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Eliminating the Suffering and Death Due to Cancer by 2015

Dr. Andrew von Eschenbach

Dr. Andrew von Eschenbach is the Director at the National Cancer Institute. This is an edited version of his remarks at a Center for Medical Progress forum on June 21, 2005.

ROBERT GOLDBERG: I am the director of the Manhattan Institute Center for Medical Progress and chair of its Twenty-First Century FDA Task Force. Our center is dedicated to sustaining the incentives and freedom required to transform scientific discoveries into treatments that in turn can enrich and lengthen life.

Dr. Andrew von Eschenbach is making this transformation his life's work. As head of the National Cancer Institute, he has been a leading cancer researcher in our country. He has also been a patient, fighting cancer with as much medical might and resources as can be marshaled on behalf of patients. Dr. von Eschenbach has, more than any other public health official—and perhaps more than any cancer researcher—moved cancer care and health care into the era of personalized medicine.

We are going to be using information obtained from the human genome on how genetic differences in our responses to drugs and disease can create treatments targeted to achieve the greatest benefit and the least risk. We have seen the fruits of this knowledge being applied in cancer. Drugs such as Herceptin (for breast cancer), Gleevec, and Erbitux, switch off the production of proteins that create cancer cells, leaving normal cells intact. These treatments can increasingly be tailored to genetic variations. They all attack cancer without the draining and costly side effects of chemotherapy, and the ability to target treatments will enable us to tailor who gets what drugs. Moving toward personalized medicine—not lawsuits, bureaucrats, or longer clinical trials—will make medicine safer and more effective, in the final analysis.

Dr. von Eschenbach will describe what lies ahead and how we can get there. It is not a matter of if, but rather when and how, personalized medicine becomes the norm. It is good to hail the discovery process, but unless we can commercialize safe and effective treatments, progress against disease will stall.

Ironically, this week is dedicated to spotlighting life-saving treatments on various television shows, but too often the media are rife with accusations. The amazing advances made in treating diseases with medicines contradict the accusations that some people make: that the drugs are unsafe or ineffective, or that research conducted by drug and biotech companies or their researchers is tainted or false.

What Dr. von Eschenbach said in a forum of cancer patients and their families more accurately defines the reality and focus of the cooperative effort to control and defeat cancer: "The NCI plays a critically important role in fostering and developing research, but no matter how big our budget, the NCI cannot do it alone. My commitment is to collaboration and partnership. Discovery does not reach its full benefit until it results in an intervention that can be applied to a patient and save a life. We recognize how our privilege and our purpose are interconnected. There are extraordinary

possibilities within our grasp, and if we can work collaboratively and cooperatively, we can make the dream—of a world free of pain and suffering and death due to cancer—a reality. We can do it in our time. One hundred years ago, they unlocked the mysteries of the atom and by doing so saved the world from a disaster that was war. We have the same opportunity to use our knowledge of the living cell to eliminate the diseases that result from cell abnormalities. Conquering cancer is a reality within our grasp. It is time to seize that reality."

DR. ANDREW VON ESCHENBACH: Rudolph Giuliani commented that the Manhattan Institute addressed old problems with fresh thinking. I want to talk about a problem that has been plaguing us probably since the beginning of our existence: the old and unfortunately also our current problem of cancer.

Our plan is to eliminate the suffering and death that result from this process that we understand as cancer, and we are committed to a goal of doing so as early as 2015.

This year, more than 1.4 million Americans will hear the words, "You have cancer." One out of every two men and one out of every three women during their lifetime will hear the words, "You have cancer." One American every minute is dying as a result of this disease. It is an old and enormous problem. But I want to talk less about the old problem and more about fresh thinking.

To do something about the problem was, even a few years ago, perhaps unimaginable. Now we need fresh thinking about new goals. Goals that remain focused not as a cure but as a long-term solution for controlling cancer. Fresh thinking involving looking at those solutions not as a magic bullet, but with the realization that we can now have a strategy for many interventions capable of preempting the cancer process.

New thinking about the consequences of this possibility of preemptive strategies that will change the culture of medicine and science and move it away from a preoccupation with individual discoveries of the parts and pieces to the realization of how much can be accomplished by coming together as teams to integrate and combine our individual contributions.

What has led us to this point probably began in 1971 with the passage of the National Cancer Act, when this country committed its resources to conquer cancer. We began a journey in 1971 that proceeded along two roads. One road took what was available at the time to try to conquer cancer. Our strategy was a seek-and-destroy strategy—find it and kill it. Find it as early as you can and kill it as effectively as you can, using what is available in surgery, radiation, and chemotherapy. That journey has resulted in progress. Certain cancers are now remarkable in terms of a successful outcome—testicular cancer and childhood leukemia, for example.

But, at the same time, we also began another journey: the journey to understand cancer. We began to unravel the fundamental mechanisms that are responsible for cancer—the genetic and molecular changes that give rise to this horrendous disease. That journey has led us to a truly transformational moment. Now the National Cancer Institute has committed itself to a goal, one based on our emerging understanding of cancer as a disease process. Our plan is to eliminate the suffering and death that result from this process that we understand as cancer, and we are committed to a goal of doing so as early as 2015.

As bold as that might sound, we have the ability within our grasp, based on the trajectory of progress, to expand our understanding of the fundamental mechanisms that give rise to our susceptibility to cancers, the early events of malignant transformation, the progression and the metastatic spread, and the ultimate death that we see all around us in our friends and relatives. That entire process is now vulnerable because we are understanding the molecular mechanisms that control that process and we are learning how to exploit those mechanisms to prevent, detect, eliminate or control the process. We are able to change and control the behavior of cancer such that, we can in many cases cure or in

others, as with other chronic diseases that are well managed, a person can live with, and not die from, the disease.

We have a strategy, a goal, and a commitment, but our success is going to be dependent upon our ability to bring all the necessary parts together. Cancer is a systems problem and requires a systems solution. We must recognize as a community that the opportunity to eliminate the suffering and death from cancer is within our grasp, but we must create the synergy and the integration that will bring that about. It will require change, and we are in the process of that change. We will see shifts from what has been an approach to public health becoming one of personal health.

Genomics, proteomics, and emerging technologies are enabling us to profile not only diseases but the persons who bear those diseases. We can thus understand the genetic and molecular differences so that we can begin to personalize intervention strategies. We have worked over the past thirty years in a statistical model. Clinicians such as myself have prescribed a therapy for a cancer based on a statistical probability of success. Today, we consider it a major breakthrough if we have a chemotherapy strategy for advanced pancreatic cancer that has a 60 percent complete response rate. Unfortunately, that means that 40 percent of patients are paying the full price of care and obtaining no benefit. We are just beginning to know which cases fall into which category. The technologies are now within our grasp that will enable us to make those kinds of decisions, as in the case of large B-cell lymphoma where gene profiles can segregate patients who will respond to chemotherapy.

In our recent experience with lung cancer, we have seen the introduction of the drugs Iressa and Tarceva, which are targeted to affect an enzymatic pathway involved in the proliferation and growth of cancer cells. By understanding the genetic mutations that lead to that abnormal pathway, we can identify those patients who might benefit from that particular intervention.

This approach to cancer treatment is not yet fully realized, but clearly we can begin to see that possibility. We will not only use targeted, mechanistic-based therapeutic strategies, but technologies are also enabling us to see the impact of our intervention on patients in real time. We are moving from an era where imagery is no longer simply enabling us to see a lump on a chest X-ray or a mass on a CT scan, but enabling us to visualize—using molecular imaging—the biology of the disease in real time. We no longer have to wait three to six months to see if a therapy is working by observing whether the tumor has shrunk. For example, in gastrointestinal cancer, applying the new drug Gleevec, that is targeted for a particular pathway in that tumor, you can use radioactive imaging agents to see in twenty-four to forty-eight hours whether you have altered or changed the biochemistry of that tumor and thus know whether you are achieving the desired therapeutic effect. If not, the therapeutic plan can be changed.

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The NCI is committed to this discovery and development path. We have a significant challenge in appropriately delivering these interventions. We will see transformations occurring by virtue of the ability, for the first time, to witness the human biology of cancer in the clinic, in real time, from a fundamental mechanistic perspective. We are beginning to unravel and understand the mysteries of cancer not only in laboratories but in the clinic.

We have been blessed at the NCI in the past thirty years in that our commitment has created an enormous infrastructure to exploit this new approach. We have sixty NCI-designated cancer centers, many of which are in New York—one of our largest is Memorial Sloan-Kettering, for example. Across the country, the finest and most advanced institutions are engaged in discovery, development, and delivery. We are now integrating those cancer centers—so that the whole is greater than the sum of its parts—by providing a common biomedical

informatics platform called caBIG that will link, in real time, data and information coming out of the full continuum of basic and clinical research.

As we move into this era of personalized therapy, our ability to define subsets of patients is going to require clinical investigations across an enlarged network. For example, today in pediatric oncology, certain questions arise, for which there are not enough patients in the entire United States to study. So we have to look globally to answer those questions. This sort of situation is happening even more frequently, so it is important that we create a seamless integration, a network of networks.

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We are reaching out to other federal agencies, not only other institutes in the NIH. We have created joint task forces with the FDA and the Center for Medicare and Medicaid Services because the regulatory components and the reimbursement components of this continuum are an important part of the systems solution. We are reaching out to other departments, such as the Department of Energy, the Department of Commerce, and the Department of Defense, which enables us to access technologies that are being developed and applied in a variety of other fields.

At Vanderbilt University, their cancer center has a proteomic research program to identify the protein signatures present in cancer. We can look for those signatures as a means of early detection and prediction of the presence of cancer. To perform those studies, the researchers within the cancer center collaborated with scientists in the School of Engineering at Vanderbilt, where there are extraordinary advances in the development of mass spectrometry, a protein separation technology. That collaboration has become biphasic. The head of the School of Engineering stated: "The cancer investigators think that they are getting the best deal because they are able to do their genomic and proteomic research using a state-of-the-art facility. Actually, we are getting the better opportunity, because by having them working in our laboratories, we are given greater insights into what the next generation of this technology should be. So we have a competitive advantage."

The engineers and the cancer researchers realized that there was another piece missing: the high-end computational capacity to process the data. They reached out to the National Laboratory at Oak Ridge to provide the computing capability. This story reflects the strength of what we can accomplish together in this country as part of our responsibility to solve the problem of cancer.

We perform research, whether it involves a cancer center, a sophisticated platform of advanced technology, or a national laboratory doing very high-end computational development. We integrate this research in a way that will accelerate progress in biomedical research, as well as progress in eliminating suffering and death due to diseases like cancer. This new biomedical enterprise will position us and secure us even with regard to our national economic future.

Other places, such as China and Singapore, are making huge investments in emerging technologies, whether they are genomic, proteomic, nanotechnology, or information technology. But nowhere does a better opportunity exist to wed the development of technology to the application of technology other than in America. We can transform our healthcare delivery system into a distributive network that links those platforms and cancer centers with communities so that not only are they horizontally integrated with each other, but integrated through discovery, development, and treatment within each center. This new, integrated delivery system addresses many of the problems of access and the problem of healthcare disparity and will also help eliminate much of the waste that exists within our current healthcare system.

We have an old problem, but we certainly have fresh thinking and new opportunities to make what we once thought was impossible to now be possible. In 1971, the year that we made the commitment through the National Cancer Act, I began my

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career in oncology, having just come out of the Navy. I started as a urologic oncologist, taking care of young men with testicular cancer. In the 1970s, if a young man came in with testicular cancer that had metastasized to his lymph nodes, lungs, and brain, he had virtually no chance of being alive in six months.

In 1971, a young man was born in Texas by the name of Lance Armstrong. I had the privilege in July 2004, of standing at the finish line to watch him do what no other human being had ever done before—win the Tour de France for a sixth consecutive time. Despite the fact that in 1996 he developed testicular cancer with lymph nodes, lung, and brain metastasis, he is not only alive, but has now won the Tour de France for an unprecedented seventh consecutive time.

What we thought was impossible in 1971 is a reality today. What we think is impossible today—a world in which no one would suffer or die from cancer—can become a reality if we make it happen together.

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