

*Creating Futures*

UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

Skaggs School of Pharmacy and Pharmaceutical Sciences

# Generation Rx

Preparing Colorado's future health leaders



Sarah Carson, PharmD '08



# 100 Years of Education, Patient Care and Scientific Discovery

PhD candidate James Barnard

At the Skaggs School of Pharmacy and Pharmaceutical Sciences at the University of Colorado Anschutz Medical Campus, we're preparing the world's future pharmacists and pharmaceutical scientists through innovative learning and teaching. Our researchers are leading medical discoveries that advance science and improve health care. We're enhancing culture and community through programs that reach urban and rural Coloradans. And our collaborations in research, patient care and community service are helping to ensure the health and wellness of Colorado and beyond.

Our students, graduates and faculty are making health care safer.

As experts in medicines and their therapeutic use, we're caring for patients, helping them live longer with chronic illnesses such as heart disease and diabetes, and reducing side effects of prolonged medication use.

We're tailoring medications to an individual's DNA and targeting treatments to maximize their effectiveness.

We're changing the way we think about HIV, and how to treat and prevent it.

We're vaccinating millions against influenza and pneumonia—still some of the biggest killers in the world today—and discovering new ways to deliver and transport vaccines to developing nations.

We're improving the stability of medicines to reduce deadly reactions and ensure product safety and effectiveness.

And most importantly, we're educating the pharmacists and research scientists who will make the world healthier for generations to come. To discover how your support can *create futures* at the School of Pharmacy, read some examples of our life-changing work in the pages that follow.





Jeanne Winder receives guidance from assistant professor Joseph Vande Griend, PharmD

## Making Health Care Better and Safer

For millions of Americans, drugs such as Coumadin are the difference between living a good life *with* heart disease, or dying from it.

But because the drugs are highly sensitive, managing them requires a combination of factors—patience, monitoring and patient education. Such a combination is not necessarily an easy sell in a country consumed with immediate results, but this recipe has proven an effective lifeline for area seniors.

Combining high-tech monitoring with caring student contact has proven extremely effective, especially at Clinica Family Health Services, a safety net clinic in Boulder. Patient compliance at that clinic has jumped 42 percent since the School of Pharmacy began its partnership with the clinic and instituted the program, recently recognized by the Health Resources and Service Administration.

# Helping People Live Longer with Pancreatic Cancer

When first diagnosed with advanced pancreatic cancer more than four years ago, 58-year-old Garrison Roots was told, “Get your house in order.” Initially unresponsive to radiation and early chemotherapy treatments, Roots’ tumor could not be surgically removed.

But instead of giving up, he enrolled in a clinical trial and met clinical pharmacist and School of Pharmacy associate professor Cindy O’Bryant, PharmD. O’Bryant, with a team of health care professionals at the University of Colorado Cancer Center, is responsible for keeping Roots’ cancer at bay by managing his medications.

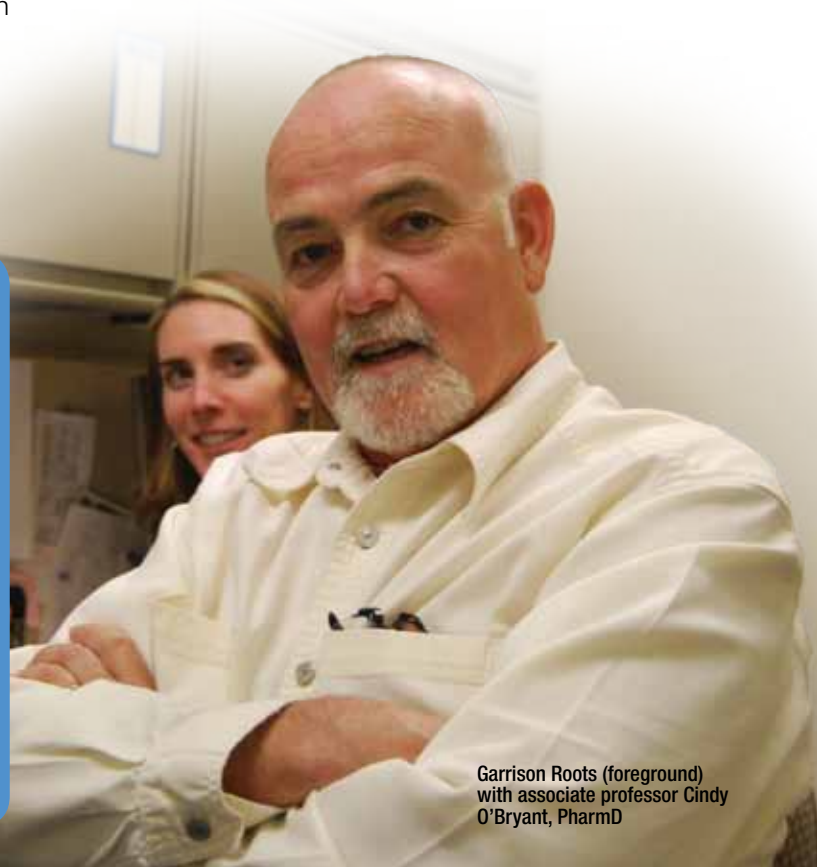
O’Bryant tests therapies developed to target cancer cells and determine which drugs may work best for a specific type of cancer or patient. O’Bryant and a multidisciplinary team focus on the early, phase 1 studies that take newly developed drugs to human patients for the first time. Most recently, such clinical trials were responsible for breakthroughs in treating aggressive forms of breast cancer.

Still, not all patients with the same kind of cancer will respond to the same drug therapy. Finding the right combination of agents takes trial and tweaking. And that’s what O’Bryant does best. “You can take three patients with pancreatic cancer, and they will all respond differently to the same treatment,” she says. “It depends on drug metabolism, disease sensitivity and tumor genetics.”

In the past, cancer treatment focused on overloading a patient’s system with chemotherapy. In recent years, progress has been made toward finding treatments that attack the cancer without poisoning the entire body. This type of tailored approach targets the cancer and provides hope to those living with a cancer diagnosis. “It may not be a cure. But if I can give them a few more years and make their quality of life better, that’s what I want to do,” O’Bryant says.

*With a five-year survival rate of just 5 percent, pancreatic cancer is one of the most deadly forms of cancer on the planet. The median length of survival after diagnosis is three to six months.*

*O’Bryant’s work—finding the right combination of medicines for pancreatic-cancer patients—helps turn months into years of survival.*



Garrison Roots (foreground)  
with associate professor Cindy  
O’Bryant, PharmD



Associate professor Peter Anderson, PharmD, in his lab

## Preventing HIV/AIDS Transmission

School of Pharmacy faculty members are responsible for some of the discoveries that are changing the way we think of HIV, and how we treat and prevent it.

Associate professor Peter Anderson, PharmD, is part of an expanding worldwide effort to fight HIV on a new front—preventing its transmission in people not yet infected by the virus. His work, published in the *New England Journal of Medicine*, demonstrates that using a daily oral combination of two antiretroviral drugs prior to exposure to the virus can protect people from the virus. This finding, which highlights a shift in strategies to prevent the transmission of HIV, has the potential to slow the spread of AIDS, and quite possibly the ability to eradicate it.

A member of an international group of scientists who worked on this study, Anderson was responsible for analyzing the drug levels of the study participants. Without

this crucial ability to determine drug levels, researchers would not know the levels that were effective in preventing transmission.

*By 2010, 33.3 million people worldwide were living with HIV. Every year, more than 2 million become infected and 1 million die of AIDS.*

*During the last 20 years, significant progress has been made in the fight against this disease. Today, because of antiretroviral medications, more people are living with the disease than dying from it.*

# Keeping Vaccines Potent at Room Temperature

Measles, hepatitis, pneumonia and polio kill 2.1 million people a year. Two billion people have been infected by hepatitis B, and an estimated 1 million die each year from the infection and its complications. In India alone, nearly 200,000 children die from measles every year.

In less-developed environments such as India, it's not just a simple matter of manufacturing and transporting enough vaccines to inoculate their citizens. The challenges run deep. Access to water. Needle disposal. Stable sources of electricity. Adequate cold storage.

Faculty members such as assistant professor LaToya Jones Braun are researching new delivery mechanisms for vaccines, and new ways to transport and protect them from damage due to temperature fluctuations. Braun has focused on one of the above issues—the need for cold storage to maintain the potency of the vaccines.

To ensure potency, liquid vaccines need to be stored between 2 and 8 degrees Celsius, requiring a global distribution network of refrigeration equipment and procedures for maintaining vaccine quality during transportation and storage.

Braun successfully developed a new formulation method that helps guard the hepatitis B vaccine against extreme temperature fluctuations, allowing the vaccine to be stored at room temperature for a significant portion of its shelf life. This breakthrough eliminates the two most significant obstacles to effective immunization programs—lack of electricity, and cold storage.

Braun's breakthrough work protecting the hepatitis B vaccine from heat and freeze damage will help ensure vaccine safety, reduce waste, increase the number of people vaccinated and potentially save millions of lives—especially in developing nations.



Assistant professor LaToya Jones Braun



Pharmacy student Erin Perling vaccinates a patient

## Our Scientists Improve the Safety of Drugs

Imagine a child with hemophilia who develops immunity to the only drug that can save her.

It's not a fictitious scenario, and John Carpenter, PhD, (pictured right) professor of pharmaceutical sciences and co-director of the CU Center for Pharmaceutical Biotechnology, is on a mission to ensure that such scenarios don't recur.



Carpenter is focused on analyzing and improving the stability of the proteins on which some drugs are based. When these products are degraded in the manufacturing

process, the stability of the proteins is compromised. That triggers an immune response in patients, which increases the risk to the patients and can be fatal.

Biopharmaceutical therapies, used in treatments for blood disorders, cancer and infectious diseases, entail a highly challenging manufacturing process. Carpenter and his colleagues work with industry partners and the Food and Drug Administration to establish and uphold high standards.

As co-founder of startup companies AktivDry and BaroFold, Carpenter's work has led to the development of dry powder inhalable vaccines for measles, and to improved biopharmaceuticals for patients suffering from chronic immunologic disorders.



## Making Dreams Come True

For most people, the name Teresa McMahan Shulkin is just a name. But for 16 former CU pharmacy students and their families, the name is synonymous with “dream-maker.” “I think of her as my Mother Teresa,” says alumna Brittany (Hanselin) Todd, 2007 recipient of the Teresa McMahan Shulkin Scholarship.

“It was a blessing for me and my family,” says Todd, who with her sister Michele were the first members of their immediate family to receive bachelor and doctorate degrees. “Our parents worked hard for years to put us through school. So having the scholarship for one of us was a dream come true.”

When Teresa graduated from the School of Pharmacy in 1976, she had no idea the kind of impact she would have on future alums.

“Without the generosity of the Teresa McMahan Shulkin Scholarship, I’d have a hard time graduating,” says pharmacy student Alex Block. “The scholarship is unbelievably helpful. I’ve been going to school on loans for as long as I can remember. I’ve had grants and scholarships every year. I wouldn’t be able to be in school without them.”

Unfortunately, the students who received a helping hand thanks to Teresa never got to know her. The scholarship was established in 1994 by her father, Eugene McMahan, a year after Teresa’s death from lupus. Though she didn’t live to see the impact, her legacy lives on through the scholarship program. As her father reflects, “She loved pharmacy, and understood the importance of giving a helping hand.”

*The average cost of a four-year CU pharmacy degree is \$100,000.*

# Addressing the Problem of Medication Disposal

Four hours. Seven pharmacy students. Four faculty members. One staff member. Six police officers. Collecting and disposing of 1,207 pounds of medical waste including syringes, ointments and prescription medications—priceless!

With 3 billion prescriptions written annually, more than 10,000 prescription medications on the market, and thousands of complementary and over-the-counter medications available, what's a person to do with unused or expired medications? Flush them down the toilet, keep them forever or drop them off at your local pharmacy?

None of those options are optimal. Flushing creates environmental concerns. Keeping them creates drug diversion and health concerns. And by law, pharmacies are not allowed to receive medications once dispensed.

So to address this growing problem, the School of Pharmacy established a prescription drug-disposal and drop-off event for the community. With approval from the Drug Enforcement Administration and the help and oversight of campus police, the medications are collected and disposed of safely. In addition to increasing public recognition of the School's expertise and resources in this area, the event provides an opportunity for pharmacy students to counsel patients and identify "loose" medications no longer in original packaging.



Catherine Jarvis, PharmD, associate dean for student and professional affairs, and assistant professor Sarah Anderson



## A Call for Support

Since we opened our doors 100 years ago, we've come so far in terms of education, community service, and research. The depth and breadth of School of Pharmacy activities today is enormous, and our work spans laboratories, patients' bedsides, and rural and urban communities alike.

Looking toward our next century, we want to expand our ability to educate high-caliber health care providers and researchers. And there is so much more we aim to do.

With the changing implications of health care reform, we must prepare for exponential growth in the field in the coming decades. We must evolve our curriculum offerings to prepare students for the many new roles pharmacists will play in the health care delivery system. And we must quicken the pace of basic research in broad areas such as drug safety; drug discovery, development and delivery; and personalized medicine.

Tomorrow's patients depend on our work, and on your support. As a donor, you can play an instrumental role in shaping the School's future by helping us:

- **Defray the cost of the new 171,416-square-foot building** that is home to the Skaggs School of Pharmacy and Pharmaceutical Sciences. Contributions toward this facility's construction will allow us to redirect funds from the School's operating budget toward expanding and enhancing our curriculum.

- **Expand programs such as experiential learning** into more communities, where our students gain practical experience in rural community pharmacies and area residents gain assistance managing chronic conditions such as diabetes and hypertension.

- **Add postdoctoral students and fellows** to our research teams that will, in turn, allow bench investigations to move toward bedsides faster, and enable more effective treatments for diseases such as cancer, muscular dystrophy, diabetes, and other endemic killers and cripples of our time.

- **Hasten research efforts in specialty areas** such as pharmacogenomics, a field in which investigators continue to increase their understanding of genetic differences—vital to the development of personalized medicine.

These are just a few priority areas in which private philanthropy can make a real and immediate difference. Because our faculty is doing so much in so many areas, a donor's personal interests and passions can readily be matched with an existing or proposed School of Pharmacy research or educational program. This is personalized philanthropy, at its best.

# Donors can help...

Increase the use of targeted and personalized medicine

Reduce contamination of medications and **make drugs safer**

Save lives by making vaccines easier to transport, deliver and administer

**Reduce environmental pollution** by providing a mechanism for disposal of unwanted or expired medications

**Educate the next generation** of innovators

Keep us safe by **preventing medication errors**

**Help people live longer** with terminal and chronic diseases

**Make dreams come true** for future pharmacists

## Our New Home

The Skaggs School of Pharmacy and Pharmaceutical Sciences building, opened in 2011, is already transforming our ability to achieve our goals. A leadership gift toward this LEED-certified facility—the first to receive this designation on the Anschutz Medical Campus—was generously provided by the ALSAM Foundation, and honors the Skaggs family, a pioneer in the food and drug retail industry.



Pharmacy student Sarah Varnado and professor Joseph Saseen, PharmD

To learn about the many ways you can make a gift contact:

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## You Can Help Shape the Future

By making a gift to the School of Pharmacy, you're bolstering initiatives that give hope to underserved communities, ferret out causes of disease at basic cellular and molecular levels, develop innovative new drug delivery systems, and provide the best and brightest young minds the education they need to become tomorrow's leaders in the field.

*We hope we can count on your support as we create futures at the School of Pharmacy and beyond.*



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