News Release

FOR IMMEDIATE RELEASE

Leading Expert in Mathematical Modeling of Cancer Joins UNM

Dr. Vittorio Cristini appointed to UNM School of Medicine’s Department of Pathology and to UNM Cancer Center

Albuquerque, NM—April 6, 2011—The University of New Mexico Cancer Center and the UNM School of Medicine announce the hiring of Vittorio Cristini, PhD, a leading expert in the mathematical modeling of cancer. Dr. Cristini’s cutting-edge work seeks to create accurate, highly complex mathematical models of cancer progression in order to represent, investigate and predict tumor growth and tumor response to treatments such as systemic and nanotechnology-based chemotherapies. Dr. Cristini’s field, physical oncology, offers a new and promising approach to better understanding the dynamics underlying tumor growth. This understanding is already allowing cancer researchers to test and refine treatment methods, and could eventually be used to optimize therapeutic approaches for individual patients.

Dr. Cristini joins UNM as a Professor in the Departments of Pathology and Chemical Engineering and in the New Mexico Center for the Spatiotemporal Modeling of Cell Signaling, one of 10 National Centers for Systems Biology in the nation, housed in the UNM Cancer Center. He has also been named the Victor & Ruby Hansen Surface Professor in Molecular Modeling of Cancer—an endowed professorship made possible by the Surface Family Trust.

“Dr. Cristini is widely recognized globally as a top scientist in the field of physical oncology, and his expertise, research interests and impressive funding record augment and reinforce the world-class research already underway at the UNM Cancer Center and in Pathology,” said Dr. Thomas Williams, Chair of the UNM Department of Pathology. “Dr. Cristini’s work is truly groundbreaking, and it both underscores and deepens the interdisciplinary nature of the research we do at UNM.”

“We are thrilled to have Dr. Cristini join our outstanding research team,” said Dr. Cheryl Willman, Director and CEO of the UNM Cancer Center. “We also deeply appreciate the incredible generosity of the Surface family, whose endowed professorships have made the

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Dr. Cristini Joins UNM Cancer Center, cont.

recruitment of Dr. Cristini and other superb new faculty possible.”

“I am delighted to be here,” said Dr. Cristini. “UNM offers a particularly exciting environment for the kind of multidisciplinary research that I do. Having good collaborators is essential in science, especially in a field like mine, which relies on the creative and productive collaboration of physical scientists on the one hand and pathologists and oncologists on the other.”

Dr. Cristini came to UNM from the University of Texas Health Science Center and MD Anderson Cancer Center. He received his PhD from Yale University, and completed his postdoctoral work at the University of Minnesota. (See his full bio below.)

About Cancer Modeling
In order to effectively treat cancer, scientists must understand and predict its behavior. But cancer behavior is staggeringly complex; it emerges from a welter of underlying physical and chemical processes that occur over multiple scales of length and different intervals of time. Cancer thus exhibits what mathematicians and physical scientists call “nonlinear” behavior. Using highly sophisticated (nonlinear) mathematics and supercomputing power, researchers like Dr. Cristini are creating models of cancer progression that begin to take this complexity into account. These “virtual tumors” (sometimes called in silico objects to denote their existence as computational constructs) can be manipulated to explore, for example, how chemotherapy drugs spread through tumors or how the microenvironment of a tumor influences its form and growth. Dr. Cristini has also used models to look at the outcomes and physical mechanisms of nanotherapy, and to better understand the causes and dynamics of cancer drug resistance. His research thus complements the cutting-edge work already being done at UNM Cancer Center in areas such as the molecular targeting of distinct oncogenic signaling components (the basis for the new frontier of molecular medicine) and the use of nanoparticles as therapeutic and diagnostic agents.

Dr. Cristini likens the cancer models he and colleagues in the field are building to flight simulators. Like their aeronautical counterparts, tumor models simulate movement across different intervals of time and space, though, as Dr. Cristini notes, the physics and chemistry involved are obviously more complex. The models are called “multi-scale” for this reason: they calculate physical and chemical processes spanning from the smallest scale (nanoscale, the level at which molecules and drugs are transported within and between cells) to the largest scale (multi-centimeter, the size of many tumors), as well as across various intervals of time, again from the smallest (milliseconds, the relevant measure for cell signaling) to the largest (the weeks, months and years over which a tumor grows).

“The power of these models is that they use quantitative methods to extrapolate from the molecular scale to the human scale,” explained Dr. Cristini. “The data we get from cancer patients is on a very small scale, yet the questions we want answered are on a tissue scale: how

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big is the tumor? How far are drugs going to be able to penetrate? Multi-scale modeling gives us a quantitative way of linking molecular data to predictions about tumor growth, treatment outcomes and, ultimately, patient health.”

Dr. Cristini’s work has already been applied to brain and breast tumors, liver cancer and lymphoma; now that he has joined UNM, he has begun collaborating with experts in leukemia and sarcoma to model those cancers. Accurate modeling of cancer tumors requires the continuous, careful integration of in vivo data, such as that gathered by Dr. Cristini’s cell biologist and oncologist colleagues at the UNM Cancer Center. This data helps calibrate the in silico model; it also offers the means by which to test and refine a model’s predictions regarding tumor growth and drug response. Improving the feedback loop between in vivo experiments and in silico models is thus an essential part of the modeling process. Here, too, the collaboration between Dr. Cristini and his UNM colleagues will define new frontiers in physical oncology—and deliver new benefits to cancer patients in New Mexico and around the nation.

About Dr. Vittorio Cristini
Vittorio Cristini, PhD, Professor of Pathology and Chemical and Biomedical Engineering at the University of New Mexico, is a leading expert and researcher in the fields of mathematical and computational biology, applied and computational mathematics, mathematical oncology, complex fluids and microfluidics, and multidisciplinary (bio)materials science. He serves as editor for Cancer Research and several biomedical journals. In 2010, Cambridge University Press released his first book, Multiscale Modeling of Cancer: An Integrated Experimental and Mathematical Modeling Approach. Dr. Cristini has also published numerous book chapters and over 60 journal articles. Among a number of awards, Dr. Cristini received the “Andreas Acrivos Dissertation Award in Fluid Dynamics” by the American Physical Society in 2000. His 2005 paper in the Bulletin of Mathematical Biology was designated a “New Hot Paper in the field of Mathematics” by the ISI Web of Knowledge; two articles have been featured in the Cancer Research Highlights of the American Association for Cancer Research. His research has been supported by the Cullen Trust for Health Care, the National Science Foundation, the National Cancer Institute, the Department of Defense, the State of California, the State of Texas and the State of New Mexico. In addition to his position at the University of New Mexico, Dr. Cristini is an honorary professor of mathematics at the University of Dundee, Scotland.

About the UNM Cancer Center
The UNM Cancer Center is the Official Cancer Center of the State of New Mexico and the only National Cancer Institute (NCI)-designated cancer center in the state. One of just 66 NCI-designated cancer centers nationwide, the UNM Cancer Center is recognized for its scientific excellence, contributions to cancer research and delivery of medical advances to patients and their families. It is home to 85 board-certified oncology physicians representing every cancer
specialty and more than 125 research scientists hailing from such prestigious institutions as M.D. Anderson, Johns Hopkins and the Mayo Clinic. The UNM Cancer Center treats more than 65 percent of the adults and virtually all of the children in New Mexico affected by cancer, from every county in the state. In 2010, it provided care to over 15,800 cancer patients. The Center’s research programs are supported by more than $59 million annually in federal and private funding.

About the UNM School of Medicine’s Department of Pathology
Part of UNM’s nationally recognized School of Medicine, the Department of Pathology is committed to improving human health through disease-oriented research, patient care and education. In addition to its core educational mission to train the next generation of research scientists and health care professionals, the Department of Pathology provides clinical and consultative pathology services in a wide variety of areas, using multidisciplinary teams of experienced specialists and state-of-the-art technologies. The Department’s nationally known researchers head important research facilities and centers funded by the NCI, NIH and other federal agencies. The Department of Pathology’s educational and research efforts are especially oriented toward New Mexico’s unique populations and cultures, with strengths in areas such as infectious diseases including human papilloma virus biology, leukemia and other forms of cancer, forensic sciences, hematopathology, molecular pathology, epidemiology and kidney disorders.

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