Published OnlineFirst March 30, 2015; DOI: 10.1158/2159-8290.CD-NB2015-043

PEOPLE

UW Health

Medical oncologist **Howard Bailey, MD,** became director of the University of Wisconsin Carbone Cancer Center in Madison on April 1; he had been serving as the center's interim director since September 2013. A professor of medicine at the university's School of Medicine and Public Health, he specializes in gynecologic and soft-tissue cancers and cancer prevention.

Bailey has worked as a cancer clinician and researcher since joining the faculty of the University of Wisconsin–Madison in 1994. He has led the development of three state- and nationwide clinical research networks to expand patients' access to clinical trials. In 2011, he was appointed to the committee that reviews all NCI-designated cancer centers. He is also the national chair of the American Society of Clinical Oncology's Cancer Prevention Committee.

University of Michigan Health System

Radiation oncologist **Theodore S. Lawrence, MD, PhD,** began his new role as director of the University of Michigan Comprehensive Cancer Center in Ann Arbor in February. He succeeds Max S. Wicha, MD, who founded the cancer center 27 years ago.

As director, Lawrence aims to increase partnerships with community cancer centers so that patients can receive high-quality care closer to their homes. He plans to continue serving as chair of radiation oncology and to remain involved in patient care and research activities as well. His laboratory work focuses on chemotherapeutic and molecularly targeted radiosensitizers. His clinical research combines his laboratory studies with conformal radiation guided by metabolic and functional imaging to treat patients with pancreatic and other gastrointestinal cancers.

A member of the faculty of the University of Michigan since 1987, Lawrence has served in leadership positions for several organizations.

Precision Medicine Initiative in the Offing

Presenting his agency's proposed budget of $31.31 billion for fiscal year 2016 to a congressional subcommittee in March, NIH Director Francis Collins, MD, PhD, outlined plans for a new, multi-agency Precision Medicine Initiative (PMI) that could lead to more effective treatments for cancer and other diseases. Suggested by President Barack Obama in his State of the Union Address, the initiative, if funded by Congress, would cost $215 million in its first year.

Historically, Collins told the committee, physicians have made recommendations for disease prevention and treatment based on what worked for an average patient, a one-size-fits-all approach. "Technology developments, along with the plummeting costs of DNA sequencing, now make it possible to develop an innovative approach to treatment that accounts for individual differences in patients' genes, environments, and lifestyles," he said.

For many years, cancer research has led the way in precision medicine, Collins noted. Now, the new initiative earmarks $70 million for the NCI to support the near-term goal of linking more individual genome changes to cancer.

"Precision medicine is really about re-engineering the diagnostic categories for cancer to be consistent with its genomic underpinnings, so we can make better choices about therapy," says Harold Varmus, MD, director of the NCI at the time of the presentation.

Last year, the NCI announced four of its own precision medicine initiatives, three of which are under way: Lung-MAP, a multi-arm clinical trial that matches patients who have squamous cell carcinoma of the lung with an experimental therapy based on genetic biomarkers; ALCHEMIST, a trial involving patients with lung adenocarcinoma whose tumors harbor *ALK* or *EGFR* mutations; and the Exceptional Responders Initiative, a study of tumors that have shown remarkable responses to drug therapies. Its MATCH trial, which will enroll up to 1,000 patients with various late-stage cancers in phase II drug studies based on mutations in their cancers, launches later this year.

The PMI "allows us to say to the public: Here's an important thing that's happening in cancer control, primarily in therapy, but with prospects for also improving our ability to make prognoses and design new therapies," says Varmus. "The PMI also intends to provide additional resources to do more clinical trials, do more genomics, and build better informatics platforms."

Also under the plan, the NIH would receive $130 million to launch a long-term study of 1 million volunteers who agree to share their medical information with researchers. The remaining $15 million would help the FDA and the Department of Health and Human Services to develop supporting regulatory infrastructure and data security protocols.

"It's big and long-term science. It's going to take time to realize the benefits," says Eric Green, MD, PhD, director of the National Human Genome Research Institute, an organizer of the million-person cohort study.

However, "one thing is clear," says Roy Herbst, MD, PhD, chief of medical oncology at Yale Comprehensive Cancer Center in New Haven, CT. "If we don't collaborate, develop larger data sets, and share that data, we'll never make the progress we want." ■

Varmus Departs NCI for NYC

After nearly 5 years on the job, Harold Varmus, MD, stepped down as director of the NCI on March 31. A former president of Memorial Sloan Kettering Cancer Center in New York, NY, one-time director of the NIH, and a winner of the Nobel Prize in 1989, Varmus will join the faculty of New York City's Weill Cornell Medical College, where he says he will continue working toward his goal "to understand cancer as best we can."

The NCI's deputy director, Douglas R. Lowy, MD, began serving as interim director on April 1.

Noted cancer investigators say that Varmus's dedicated efforts spanned every division of the NCI and will

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continue to shape cancer research and patient care long after his departure.

"I think the whole cancer research community owes him a debt of gratitude for taking on the position when he did, and working so effectively in the role. We all recognize that it was a difficult time with respect to the NCI budget," says Tyler Jacks, PhD, director of the Koch Institute for Integrative Cancer Research at MIT, in Cambridge, MA, and chair of the National Cancer Advisory Board. "There are important changes taking place in cancer research today, and Harold was intent on not letting the challenges stifle progress. He was the ideal person to keep the NCI on track and guide its development."

Varmus announced his resignation several weeks after President Obama proposed the Precision Medicine Initiative (PMI) in his State of the Union address in January, a program Varmus helped conceive and develop. If funded, the PMI will expand cancer research on genomics, informatics, and cancer biology.

"Harold Varmus brought a deep understanding of the importance of basic research and a deep appreciation for clinical research to the NCI," says Dinah Singer, PhD, director of the NCI's Division of Cancer Biology at the Center for Cancer Research, and a member of the NCI executive committee. "He's really had an enormous impact across the board in NCI-supported research."

Varmus says some of the NCI's most satisfying accomplishments during his tenure include: establishing two new centers, one for global health and another for cancer genomics; revamping investigator grants; and improving the efficiency of clinical trials by restructuring the NCI Clinical Trials Cooperative Group Program. He also helped guide The Cancer Genome Atlas.

These accomplishments occurred despite significant financial constraints. Varmus became director in 2010, soon after the federal government posted its largest deficit in more than six decades. He also led the NCI through the start of sequestration and a government shutdown.

"He's a real example of the call to service," Jacks says. "Harold could have done anything after his post-presidential phase at Memorial Sloan Kettering Cancer Center, and he chose to lead NCI."

Matthew Septimus/MSKCC

Comparing the strong financial times of the early 2000s with the tight budgets he faced as director of the NCI, Harold Varmus harked back to Mae West, who famously said, "I've been rich and I've been poor, and rich is better."

In New York, Varmus will study mutations that affect cell signaling and growth in lung adenocarcinoma in his laboratory in the Meyer Cancer Center at Weill Cornell. He'll also serve as an advisor to Laurie Glimcher, MD, the school's dean, and assist with further development of the New York Genome Center.

"There's no ideal time to leave a job like this," says Varmus. "But, I did extend my stay because I wanted to see the president announce the Precision Medicine Initiative, which I care about a lot. I'll have to leave it to others to execute." ■

Barcoding Method Speeds Single-Cell Expression Profiling

Not all cells in a tumor are created equal, and cancer researchers increasingly want to study individual cells as a way of understanding heterogeneity at the DNA and RNA level. A new method promises to aid their quest by enabling rapid, massively parallel analysis of gene expression in single cells. The technique accommodates thousands of cells and hundreds of genes per cell at one time with high sensitivity, and does it less expensively and more easily than current single-cell sequencing methods (Science 2015; 347:1258367.

The new method, developed by Stephen P.A. Fodor, PhD, and colleagues at Cellular Research in Palo Alto, CA, relies on standard dilution plating to isolate single cells; each cell is then paired with a single magnetic bead, which is decorated with barcoded mRNA capture probes. Upon cell lysis, the bead captures the cell's mRNA; the beads are then pooled for subsequent reverse transcription, amplification, and sequencing. Because each complementary DNA molecule becomes uniquely tagged, thousands of cells' worth of RNA can be analyzed in parallel, and the resulting sequences can be traced back to their parent cell.

The use of high-density microwell plates makes the method easier to scale up than current technologies involving isolation of single cells on fluidic chips or cell sorting, which are limited to tens or hundreds of cells.

"Single-cell transcriptomics can teach us a great deal about the heterogeneity of tumor populations. However, the throughput in terms of numbers of cells that can be analyzed has lagged," says Bradley E. Bernstein, MD, PhD, of Massachusetts General Hospital and Harvard Medical School, both in Boston, MA. "This is a problem for identifying relatively rare subsets of cells within a tumor, such as those that may drive tumor propagation or relapse. I find this approach by Fodor and colleagues to be quite clever and exciting for its potential to address this challenge and enable characterization of much larger numbers of cells."

In their paper, Fodor and lead author H. Christina Fan, PhD, demonstrate the use of the method, CytoSeq, to analyze about 15,000 human blood cells in 12 different experiments. In one experiment, quantifying expression of 93 genes in more than 4,500 immune T cells enabled the team to identify rare antigen-specific cells that occurred at a frequency of 1 in 1,000 cells.

Cellular Research aims to market a CytoSeq system with a capacity of 5 to 10,000 cells per run in 2016, but there is no reason that the technology could not be scaled to the 100,000-cell level,

AACR American Association for Cancer Research

CANCER DISCOVERY

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Cancer Discovery 2015;5:456-457. Published OnlineFirst March 30, 2015.