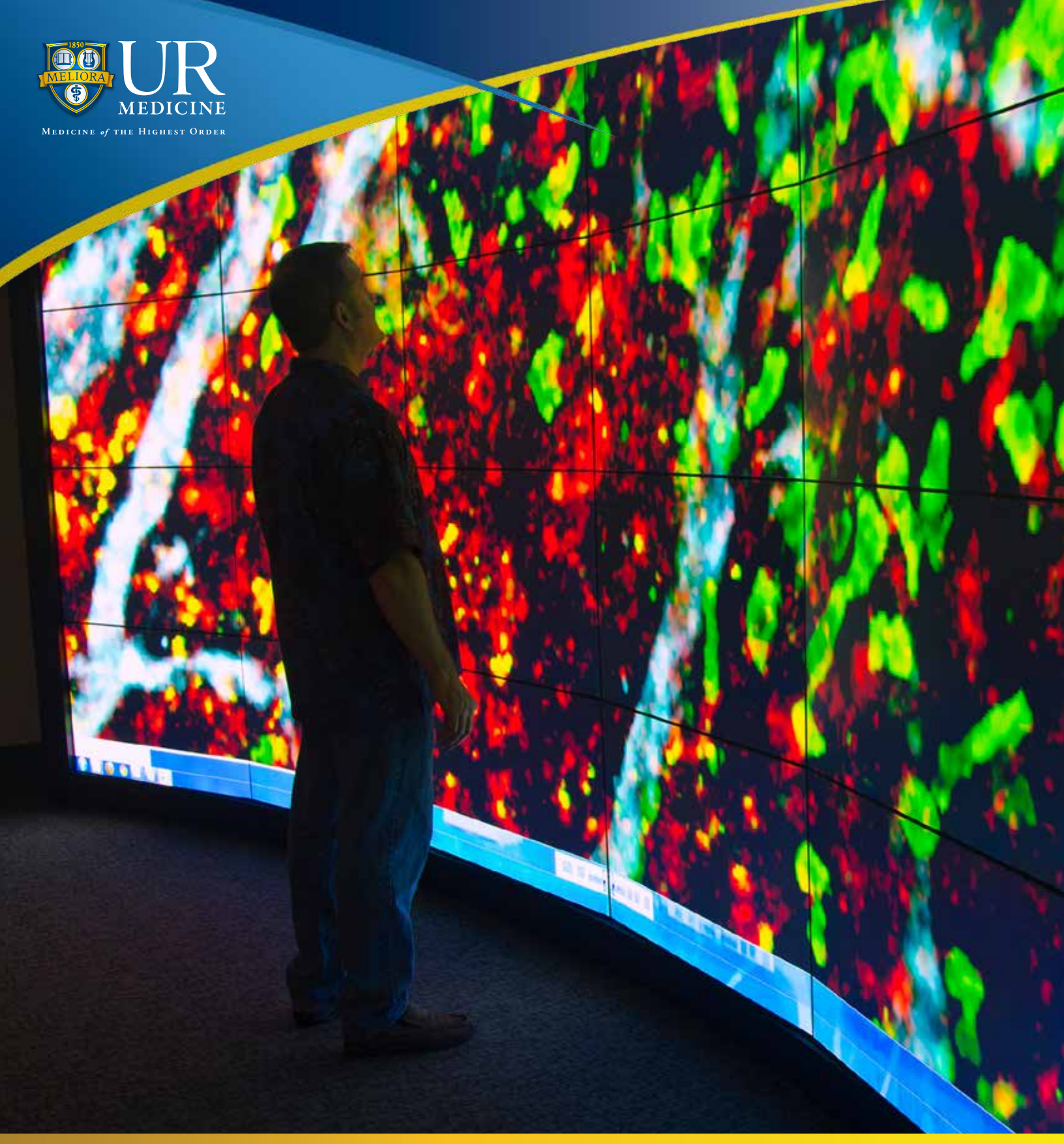
UR MEDICINE

Medicine of the Highest Order



The Healing Power of Data

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A Message from the Dean and Vice President for Health Sciences

Imagine living in a world in which: a mobile device predicts when you are at high risk for sudden cardiac arrest or stroke, and alerts you to take action to prevent a potentially fatal event; health care costs less, yet provides precision medicine tailored to your individual genetic makeup and your personal needs; physicians and public health officials receive real-time information that stops viral epidemics and biological threats before they spread to you and your family; and computational modeling permits faster design of new drugs and more efficient clinical trials, resulting in an explosion of new and more affordable treatments and cures. These four scenarios are our future thanks to data science.

The University of Rochester is at the forefront of understanding data in this new world. In 2012, through our Health Sciences Center for Computational Innovation (HSCCI) and in partnership with New York State, we acquired the Blue Gene/Q technology—IBM's latest super-computer—to become one of the top five most powerful university-based supercomputing sites in the nation. Since then our scientists, biostatisticians, and computational biologists have been working together to drink from the fire hose of knowledge contained in big data, make sense out of it, and create complex models that have vast potential to advance human health. For instance, we are already applying high-performance computing to research programs in brain injury, heart disease and infection.

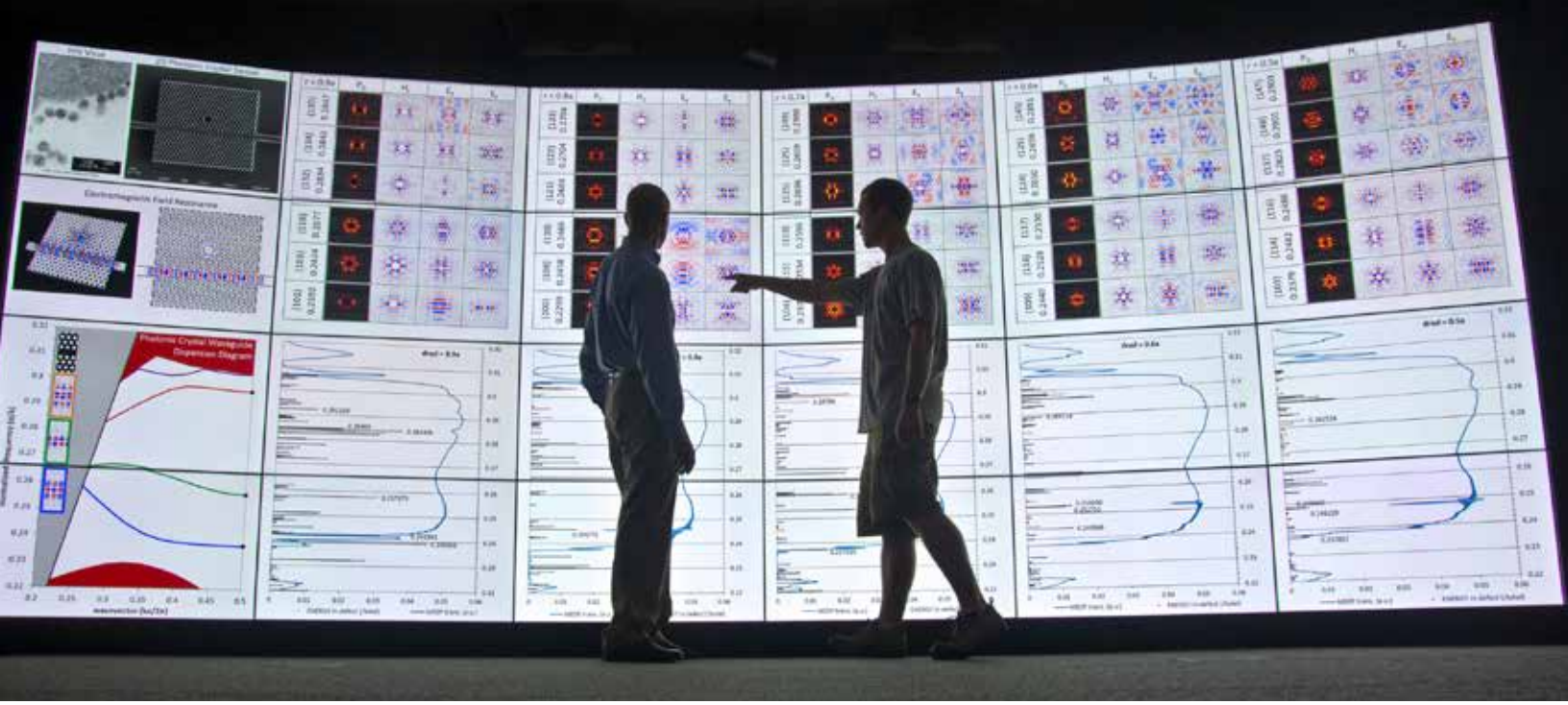
Today, the University and the Medical Center stand at a crossroads. We have the technological, bio-statistical, computational, and world-class basic research expertise needed to help people. We also have a nationally-recognized, low-cost health care system.

Now, we must turn our attention to recruiting, retaining, and training experts in the evolution of biomedical informatics—the faculty, staff, and students—who will help us interpret, visualize, and analyze data addressing vital health questions. With your support, we can lead the development of treatments and preventions tailored to your needs, safeguard the nation from emerging epidemics, and serve as a model for health care delivery. Please join me.

Best Regards,

Mark B. Taubman, M.D.
Dean, University of Rochester School of Medicine and Dentistry
University Vice President for Health Sciences

ON THE COVER: *David J. Topham, Ph.D., Executive Director of the Health Sciences Center for Computational Innovation and Professor of Microbiology & Immunology, views influenza research images in the VISTA Collaboratory, an immersive visual experience to help researchers understand scientific problems. The new lab consists of an array of 24 monitors, is 20 feet wide, and 8 feet tall, and has a resolution (50 megapixels) approaching that of IMAX theatres.*



Benjamin L. Miller, Ph.D., (at left), and Jim Baker, a physics Ph.D. student, discuss their research in the VISTA Collaboratory.

Educating the Next Generation of Scientific and Clinical Leaders

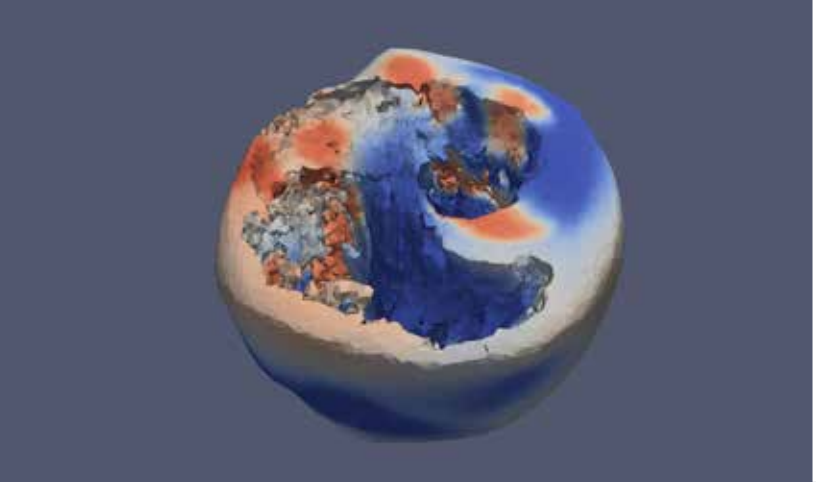
In today's information age, supercomputers can store enormous swaths of data and calculate billions of operations rapidly. Technology has advanced so quickly that it has left a demand for people with expertise in a new field—biomedical informatics—that uses data, information, and knowledge for scientific discovery, problem solving, and decision making to improve human health.

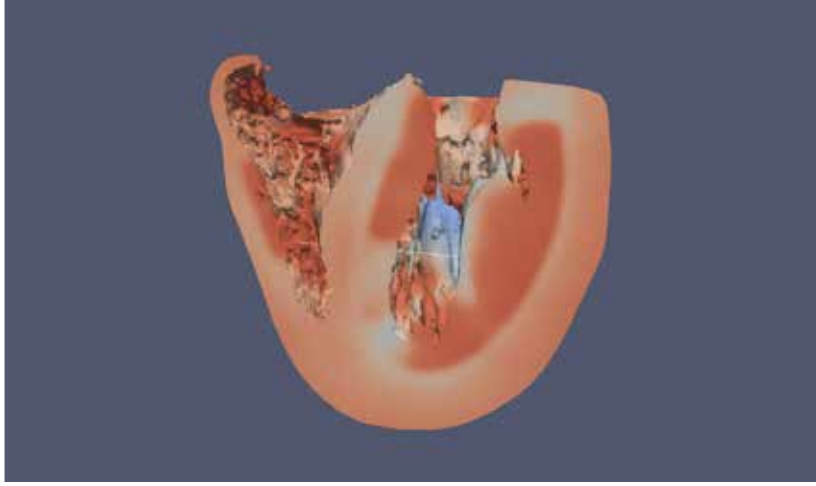
During the next four years at UR Medicine, we will launch new advanced degree programs and courses in biomedical informatics. Students will conduct discovery research by integrating and exploring massive data sets, implement and evaluate innovative solutions to real-world problems that improve the quality and reduce the cost of health care, provide better education for providers and patients, help conduct biomedical research more effectively, and improve global health.

By growing our own experts, we can take insights gained from large population studies, incorporate biological and scientific information, and suggest therapies and preventions to the people who need them, and conversely, take insights gained at the individual level back out to a large population to improve the health of a community. This takes teams of scientists, health care providers, and informatics specialists working together in the kind of collaboration that is a tradition at UR Medicine, turning problems seen at the bedside into practical research questions, and translating discoveries from the laboratory to the bedside to improve the health of people.

"The Medical Center and University are now involved in a tremendous new data initiative applied to medical problems and questions. I hope that my gift will serve as a foundation for new discovery and applications to better understand and solve complex problems in healthcare."

-Phil Templeton, '82M (M.D.)
CEO, Atomic Database Corp.





Computer models of the human heart will help us predict health risk and produce new medicines cheaper and faster.

Precision Medicine: Better Health, Better Care

A new era of medicine is upon us; one in which your genetic data and large-scale, data rich studies will turn data into knowledge to improve your health and health care. A simple blood test will quickly provide your physician with a genetic snapshot of your potential health risks. Your physician can then prescribe the right diet and preventive measures for you long before a condition appears, or use this information to resolve a difficult diagnosis.

In the not-so-distant future, our research and technology will make it possible for cancer patients to have their cancerous cells targeted for precision disease therapy, for pregnant women to forgo amniocentesis to determine fetal genetic defects or metabolic disorders, and for us to understand how DNA, proteins, cell development, and environmental exposures interact to produce novel, effective therapeutics designed specifically for you.

At UR Medicine, one of our most exciting projects is a partnership with IBM that uses our vast collection of heart arrhythmia data—one of the largest collections in the world—to create sophisticated computer models of the heart that can predict the risk of arrhythmias and sudden cardiac death in persons with underlying heart disease, and thereby allow doctors to intervene before problems arise. This modeling will also make the testing of new heart drugs more efficient, effective, and safe—making the production of new medicines cheaper and faster.

Real-time data can also help people get the personal care they need when they need it. We are developing cutting-edge methods to detect early signs of depression and suicide risk by detecting patterns in data from patient self-reported information, physician's notes, medical records, prescription drug use, and hundreds of other clues to determine if a patient is at risk of taking their own life. In the future, we may not have to worry that we recognized, too late, the signs of psychiatric emergency.

The future of precision medicine plays to UR Medicine's strengths, requiring a competitive edge and expertise in genomics and RNA biology—in which the UR Medicine is a world leader—and collaboration among basic researchers, clinical researchers, health care providers, and those able to use technology to collect, sort, analyze, synthesize, and visualize data in new ways.

"Data science will give us a much better understanding of how we can help the people in our community—and yours—live healthier lives."

—Danny Wegman

President and Chairman of the Board of the Wegman Family Charitable Foundation,
University Trustee, and honorary chair of the Medical Center Campaign.
The Foundation committed a transformational gift to the University's new Institute for Data Science.

Data Science Saves Lives Worldwide

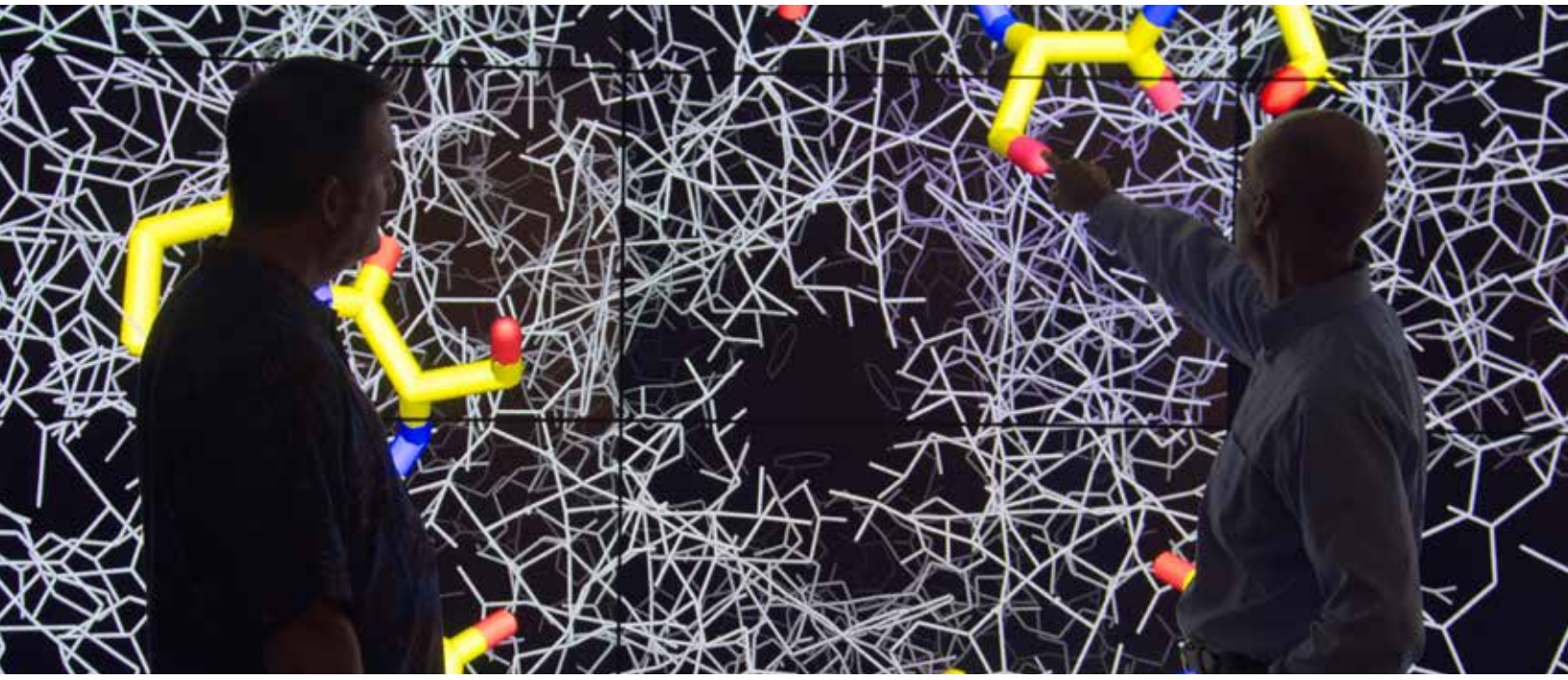
Pandemic flu. AIDS. SARS. Ebola. In our highly mobile world, emerging pathogens can spread faster than ever around the globe. The minute any threat or potential pandemic is identified, our goal is to use our technology to help scientists, clinicians, and public health officials spring into action, and stop it dead in its tracks.

At UR Medicine, we are meeting the challenge of this new era head on, using data as a weapon against infections. For example, in our New York Influenza Center of Excellence (NYICE)—part of a network of five centers nationally—our researchers are using social media as an early warning system to monitor flu outbreaks in real-time, and we are moving toward predicting when and where outbreaks may occur before they happen. We are also collecting genetic data from viruses to rapidly identify and visualize mutations that allow viruses to escape your immune system, in order to design more effective vaccines for you.

UR Medicine is home to the nation's only Respiratory Pathogens Research Center (RPRC). Clinicians and scientists in the RPRC are using data intensive approaches to study the interplay among the immune system, commensal bacteria (the "microbiome"), invading viruses ("virome"), and host genes (the genome) to predict which infants—including those born prematurely—are most at risk for severe lung disease, so disease can be prevented.

Our ultimate goal is to identify new infections and emerging disease threats in Rochester, across the nation, and around the world to reduce the spread of disease and help health care practitioners mobilize treatment and vaccination programs more rapidly.

Leading the way is the HSCCI VISTA Collaboratory—an 8' x 20' high definition display wall connected directly to our supercomputers—where data comes to life. VISTA creates an immersive, multidimensional experience that gives our scientists access to new data visualization tools that identify patterns, relationships, and features in the data that would otherwise have gone unrecognized. We can then better share and explain the data to colleagues and collaborators in unique ways, turning data into knowledge to improve human health.



David J. Topham, Ph.D., Executive Director of the Health Sciences Center for Computational Innovation and Professor of Microbiology & Immunology (at left), and Benjamin L. Miller, Associate Director of the Health Sciences Center for Computational Innovation and Professor of Dermatology, view influenza research visualizations in the VISTA Collaboratory.

Help Us *Turn Data Into Knowledge To Improve Health*

You can help us turn data into knowledge that fosters new discovery, reforms clinical care, and improves our health and quality of life by supporting the people who make it all happen: our faculty, post-doctoral fellows, and graduate students. Here is a sampling of how you can help.

FACULTY

ENDOWED AND DISTINGUISHED PROFESSORSHIPS—$1,500,000 *to* $2,000,000 OR MORE

Endowed professorships are permanent funds that honor acclaimed leaders who perform groundbreaking research, mentor junior faculty, and attract and retain talented fellows, residents, and students. They are among the most coveted and defining rewards that a faculty member can receive, recognizing and fostering excellence. Professorships also serve as a powerful recruitment tool, drawing new faculty of established distinction from around the world.

ENDOWED RESEARCH AND EDUCATION FUNDS—$500,000 *to* $1,000,000

Endowed research and education funds provide lasting support of the work of scientists or clinicians who have not yet attained the level of professor, but whose work sets them apart from their peers.

RESEARCH AND EDUCATIONAL PILOT PROJECTS/SEED FUNDS—$50,000 *to* $250,000 *(annually)*

Gifts for seed funding are "risk capital." They allow scientists to shift the direction of their research to follow promising leads, new ideas, or use new technology to propel scientific discoveries in new ways.

POST-DOCTORAL FELLOWS

Fellowships provide significant work experiences for clinicians to hone their skills and further explore a particular field of medicine, or for scientists to conduct in-depth research that advances human health.

ENDOWED FELLOWSHIPS—$750,000 OR MORE

Funds provide permanent support that allows fellows to complete their training without having to devote time to working outside their field, or resorting to additional loans for support.

ANNUAL FELLOWSHIPS—$25,000 *to* $75,000

Funds support an aspiring scientist or clinician, for one year, while providing training and mentorship in the laboratory or health care setting.

GRADUATE STUDENTS

Funds support students pursuing a M.S. or Ph.D. in biomedical informatics who are aspiring scientists, public health, or health care professionals looking for new ways to solve health problems in the laboratory, at the bedside, in the community, and around the world.

ENDOWED GRADUATE PROGRAM IN BIOMEDICAL INFORMATICS—$2,000,000 to $5,000,000 OR MORE

You can have an enormous impact on our ability to lead the nation in educating the next generation of biomedical informatics leaders by providing permanent support of our program.

SCHOLARSHIPS—$25,000 *to* $50,000 OR MORE

Scholarships can be created in your name or a name of your choosing. Endowed scholarships provide permanent support ($50,000 minimum), while George Eastman Circle scholarships provide immediate support ($5,000 minimum annually for five or more years).

For more information about
how your gift can make an impact,
please contact Dianne Moll at:
(585) 273-5506 • dianne.moll@rochester.edu

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