The Ohio State University Center for Personalized Health Care

At Ohio State, personalized health care (PHC) is envisioned as health care that will utilize gene-based information to understand each person's unique requirements for the maintenance of their health, prevention of disease and therapy tailored to their genetic uniqueness. Ideally, it also includes incorporating knowledge of their environment, health-related behaviors, culture and values.

The Ohio State University Medical Center has longstanding interest in personalized health care. Ohio State's Medical Center's vision statement, adopted in June 2004 following input of hundreds of leaders across the Medical Center and community, states, "working as a team, we will shape the future of medicine by creating, disseminating and applying new knowledge, and by personalizing health care to meet the needs of each individual."

OSUMC has made it a priority to develop a national leadership position in personalized health care. The Medical Center's Strategic Plan calls for each of its six Signature Programs (Cancer, Critical Care, Heart, Imaging, Neurosciences, Transplantation) and three Key Research Programs (Behavioral Medicine, Bioinformatics, Genetics) to develop, support and implement initiatives that bring personalized health care to a practical reality.

The university's Board of Trustees approved the creation of the Center for Personalized Health Care (CPHC) in 2005. CPHC was directed to serve as an advocate and facilitator of multiple initiatives that comprise personalized health care – research, education, prevention and treatments designed to meet patients' individual needs based on their unique biology, behavior and environment. Daniel Sedmak, MD executive vice dean of the College of Medicine and senior associate vice president for Health Sciences, was named executive director of the CPHC April 2007. Clay Marsh, MD, director of Pulmonary, Allergy, Critical Care, and Sleep Medicine, was named to lead the development and implementation of a strategic planning for the Center. The Center has a core a group of distinguished faculty that includes: Michael Caligiuri, MD (cancer); Carlo Croce, MD (human cancer genetics); Rebecca Jackson, MD (women's health); Clay Marsh, MD (pulmonary & critical care); Wolfgang Sadee, Dr.rer.nat (pharmacogenomics); and Chandan Sen, PhD (wound care and surgery).

The vision of the CPHC is to see the incorporation of personalized health care initiatives into health maintenance and clinical care across the nation and around the world. Its mission is to propel translational and clinical research in personalized health care at The Ohio State University Medical Center, facilitate the incorporation of this research into patient care and educate and advocate for PHC locally, nationally and internationally.

Leadership

Daniel Sedmak, MD
Executive Vice Dean of the College of Medicine
Senior Associate Vice President for Health Sciences
executive director of the Center for Personalized Health Care

Before assuming his current role at The Ohio State University, Dr. Sedmak served as the executive dean and executive vice president for Health Science at Georgetown University. Dr. Sedmak graduated summa cum laude from The Ohio State University College of Medicine in 1980 and is a member of the Alpha Omega Alpha Honor Medical Society. His scientific focus is the pathobiology of cytomegalovirus persistence. Prior to entering administration full-time, Dr. Sedmak was a clinical immunopathologist and NIH-funded investigator for more than 15 years. He has authored more than 100 peer-reviewed articles.

Clay Marsh, MD
Professor of Internal Medicine
Director of the Division of Pulmonary, Allergy, Critical Care and Sleep Medicine
Director of the Center for Critical Care
Deputy Director, Davis Heart and Lung Research Institute

Dr. Marsh did his undergraduate training in biology and completed medical school at West Virginia University. He matriculated to The Ohio State University in 1985 and completed his training in Internal Medicine in 1988. Dr. Marsh is a member of the American Society for Clinical Investigation and a fellow of the American Thoracic Society. He is also immediate past chair of the Scientific Committee of the Sarnoff Cardiovascular Research Foundation and is the chair of the Board of Directors for this organization in 2007-2008. Dr. Marsh is currently appointed by the leadership of the OSU Medical Center to lead the strategic planning process for the Medical Center's personalized health care initiative.

Staff and Contact Information

Henry Zheng, MBA, PhD, Director of Operations of the Center for Personalized Health Care
Henry.Zheng@osumc.edu

Lee Xu, MD, PhD, MBA, Assistant Director of Program Development
Lihui.Xu@osumc.edu

Wendy Philips, Assistant Director of Communications
Wendy.Philips@osumc.edu

Jennifer Mall, Program Associate
Jennifer.Mall@osumc.edu

The Ohio State University
Center for Personalized Health Care
165 Prior Health Sciences Library
376 W. 10th Ave.
Columbus, OH 43210
ph: (614) 292-7424
fx: (614) 688-5785
http://cphc.osu.edu

THE OHIO STATE UNIVERSITY Medical Center

The Ohio State University Medical Center

Improving People's Lives Through Personalized Health Care

The Promise of Personalized Health Care

Imagine health care that promotes health, defines disease before it is clinically manifested and individualizes prevention and treatment strategies for each person. This is the promise of personalized health care. Personalized health care utilizes gene-based information to understand each person's requirements for the maintenance of their health, prevention of disease and therapy tailored to their genetic uniqueness. At The Ohio State University Medical Center, we envision this care as cost-effective, high-quality and transformative. Moreover, we will incorporate a person's unique environment, health-related behaviors, culture and values into this individualized program of health and wellness.

This approach to health and disease management is revolutionary and will fundamentally alter the practice of medicine. The future of personalized healthcare is one in which physicians and health care professionals, armed with electronic medical information and a patient's detailed genome and family health history, prescribe treatments based on an individual's unique genetic, behavioral and environmental factors. Patients control their own health by understanding their genetic predisposition to diseases, and follow proven approaches to actively prevent or postpone their disease. At the same time, medications will target individual needs more precisely through understanding relevant variations in a patient's genome, an approach that will also minimize genetic-based adverse effects.

The Case for Transformation Through Personalized Health Care

Health care in the United States is bordering on a state of crisis. According to the U.S. Census Bureau, more than 45.7 million residents in this country have no health insurance. In 2008, total healthcare spending represented 17 per cent ($2.4 trillion) of the gross domestic product (GDP) and is projected to increase to 20 per cent ($4 trillion) of the GDP by 2015[i]. Chronic diseases like heart disease, asthma, cancer, and diabetes are primarily responsible for the rise in healthcare spending. According to the Centers for Disease Control and Prevention, chronic diseases are responsible for 70 per cent of deaths, and the management of these diseases represents 75 per cent of all healthcare spending.[ii] Among developed countries, the United States has the highest level of health expenditures per person. In 2006, health expenditure per capita was $6,714 in the United States but was $2,760 in the United Kingdom and $2,474 in Japan[iii]. Despite spending the most among developed countries, the United States does not have better health outcomes. In 2005, life expectancy in the United States stood at 77.8 years, almost one year below the average of 78.6 years among developed countries. Infant mortality rates in the United States stood at 6.9 deaths per 1,000 live births in 2005, 32 per cent above the OECD average of 5.2[iii].

The healthcare problems we are facing in the United States will get worse as the aging population continues to grow. The current system is not working and we must transform the healthcare system to make it function again. A promising approach to transform the healthcare system is to develop and implement personalized health care. Personalized health care introduces disruptive innovations that will achieve better health outcomes and lower healthcare costs at the same time. Discoveries in human genomics and proteomics will lead to early detection of health risks. Subsequent development of biomarkers and diagnostic tools will direct the prevention and treatment strategies to specific individual levels. Information technology and advanced computation algorithms will help keep healthcare providers and consumers informed about changes in health status and take action early before diseases manifest.

Success stories of personalized health care are emerging. According to a new research study released Jan 13, testing all colon cancer patients in the United States for a drug-defeating gene mutation called KRAS might save $604 million annually in costs for treatment with a drug called Erbitux. Those who have the KRAS mutations will not respond effectively to treatment using Erbitux or similar drugs. A $450 test for the gene can save about $60,000 in treatment costs for each patient.[iv]

Ohio State's Conceptual Model of Personalized Health Care

At Ohio State, we see personalized health care as a broader concept – a spectrum ranging from understanding a patient's genotype and family health history to learning the behavioral and environmental context to tailor health, wellness and medical interventions. Our model also extends to creating tools to move the patient-physician relationship to health care on demand, meeting individual needs and expectations. This approach is consistent with the model that Koury, et al (2007) proposed, which divides the translation process into four phases. OSU's approach to personalized health care development reflects this model to a great extent.

The Continuum of Translation Research in Genomic and Personalized Medicine

Translation Research Phase	Notation	Types of Research
T1	Discovery to candidate health application	Phase I & II clinical trials; observational studies
T2	Health application to evidence-based practices guidelines	Phase III clinical trials; observational studies; evidence synthesis and guidelines development
T3	Practice guidelines to health practice	Dissemination research; implementation research; diffusion research; Phase IV clinical trials
T4	Practice to population health impact	Outcome research (included many disciplines); population monitoring of morbidity, mortality, benefits & risk

Source: Koury M, Gwinn M, Yoon P, et al, 2007

Phase 1 is the discovery stage. To realize the full potential of personalized health care, we will develop generic technical platforms that will advance profiling of patients, including genomics, proteomics and metabolomics, to decode unique organ-based and blood genetic and protein networks active in health and disease. In particular, we will utilize an integrative and systems perspective. This integrative approach involves gaining all relevant clinical, pathological and outcome patient information and combining this patient-centered phenotype information with complete genomic and protein network activation. Using advanced informatics, we will define unique underlying mechanisms to individual health and disease using phenotype-genotype interactions to establish novel mechanisms of disease. This integration is the systems biology approach. This new approach gives us a unique opportunity to generate novel insights from large data sets.

Stage 2 of our model is the application of basic discoveries to experimental therapeutics and preclinical models and trials. As a recipient of National Institutes of Health's $35 million Clinical and Translational Science Award grant and an National Cancer Institute-sponsored phase I and phase II experimental chemotherapeutics, Ohio State has a strong foundation in translational research. To facilitate clinical and translational research, we are developing a general patient informed consent process to prospectively collect patients' bio-specimens and DNA samples for medical research. This biobank will be linked with the patient clinical database to make it highly useful for translational research.

Stage 3 is the application of scientific discoveries from basic science and translational research to improve people lives through the implementation of evidence-based personalized medicine and health and wellness maintenance practices. This pillar of our expression of personalized medicine involves re-engineering the healthcare delivery system to be health-and wellness-focused, individualized and participatory, high-tech and high-touch. It will be a process which a lifelong relationship between our health system and our customers through early risk assessment, predictive health and a medical home, where our customers are always welcome.

Stage 4 is creating tools to bring health care to each home and community. These tools will bring the health system to patients' homes and to their primary care physician's office. We will develop not only targeted therapy that will treat the patient with the right medicine at the right time, but most importantly, a health and wellness intervention strategy that delays, prevents or preempts the onset of diseases. Our commitment is to help people maintain healthier, happier and more productive lives.

To deliver our commitment to improving people's lives holistically, we will partner with The Ohio State University Management Health Care Systems to develop and implement innovative programs to promote the active participation of individuals in their own "personalized" health maintenance and to use genetic tests and health markers to predict and prevent disease. We will develop evidence-based clinical application programs with our Health System partners and providers to apply evolving tools and technologies to improve health outcomes of our patients. The long-term prospect of using this individualized approach to maintain health and to prevent diseases will have the potential of lowering health care costs and improving people's lives. This new development in medicine is what Dr. Leroy Hood of the Institute of Systems Biology describes as the P4 medicine. It is nothing less than a revolution in wellness and disease treatment.

Policy Implications

Personalized health care is the strategic platform of The Ohio State University Medical Center. We invested in the development of this new frontier in the years to come. However, personalized health care is a vastly complex area and we need well-coordinated efforts and support from federal and state policymakers to make it a reality. Policy changes and public investment in this emerging paradigm of healthcare management will improve health outcomes and save money in the long run. The NIH Roadmap and the FDA's Critical Path initiatives are examples of the government's efforts to support personalized health care.

The Ohio State University Medical Center is committed to improving people's lives through personalized health care. We urge our legislative leaders and public officials to support the development of personalized health care as a long-term strategy in transforming health care in the United States. A pending federal legislation on genomics and personalized medicine will lead to greater resources for personalized health care research. Public investments are needed in research infrastructure development, education of current and future physicians in the use of genetic discoveries, and the translation of discoveries to patient care practices. The Ohio State University is one of a limited number of university campuses with a comprehensive array of health science colleges with extensive expertise. We have the talent, foundation and commitment to provide academic leadership in transforming health care through personalized health care. We are well-positioned to be part of any federal and state initiatives to transform the healthcare system in the United States.

References:

[i] The National Coalition on Health Care: **http://www.nchc.org/facts/cost.shtml**. Retrieved on January 14, 2009.

[ii] Centers for Disease Control and Prevention: **http://www.cdc.gov/nccdphp/overview.htm**. Retrieved on January 14, 2009.

[iii] Organization for Economic Cooperation and Development: **http://www.oecd.org/dataoecd/46/2/38980580.pdf**. Retrieved on January 14, 2009.

[iv] **http://www.bloomberg.com/apps/news?pid=20601103&sid=abNqlkdPZxSw&refer=us#**.

THE OHIO STATE UNIVERSITY Medical Center