more difficult. As discussed below, college leaders have grave concerns about operating under these conditions in the long term.

**Single Most Critical Issue**

As in past years, the department heads and senior administrators of the College of Pharmacy identify the deficit of resources of all kinds as the critical issue that negatively affects nearly every aspect of the college’s mission and goals.

Meeting the strategic direction set by the University of Arizona for expanding our impact on Arizona’s workforce calls for the college to expand programs and yet funding to the college has been decreased repeatedly. This is especially true in terms of Phoenix programs, as there has been no funding specified for developing PharmD or research programs there. As in the past, we rely greatly on the tuition from our PharmD students to fill the gap between available funding and what we need to maintain a high-quality program. Our 2011-2012 differential tuition is $11,800, nearly $1,000 more than base tuition, making total annual tuition costs for in-state residents $22,640. Administrators and faculty are extremely reluctant to continue increasing the burden on students. We saw a slight decrease in our applicant pool this year from 2009, which may have been due to the rise in tuition.

The key to all our success is our ability to recruit and retain stellar faculty who will contribute to our longstanding national reputation as a top-tier college of pharmacy and also attract further external funding. To do so requires providing competitive salaries and excellent facilities to those faculty. Most of our faculty receive salaries well below the standard appropriate for a premier college of pharmacy. We are finding it increasingly difficult to compete with other institutions and with the private sector for outstanding scientists, clinicians and other professional personnel.

Even when we can adequately fund a faculty salary, the limits of our physical facilities adversely affect recruitment, retention and our ability to expand our degree and research programs. Although a few of our faculty benefit from the recent purchase by UA of the sanofi-aventis building in Oro Valley, we are still severely hampered by inadequate research facilities for many of our investigators. We are in desperate need of modern laboratories and research facilities to attract and retain top scientists, and are suffering from years of neglect by the university and state to keeping facilities modern.

We are pursuing new resources through philanthropy, research expansion and new clinical services. However, if we cannot resolve our resource issues (competitive salaries, adequate space, sufficient program expansion funding) for the long term, we face a major retrenchment in research and academic efforts, and subsequent loss of accomplishment and our reputation as a premier college of pharmacy.
Appendix 1 Metrics

Expanding Access and Enhancing Educational Excellence
*UA Metric:*
Increase graduate enrollments to reflect the growth and diversity of the state
  - Percent of First-Year, Full-Time PhD Students Fully Funded = 100%
  - Stipend for First-Year Graduate Assistant = $20,425 (.5 FTE)

Expanding Access and Enhancing Educational Excellence
*UA Metric:*
Lead the nation in research and outreach activities that are critical to our state’s future
  - R&D Expenditures (FY 2011) at the College of Pharmacy = $15,052,494

Expanding Community Engagement and Workforce Impact
*UA Metric:*
Build our endowment to improve our ability to provide Arizona with the best people and programs
  - Current Endowment Assets: $4,589,619

Improving Productivity and Increasing Efficiency
*UA Metric:*
Full educational cost per PharmD degree (COP expenses divided by number of students times 4 years of education)
  - $131,145
Appendix 2 Requested Reports

College of Pharmacy Salary Equity Analysis
The college participates each year with the American Association of Colleges of Pharmacy in a salary survey of all faculty. We have established a set of peer institutions with which we compete for faculty, students and research projects, and we compare our progress with theirs. Additionally, we compare salaries for faculty by rank and years in rank with the entire database of colleges of pharmacy faculty.

The two major academic units of the college have established the 75th percentile as the standard to which our faculty should be judged, based on our national rankings and standing with the other colleges of pharmacy. These numbers have traditionally indicated whether we can expect to be successful in recruiting new faculty and retaining existing faculty. Currently, based on 2010 figures, 16 of 47 faculty members are at or above the 75th percentile of public pharmacy schools. About $534,300 would be necessary to bring the rest of the faculty to the 75th percentile.

We also evaluate our faculty salaries, by rank and years in rank, for any possible salary inequities that may be caused by gender, race or other such factors, taking into account productivity and performance evaluations. The department heads and the assistant dean for finance and administration have reviewed this information for 2010-2011 and find it fair and equitable within the college, but with lower than appropriate across-the-board salaries.

Report on Faculty Recruitments and Diversity
The Department of Pharmacy Practice and Science recruited for two faculty positions during FY 2011. Both of the new faculty members are White women. In the last four years, the department has increased its number of female faculty from two to nine.

During FY 2011, the Department of Pharmacology and Toxicology conducted a search for a tenure-eligible faculty position in medicinal chemistry. The search was unsuccessful as none of the candidates had the requisite repertoire of skills required for the position. The search remains ongoing. The department currently has 18 tenured or tenure-track faculty. Of these, four (22 percent) are female, including three Asian females.

Report on Faculty Retention
One member of the Department of Pharmacy Practice and Science accepted a position at a local community pharmacy in June 2011. She will remain involved in mentoring our PharmD students in their experiential educational experiences.

One associate professor in the Department of Pharmacology and Toxicology was being actively recruited by a peer institution. With the assistance of the Provost’s Office and the College of Pharmacy, we were successful at retaining this faculty member.
Appendix 3
Reports from College of Pharmacy Centers

- Arizona Poison and Drug Information Center
- Center for Health Outcomes and PharmacoEconomic Research
- Dean Carter Binational Center for Environmental Health Sciences
- Medication Management Center
- NIEHS Superfund Research Program
- Southwest Environmental Health Sciences Center
Arizona Poison and Drug Information Center
2010-2011 Summary

The Arizona Poison and Drug Information Center (APDIC) is a center of excellence at the College of Pharmacy that is partially funded through the Arizona Department of Health Services and a variety of service contracts. It was officially established as a comprehensive poison control and drug information center by the Arizona Legislature in 1980, following more than 25 years of outreach service to the state’s health professionals and citizens by college faculty and staff. One of the first such centers in the nation, the center is certified by the American Association of Poison Control Centers (AAPCC) and serves all geographic areas of Arizona except Maricopa County.

The Arizona Poison and Drug Information Center is staffed entirely by pharmacists who are trained specialists in toxicology and drug information and are certified by the AAPCC. The APDIC answered more than 60,000 phone calls in fiscal year 2011 from the public, physicians and other healthcare professionals. The types of calls handled by the pharmacists are 50 percent exposures and 50 percent drug information. Half of all exposure calls involve children under the age of 6 years while the patient populations with the most serious outcomes are those over the age of 18. The drug information calls range from tablet identifications to drug-drug interactions, correct doses, proper drug administration, to stocking recommendations for hospitals and pharmacies.

The center is also home to the Pregnancy Riskline (PRL). This is a unique service, staffed by genetic counselors, fields over 2,000 calls per year from expecting mothers, nursing mothers and physicians about risks to medications and chemicals during pregnancy and while breastfeeding.

The APDIC and PRL have been actively involved in outreach for many years, providing information, lectures, or presentations to a variety of audiences. The managing director and part-time education coordinator, along with College of Pharmacy students and volunteers, have provided 100 presentations and fairs, over 50 interviews to the media, distributed over 80,000 brochures and educational materials, and had over 60,000 visits to our website.

Along with the public service, the APDIC and PRL are involved in a variety of research projects both locally and nationally. The APDIC has been actively involved in the clinical trials to bring scorpion and rattlesnake antivenoms to market and recently hired a research coordinator with a degree as a physician’s assistant. The PRL is involved with national studies looking at outcomes during pregnancy for medications used to treat various conditions.

The APDIC and PRL also participate in the academic mission of the university as an experiential learning site for medical, nursing, pharmacy, public health and basic science students. Additionally, APDIC serves as a teaching site for U.S. Army trainees in emergency medicine. APDIC staff participate in the College of Pharmacy didactic training offered to all PharmD candidates at the UA.

Submitted by Keith Boesen, Managing Director
The Center for Health Outcomes and PharmacoEconomic Research has experienced a challenging yet successful year. This year's efforts have focused on *Expanding Access and Enhancing Educational Excellence*. This has been achieved through hiring new personnel, growing training opportunities, and expanding our role as a multi-disciplinary Center of Excellence.

**Personnel**
Patricia Herman, ND, PhD, joined the HOPE Center in October 2010. Dr. Herman is an NIH-trained research methodologist, a resource economist and a licensed practicing naturopathic physician. She has been awarded several grants and is collaborating with several faculty to expand our research efforts.

**Training Programs**
Due to increased attendance this year, substantially more income ($120,000 compared to $53,000 in 2009) was generated from training programs and conferences. In addition to our annual training program, customized programs for pharmaceutical companies included sessions for BMS, Biogen Idec and AstraZeneca.

**Fellowship**
A new AHEC-funded interdisciplinary fellowship program in clinical outcomes and comparative effectiveness research has been established within the HOPE Center. Ivo Abraham will direct the program which will fund four fellows and several graduate research assistants. The Allergan Pharmaceuticals two-year fellowship program is in its fourth year, with a new fellow joining in August 2011.

**Expanding HOPE Center**
Ivo Abraham has led a Steering Committee involving all four colleges of the Arizona Health Sciences Center and the Office of the Vice President for Research in efforts to expand our scope and size. Discussions are under way with the other AHSC colleges to create a single, overarching center with investigators from pharmacy, medicine, nursing and public health. It is proposed that the HOPE acronym be retained, but the name be changed to Health, Outcomes, Performance & Effectiveness. More effort will be directed to formalizing these relationships and securing service contracts in 2011-2012.

**Other Contributions**
- As a resource for both professional (i.e., PharmD) and graduate students in the College of Pharmacy, the center funds and maintains an extensive collection of books and journals related to pharmacoconomics, health economics and policy, and clinical research. Many of these publications are not available in the university library system (e.g., *PharmacoEconomics, Journal of Research in Pharmaceutical Economics*).
- The center has access to several state and federal databases that are available to both PharmD students and graduate students for research purposes.
- The center has funded and provided in-kind support for PharmD student projects, MS thesis research, and PhD dissertation research. Center personnel are serving as advisers on PharmD senior research projects as well.

*Submitted by Amy Grizzle, Assistant Director*
Dean Carter Binational Center for Environmental Health Sciences
(U.S.-Mexico Binational Center for Environmental Sciences and Toxicology)
Summary 2010-2011

Funding: NIEHS Superfund, U.S. Environmental Protection Agency, Consejo Nacional de Ciencia y Tecnología, Border Environmental Health Commission, NIEHS SRP Conference Fund

Following the passing of the Dean E. Carter, PhD, founder of our U.S.-Mexico binational efforts, during 2010-2011 a request was made and approved by the university and ABOR to rename the U.S.-Mexico Binational Center for Environmental Sciences and Toxicology to the Dean Carter Binational Center for Environmental Health Sciences.

The Dean Carter Binational Center for Environmental Health Sciences at the University of Arizona is a premier center dedicated to building human capital via graduate student trainings with NIEHS-funded researchers, training to the community via promotoras, and information exchange between Mexican and American academics. Together, Arizona and Mexico are addressing risk assessment and remediation issues concerning hazardous chemicals ubiquitous throughout the southwestern U.S. and Mexico.

Expanding Access and Enhancing Educational Excellence
1. Held retreat with all 11 Mexican partners as well as officials from EPA, NIH, and CONACyT to layout the future plans for the Dean Carter Binational Center.
2. Using support from EPA, continued to host eight Mexican exchange scientists/graduate students in various laboratories at the UA.
3. Hosted Binational Meeting on Nanotechnology/Nanotoxicology between UA and institutes from Monterrey and Durango, Mexico, with the mission of developing collaborative nano-studies that would be supported by CONACyT.

Increasing Achievements in Research, Scholarship, and Creative Expression
1. Utilized funds from CONACyT to support pilot projects with the expectations that these project will lead to continued support from non-U.S. sponsors. In one case, the World Health Organization has already provided additional support for studies on the effect of metals on children’s health.
2. The binational center was included with a team of UA officials to meet with CONACyT to sign collaborative agreements relative to supporting the training of Mexican graduate students at the UA and to do short term exchange of Mexican and American graduate students at each other’s institutes.
3. The binational center was included with a team of UA officials to meet with the U.S. ambassador to Mexico to stimulate further research and economic developments between the UA and Mexico.

Expanding Community Engagement and Workforce Impact
1. Received a grant from EPA/Border Environmental Health Commission to prepare training modules to train Hispanic health workers (promotoras) about environmental health concerns to the community.
2. Provide bilingual (English and Spanish) information brochures on environmental contaminants and remediation to community organizations in Nogales, Yuma and Mexican cities (San Luis Potosi, Torreon, Durango).

Improving Productivity and Increasing Efficiency
1. Using funds from NIH and EPA, the center provides access to facility cores at the UA in the areas of genomics and metal analyses.

Submitted by A. Jay Gandolfi, Director
Medication Management Center
Summary 2010-2011

The Medication Management Center had a very successful 2010-2011 program year. Since its inception in 2006, the center continues to be the only national medication therapy management program developing innovative software solutions and clinical services. The success of the center continues to drive interest from a number of prospective clients including Medicare program sponsors, commercial insurance providers, self-insured employers and pharmacy benefit managers.

Highlights

Academic Excellence:
- The center employs 20 student workers from the University of Arizona.
- The center is an introductory and advanced pharmacy practice experiential site for dozens of pharmacy students from the University of Arizona.
- The center is an advanced pharmacy practice experiential site for pharmacy students from Xavier, The Ohio State University, Midwestern University, University of New Mexico, University of Colorado, Creighton, and the University of Florida.
- The center supported a graduate assistantship for a pharmacoeconomic graduate student. The work of the student has resulted in several pending publications.

Societal Impact
- The center employs 30 benefits-eligible individuals including pharmacists, technicians, IT professionals and administrative staff. This represents a 50 percent increase over the previous academic year.
- Currently, the center provides medication therapy management (MTM) services for approximately 2 million Medicare beneficiaries; MTM services for thousands of state of Minnesota employees; and a nicotine cessation program for state of Arizona employees.

Innovation
- Technology developed by the center has drawn the attention of several investors. A for-profit spin-off is currently being negotiated between an investor and the Office of Technology Transfer.

Opportunities
- The outlook for 2011-2012 is very positive. The center will generate approximately $5 million in revenue in 2011.
- The center’s commercial (non-government) business more than doubled in 2010-2011. Additionally, the center launched a large program for Blue Cross Blue Shield of Massachusetts in July 2011.

Challenges
- Currently, the biggest challenge is the university contracting process. The contracting process is cumbersome due to the number of departments involved (PACS, ORCA, and Sponsored Projects) and the type of contract required.
- The center also faces challenges meeting the increasing IT security required by HIPAA and HITECH. The university does not offer adequate IT security support requiring the center to develop internal solutions and hire internal specialists.

Submitted by Kevin Boesen, Director
NIEHS Superfund Research Program
Summary 2010-2011

Funding: National Institutes of Health, NIEHS; TRIF-University of Arizona

Our NIEHS-sponsored Superfund program used its first of five years of renewed funding (years 21-26 - until 2015) to initiate its new project, define its field studies and continue to address environmental sciences and health issues of concern to the desert Southwest.

Expanding Access and Enhancing Educational Excellence
1. Have incorporated more minority undergraduate and graduate students in both our research and community activities. In particular have pushed for the students to see how their research and educational training can be applied to translational applications in the community.
2. Because our previous information brochures on environmental pollutant and remediation have been so well received, our SRP has doubled the number of topics now being addressed. As before, the brochures will be in both English and Spanish and will be also available for download on our website.

Increasing Achievements in Research, Scholarship, and Creative Expression
1. Demonstrated in animal models and in cell cultures that exposure to arsenicals at levels present in the Arizona environment can lead to hypertension and thickening of the septal membranes of the heart. This is of major importance because hypertension and heart defects continue to be on the increase in the Arizona population.
2. Identified the Iron King Mine, a National Superfund site in Dewey and Humboldt, Arizona, as a model site for assessing the impact of mine tailing dusts on the surrounding ecology, environment and human health.

Expanding Community Engagement and Workforce Impact
1. Using funds from the EPA, was able to initiate the training of Hispanic health workers (promotoras) in south Tucson, Nogales and Yuma about the potential health and environmental effects of environmental pollutants.
2. Working with EPA Region 9 and Arizona Department of Environmental Quality and local officials from Dewey and Humboldt, Arizona, educated the communities about the environmental and health concerns of the National Superfund Hazardous Waste Site, Iron King Mine.
3. Received additional funding to Superfund graduate trainee Monica Ramirez to work with the community to understand their potential exposure to toxic metals from home vegetable gardens.
4. Working with the Sonoran Environmental Research Institute to make small businesses aware of the industrial, environmental and personal health effects of the chemicals and solvents they are using. Have focused on printing, nail salon and automobile businesses at this time.

Improving Productivity and Increasing Efficiency
1. Received matching support from the UA VPR for obtaining a new state-of-the art Inductively Coupled Plasma Mass Spectrometer to provide improved detection of metals in environmental and biological samples. This instrumentation is used by all of our Superfund investigators, all the Mexican partners of the Dean Carter Binational Center, by colleagues in public health and Superfund collaborators at University of New Mexico and Dartmouth College.

Submitted by A. Jay Gandolfi, Director
Southwest Environmental Health Sciences Center
Summary 2010-2011

The Southwest Environmental Health Sciences Center is an NIEHS-funded center of excellence that was competitively renewed for five years effective April 1, 2006. The overall theme of the center is to study the mechanisms by which environmental chemicals/factors may cause or influence human disease. Currently, SWEHSC membership consists of 40 investigators and seven key personnel from 15 departments or academic units, within five colleges of UA and two members outside of UA. A competing renewal for Years 16-20 was submitted on March 30, 2010 and a subsequent A1 application was submitted March 31, 2011.

Increasing Achievements in Research and Scholarship
During 2010, SWEHSC members excelled under four Research Focus Groups (RFGs), with investigators sharing overlapping research interests.

• RFG1: “Southwest Hazardous Environmental Exposure” focuses on the molecular mechanisms by which chemicals, or other environmental factors, initiate cell injury, leading to tissue injury and diseases.
• RFG2: “Environmental Lung Diseases” members focus on adverse effects of inhaled dusts and dust components that would be encountered in the desert Southwest.
• RFG3: “ROS and Disease Prevention” has its primary goal to promote multi-disciplinary research into the mechanisms by which various environmental factors (UV light, ROS-generating chemicals, etc) interact with combinations of genes to produce adverse health effects.
• RFG4: “Exposure, Fate and Disposition” has the goal to determine the fate of environmental chemicals within the body, and environmental exposures or disease states, which alter chemical disposition by modulation of drug metabolizing enzymes and drug/metabolite transporters.

Improving Productivity and Increasing Efficiency
SWEHSC research accomplishments from during 2010-2011 include, but are not limited to, the following:

• At the time the center was last renewed (2006), there was a substantial research funding base of $13,946,705 in annual direct costs for peer-reviewed grants. The amount of overall grant funding has increased by 129.9 percent to $32,070,411 in March 2011. The infrastructure of SWEHSC made substantial impact on the increased funding as a whole.
• The Integrative Health Sciences Facility Core (IHS), facilitated the extension of basic research discoveries into the clinical and public health arenas, and resulted in an increase in the numbers of human subject-based research projects conducted by SWEHSC investigators, and the number of human subjects participating in such projects. Of the 19 projects supported by the IHS, all but three involve human subjects or the analysis of human samples. Impressively, the number of SWEHSC investigators directly involved in funded human studies has grown from two at the end of our previous funding cycle to 20 investigators. Further, the number of physicians within the center membership has grown from one to six. The core has been utilized by 16 center investigators during the last funding period. Usage of the core has resulted in 12 publications and assistance with 13 federal grants or program projects.
• Our Career Development Core continued to provide mentoring to junior investigators, and cross-training of researchers in current techniques, to enhance the EHS research programs of fellows and clinicians, and for bench researchers interested in human studies research.
• The Cellular Imaging Facility Core has been utilized by 35 center investigators during the last funding period. Usage of the core has resulted in 107 publications and assistance with 79 federal grants or program projects.
• The Genomics Facility Core has been utilized by 26 center investigators during the last funding period. Usage of this core has resulted in 55 publications and assistance with 50 federal grants or program projects.
• The Proteomics Facility Core has been utilized by 23 center investigators during the last funding period.
Usage of this core has resulted in 42 publications and assistance with 54 federal grants or program projects.

**Expanding Community Engagement and Workforce Impact and Expanding Access and Enhancing Educational Excellence**

In addition to promoting research, the SWEHSC enhances and extends the education and service activities of the Center for Toxicology through the Community Outreach and Education Core (COEC).

- **COEC Partnership with American Indian communities has expanded:** COEC worked with the Inter Tribal Council of Arizona, attending their semi-annual meetings and presenting “Environmental Health Research Methods,” “Engaging Community Members in Environmental Projects” and demonstrating the outreach method of information walks with the Asthma and Allergy Walk [http://coec.pharmacy.arizona.edu/hope2/aa_hops.html#museum](http://coec.pharmacy.arizona.edu/hope2/aa_hops.html#museum). This has led to emerging relationships with the Hopi Tribe, the Ft Mohave Indian Tribe, the White Mountain Apache Tribe and the Tohono O’Odham Nation. The relationship with the Gila River Indian Community has continued with the Community Action for a Renewed Environment (CARE) project, with a second application for funding for Phase II of the CARE Project from the U.S. Environmental Protection Agency.

- **COEC Partnership with the Unified Community Advisory Board and Sunnyside Unified School District (SUSD):** This project has developed with the SUSD School Board adopting the *TCE Contamination and Clean-up Curriculum in 2010*. Professional development started with a TCE Symposium in early 2011, which taught the SUSD teachers about the contamination in Tucson, health research of SWEHSC members and the lessons of the curriculum. Implementation will be required learning for all freshman students in SUSD high schools in school year 2011-2012.

- **Keep Engaging Youth in Science (KEYS) High School Student Internship Program enrollment reaches 104 interns in 2011:** COEC recruited the majority of the center investigators to host high school students into their laboratories each summer, leading to life-changing experiences for those students who are interested in entering into research careers. SWEHSC members and their graduate students also provided educational sessions during the institute. They discussed careers in biomedical research, toxicology and ethics of research using living organisms. Interns conducted research related to arsenic exposure, lung disease, UV exposure and the effects of chemicals in everyday life.

*Submitted by Serrine Lau, Director*