



PERSONALIZING MEDICINE



Paving a new frontier in health care: UF is designing an archetype for transferring the latest laboratory findings into the patient care setting

It has been 10 years since the Human Genome Project was completed, and as promised, deciphering the human genetic code has led to new avenues for medicine and biotechnology.

One of the most promising and anticipated advancements in health based on what we now know about the human genome is personalized medicine, which tailors therapies based on an individual's unique genetic makeup.

"We know that our genes influence all kinds of things, like hair color or how tall you are," said Julie Johnson, PharmD, director of the UF College of Pharmacy's Center for Pharmacogenomics. "But we also know, for example, that it affects how well you respond to certain medications."

Armed with knowledge of a person's genetic information, physicians at UF Health have implemented a new standard of care that will help doctors ward off heart attacks and strokes after heart procedures. A simple blood test for patients receiving treatment in the catheterization lab for blocked vessels in the heart will provide genetic information indicating how well a patient responds to a

common anti-clotting drug called clopidogrel.

If results suggest clopidogrel, also known as Plavix, is not the best treatment option, the electronic medical record system will alert the cardiologist and recommend alternative drugs.

"This helps us prescribe the right medication the first time and absolutely has the potential to reduce complications," said R. David Anderson, MD, director of interventional cardiology.

The new program may be a clear-cut example of the translational-research approach to modern health care, but there was nothing simple about developing the rigorous process that made it possible to transfer this scientific finding into the patient-care setting.

With its successful implementation of this method of personalized medicine, the University of Florida, through Johnson's vision and the resources of the Clinical and Translational Science Institute, has created a model for moving genetic advances from bench to bedside. UF is now preparing to share it with other academic institutions, large hospitals and community practices.

"The model we've developed can provide a blueprint for other health systems that want



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to use evidence-based genetic information to improve patient care,” said David R. Nelson, MD, director of the UF CTSI. “This is a major step toward being able to translate more than a decade of ground-breaking genomic research into better health.”

Nelson added that while the personalized medicine program launched in the UF cardiac catheterization laboratory involves pharmacogenetics, its delivery system could be applied to a variety of genetic discoveries and for a wide range of clinical settings, placing UF and the state at the forefront of implementation science.

“UF Health was the perfect testing ground for understanding how to execute the program and get it to work,” Nelson said. “Now we can offer that technology out to the state. And that is a fundamental mission of the CTSI — to build infrastructures for implementing research findings throughout health care systems and community hospitals in Florida.”

Building the model

Led by the CTSI and funded by grants from the National Center for Advancing Translational Sciences and the National Institute of General Medical Sciences, the Personalized Medicine Program assembled

a multidisciplinary team that includes researchers, physicians, information technology experts, laboratory medicine personnel and hospital administrators. Under Johnson’s leadership, a team of more than 50 faculty members and staff developed not only the infrastructure required to generate electronic medical record alerts, but also the process for determining when there is enough evidence to act on genetic findings in the clinical setting.

“We’re excited to be one of the first places in the state to use genetic information to guide treatment decisions,” Johnson said, “and we’ve progressed to the point that we will expand our program at UF and begin our outreach across the state.”

Johnson’s team recently was awarded additional funding from the National Human Genome Research Institute to take the Personalized Medicine Program to the next phase. They plan to expand the number of patients who receive genetic screening within UF Health and broaden the medications examined, including 6-mercaptopurine and azathioprine, drugs used to treat children with acute lymphoblastic leukemia and adult and pediatric gastroenterology patients.

PHOTO BY MARIA BELEN FARIAS



Julie Johnson, PharmD, and a team of more than 50 faculty members and staff worked with stakeholders across UF Health to be able to deliver on the promise of personalized medicine.

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David R. Nelson, MD, director of the UF Clinical and Translational Science Institute, said the fundamental mission of the CTSI is to build infrastructures for implementing research findings throughout health care systems and community hospitals in Florida.



“All the genotype testing will be done here at UF PathLabs (Pathology Laboratories),” Johnson explained. “By doing it in-house, we can provide faster turnaround, more support and better interpretations. It makes the whole process easier for the physician who is learning to integrate this information into their patient’s treatment.”

Future of health care

As part of its implementation, the Personalized Medicine Program also is inviting patients to participate in a research study that allows UF to store additional genetic information in a secure data repository for future use in clinical care and research. Only patients who consent to participate in the research component will have additional genetic information stored.

“We’re building information that will help guide a patient’s drug therapy over the long term,” Johnson said. “The thinking is that this is the future of health care — that eventually every person will have a lot of their genetic data available in their health care record, and the health system will figure out what pieces of those data are reasonable to use clinically.

“That’s why we’ve built this program the way we did,” she added. “We are figuring out the logistics to make all of that work.”

In addition to broadening the use of personalized medicine at UF Health, the program’s proposed expansion would share lessons learned with the Orlando Health network of hospitals, helping implement the clopidogrel program at two of its cardiology practices. Nelson added that they envision expanding it even further, eventually working with the Florida State University College of Medicine and its network of community-based physician practices.

Nelson explained that UF Health can serve the NIH well in its goal of fostering new approaches for how scientific discoveries are translated into medical practice. Wayne Jenkins, MD, MPH, president of Orlando Health Physician Partners agrees.

“The Personalized Medicine Program at the University of Florida represents a transformative initiative in health care for the people of Florida,” said Jenkins, also senior vice president of Orlando Health. “We strongly believe that genomic medicine is part of the future of medical care in the community, and we are pleased to partner with UF to help build our own capacity to strengthen its clinical and translational application.”

A key component to the success of the personalized medicine implementation was aligning the stakeholders within the academic health center.

“A lot of people had to come together to get something that seems as simple as ‘you’ve got a piece of your gene that impacts a drug prescription and will influence your outcome,’” Nelson said. “Just getting that information into the health record, having the health system recognize that there are data there that can impact a decision, creating an educational program for the practitioners and then a monitoring program was anything but simple, and it required buy-in from every corner of UF Health.

“But thanks to our receptive leadership and a cultural shift that embraces translational research within the hospital, we figured out how to do it,” he said.

The project represents a measured, stepwise approach, and it must demonstrate value in improved health and reduced costs if personalized medicine is to be fully embraced and reimbursed, according to David S. Guzick, MD, PhD, UF senior vice president for health affairs and president of UF Health.

“Our patients are at the center of everything we do,” Guzick said. “This new capability is an extraordinary example of what happens when our health system and researchers work together to harness the latest medical knowledge and technology. A sometimes invisible connection like this, between a discovery of an investigator and its impact on our patients, is what moves medicine forward at UF Health.”

HAVING A HEALTHY IMPACT

In 2009, the UF Clinical and Translational Science Institute received a Clinical and Translational Science Award of close to \$26 million from the National Institutes of Health to help speed discoveries to Floridians. The progress made in UF's Personalized Medicine Program is a direct offshoot of that award and its intended mission of enhancing medical care and health throughout the state, said institute director David R. Nelson, MD.

"As one of only two CTSA institutions in the third-largest state in the country, it is important for us to figure out a way to get evidence-based science into health care settings — and that includes the entire spectrum of medical discovery, not only genomic medicine," Nelson said.

In collaboration with Florida State University, the institute created Health IMPACTS for Florida, which engages a large number of physicians in practices across the state in clinical research projects. Participating physicians will use the knowledge gained to improve health in their communities.

For its first two research projects, Health IMPACTS has been working with a network of primary care practices affiliated with UF and the FSU College of Medicine to assess and monitor mild traumatic brain injury and health risk behaviors among youth in the state.

UF and FSU jointly received a \$600,000 grant from the state in 2010 to launch Health IMPACTS, an acronym that stands for "integrating medical practice and community-based translational science." An NIH grant of \$472,675 to the UF CTSI followed about six months later.

The mild traumatic brain injury study provides participating practices with the latest training and screening tools for assessment and treatment of concussions. The second Health IMPACTS pilot study uses iPads to survey youth about health risks and refer them to resources in their own communities. In addition, Health IMPACTS makes available locally based research coordinators to help practices get the studies up and running.

Elizabeth Shenkman, PhD, chair of the department of health outcomes and policy and co-director of the CTSI's Implementation Science Program, is leading the effort to put the Health IMPACTS infrastructure in place.

Health IMPACTS was established to provide a variety of settings in which to carry out the studies, Shenkman explained.

"A big part of our work is making sure that research conducted in academic settings will translate into a wider range of clinical and health care settings in the community," she said. "We hope to create a strong community-based infrastructure so when other faculty see opportunities to translate research findings into community practices they don't have to spend months and years developing the



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To help expand opportunities for using science to improve medical practice and better tailor care to the needs of individual patients, Shenkman, along with Garth Graham, MD, assistant dean for health policy, is leading the development of the CTSI's new Implementation Science Program.

“Implementation science and personalized medicine go hand-in-hand,” Graham said. “We look at a patient within his or her community, then look at the health care setting and determine how it interacts with the patient.”

As it matures, the Health IMPACTS collaboration can provide a statewide conduit for implementing science into health care.

“Engaging community-based physicians in leading-edge research — in their offices, in their clinics, wherever health care is taking place — that’s how we translate exciting findings out into the community and test them and change the standard of care,” said Myra Hurt, PhD, a professor and senior associate dean for research and graduate programs at the FSU College of Medicine.



Garth Graham, MD, MPH, and Elizabeth Shenkman, PhD, have been tapped to develop the CTSI's new Implementation Science Program.