RESEARCH for A cure

National Foundation
for Cancer Research
2009 Progress Report

NFCR MISSION STATEMENT

The National Foundation for Cancer Research (NFCR) was founded in 1973 to support cancer research and public education relating to the prevention, early diagnosis, better treatments and ultimately, a cure for cancer. NFCR promotes and facilitates collaboration among scientists to accelerate the pace of discovery from bench to bedside. NFCR is about Research for a Cure—cures for *all* types of cancer.

TABLE OF CONTENTS

FROM THE PRESIDENT

Dear Friend of NFCR,

A new era is dawning in the treatment of cancer, America's most devastating killer.

This isn't just hope.

By integrating molecular-based technologies, systematic tissue sample procurement and analysis, and biomedical informatics, NFCR researchers are developing new technologies like the CTC-chip that may revolutionize the way oncologists detect, monitor, and treat cancers.

NFCR research breakthroughs make it clear that each patient's cancer must be treated on an individual basis.

These aren't just empty promises.

In this report you will read how NFCR research to discover the molecular basis of each person's cancer – and how these cancers spread – coupled with research to design anti-cancer drugs that target the very genes that make a cell cancerous, are new paradigms for treating cancer.

Since 1973, NFCR has been at the cutting-edge of cancer research, fostering innovation in basic, translational, and clinical research to create a powerful synergy in the laboratory and at the bedside, with new approaches to treating cancer.

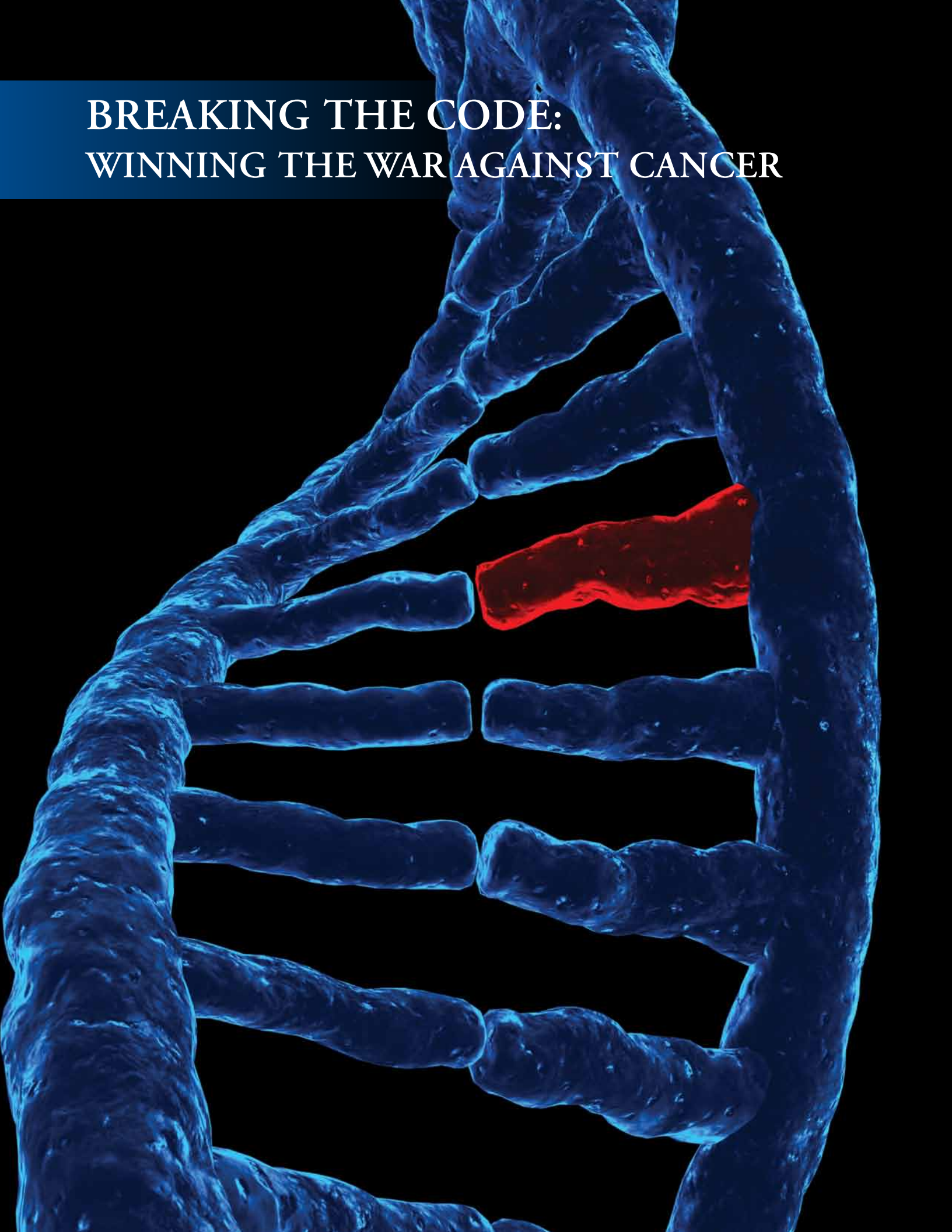
This is ***Research* for a Cure!** Cures for *all* types of cancer.

This is what NFCR is making possible.

Thank you and sincerely,

Franklin C. Salisbury, Jr.
President

BREAKING THE CODE:
WINNING THE WAR AGAINST CANCER



The "black box" that was the cancer cell has been opened, and with the support of millions of Americans, NFCR researchers have pioneered the redefinition of cancer as a genetic disease, making possible new approaches to treating cancer and transforming medicine so that real hope for a cure is now within sight.

NFCR scientists are at work on new anti-cancer drugs that target the very genes and signaling pathways that make a cell cancerous. These new targeted cancer therapies are proving more effective, longer lasting and far less toxic than radiation and chemotherapy – treatments with side effects that inspire dread so deep that they are almost as feared as the cancer itself.

Today, more individuals diagnosed with cancer are surviving longer than ever before. Even those who ultimately succumb to cancer live longer and experience a much better quality of life than was possible just a few years ago. Every day at NFCR, our researchers report progress in the development of promising new to prevent, detect and treat cancer. But until there is a cure, we will not be satisfied – too many lives are at stake.

The National Foundation for Cancer Research is an innovative cancer charity, supporting cancer research in a truly collaborative way, reaching global dimensions. Since 1973, NFCR has spent over $275 million to fund "high risk/high reward" research at universities and research hospitals worldwide.

The research funding we provide is having a catalytic effect, and accelerating the pace of cancer research. Today in laboratories across the United States, England, Germany, and China, NFCR scientists are moving cancer research toward that ultimate goal – finding cures for *all* types of cancer.

TARGETING TOP KILLERS TO SAVE LIVES

In 2009, it was estimated that about 1,479,350 new cases of cancer were expected to be diagnosed; and it is estimated that 562,340 people will die from it in the United States alone. That's 1,500 people a day. One person every minute. Nearly half of all cancer deaths in the United States are caused by four types of cancer: lung, breast, prostate, and colorectal. Besides the research on other types of cancer, NFCR has developed a comprehensive approach to support promising research programs that target the four leading killers. NFCR helps bring scientists closer than ever to developing early diagnostic tools, discovering new cancer targets, and bringing more effective anti-cancer treatments to cancer patients.

LUNG CANCER RESEARCH

Causing nearly one-third of all cancer deaths in the United States, lung cancer remains the number one killer amongst all types of cancer. NFCR provides funding to support eight leading scientists from around the world to find a cure for lung cancer. NFCR-supported research is focused on several critical areas, including: chemoprevention, early diagnosis, personalized medicine, and the development of cutting-edge microchip-based technology for real time monitoring of cancer. Research breakthroughs in these areas will bring significant benefits to lung cancer patients, improving their survival rates and quality of life.

PROSTATE CANCER RESEARCH

More than 192,000 men were diagnosed with prostate cancer in 2009 in the United States, and about 27,300 died from it. The 5-year survival rate for prostate cancer patients has dramatically increased to nearly 100%, largely due to recent advances in cancer research. However, once the cancer has spread, it can be fatal because there is no curative treatment available at this time. Six NFCR scientists are seeking novel strategies to tackle metastatic prostate cancer on multiple fronts; including gaining more insights into the molecular mechanisms that drive cancer invasion and spread, identifying new tumor targets for improved therapies, and developing novel gene therapies for the treatment of metastatic prostate cancer. Their critical and innovative research will lead to better strategies in the prediction and treatment of prostate cancer.

BREAST CANCER RESEARCH

Breast cancer is the most frequently diagnosed cancer and the second leading cause of cancer death in women. NFCR supports breast cancer research in the laboratories of 10 leading scientists in this field. These scientists are at the frontline of multiple areas of breast cancer research; including the development of cutting-edge molecular imaging technology that will allow earlier diagnosis, seeking new strategies to overcome tumor drug resistance, developing nanocomplex drug delivery technology, researching new anti-cancer drugs for improved treatments, and establishing more effective strategies to stop metastasis – which kills more than 90% of breast cancer patients.

COLORECTAL CANCER RESEARCH

Colorectal cancer is the third leading cancer killer of both men and women in America. With NFCR support, eight outstanding scientists are launching attacks on this deadly disease. Their research has already led to the discovery of new biomarkers for more accurate monitoring of drug efficacy, and has brought more potent therapies for treatment of colorectal cancer to the patient.

OTHER TYPES OF CANCER

Besides conducting leading-edge research, NFCR scientists are also working around the clock to find more effective treatments for other types of cancer. Pioneering research is being conducted to fight pancreatic, ovarian, brain, liver, esophageal, gastric, cervical, kidney, head and neck cancer, as well as leukemia, lymphoma, multiple myeloma, melanoma, soft tissue sarcoma, and many other types of cancer.

NFCR scientists are moving cancer research toward our ultimate goal – finding cures for cancer…*all* types of cancer.

A NEW MILESTONE IN THE FIGHT AGAINST CANCER

NFCR Project Director Daniel Haber and his team of scientists at the Massachusetts General Hospital Cancer Center have taken the cancer research community by storm with their groundbreaking invention of the CTC-chip, a nanotechnology device which may well revolutionize how oncologists detect, monitor and treat cancers in the future.

THE CTC-CHIP: AN EXCITING NEW TOOL TO DETECT CIRCULATING TUMOR CELLS IN CANCER PATIENTS

Circulating tumor cells (CTCs) are rare cancer cells that originate from a malignancy and circulate freely in a cancer patient's blood stream. The CTC-chip can capture extraordinarily rare cancer cells – one tumor cell in a billion blood cells – from a small blood sample, allowing doctors to determine the genetic signature of a patient's tumor, and then identify patients for whom targeted cancer therapies will work. Dr. Haber hopes this NFCR-funded technology may revolutionize the way oncologists treat cancers in the near future. The CTC-chip opens up a whole new field of studying tumors in real time, and when the device is ready for larger clinical trials, it should give oncologists new options for measuring treatment response, defining prognostic and predictive measures, and studying the biology of blood-borne metastasis, which is the primary method by which cancer spreads and becomes lethal.

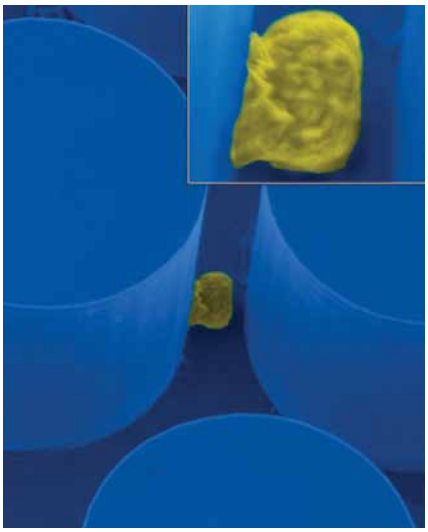
This noninvasive technology works with a 10 milliliter blood sample from a cancer patient – just two teaspoons – sending the patient's blood across 80,000 tiny columns on the microchip so that a specially-designed antibody glue can latch onto passing cancer cells, offering doctors early evidence of metastasis and enabling clinicians to closely assess cell changes in response to treatment.

One can imagine a day when these CTC-chips become affordable enough for routine blood testing for early diagnosis of cancer. Further out, implantable sensors could constantly watch for cancer cells and report immediate updates when cancer is detected. A text message could inform you and your doctor that you have very early stage cancer, and that you should seek immediate treatment for a 99.99% chance of a cure.

NFCR believes that microchips are the future of biotechnology. Smaller and more complex and powerful devices will slay many diseases.

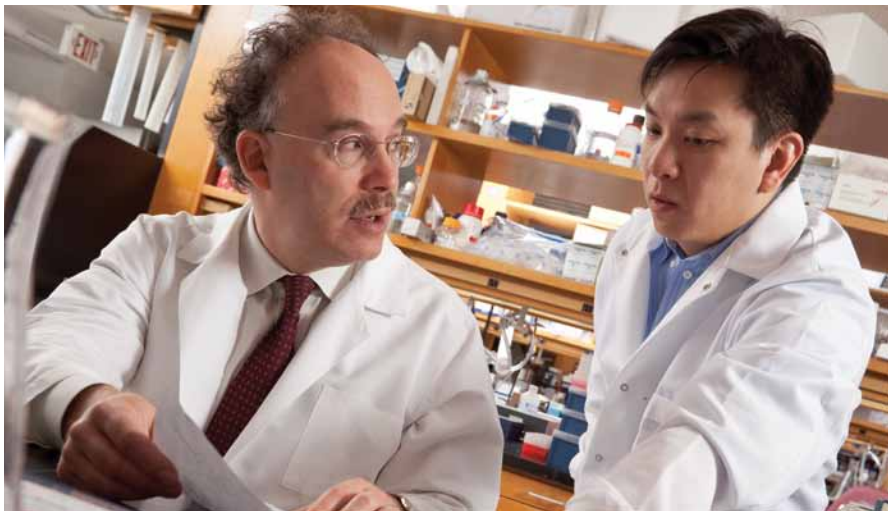
NFCR "ADVENTURE FUNDING": A DECADE IN THE MAKING

This promising breakthrough didn't happen overnight. Dr. Haber's groundbreaking research has been over a decade in the making with NFCR support. Before the most recent version of the CTC-chip, it was not possible for clinicians to gather information from CTCs that would be useful for clinical decision making. Earlier versions of the CTC-chip required hand-counting of thousands of microscopic images, which, while sufficient for the initial proof-of-principle studies, was far too time-intensive for handling high volumes of patient samples for any real application. Researchers were also limited in their ability to analyze cellular factors that could be markers for important properties of the tumors.



This microchip-based device for detecting and analyzing tumor cells in the bloodstream is revealing cellular differences that may reflect a tumor's aggressiveness and long-term response to treatment.

Dr. Haber's updated CTC-chip now incorporates improved imaging technology, allowing more complete visualization of cells captured by the device, and uses new software that automates the identification of CTCs using criteria specific to the particular type of tumor. Now a silicon chamber containing thousands of microscopic columns through which is passed a teaspoon of blood, the CTC-chip allows the capture



of rare cancer cells that circulate in the blood of patients with invasive cancers. Once captured, these extraordinarily rare cancer cells can be analyzed to reveal critical information about the spread of cancer and the potential effectiveness of different treatments. This approach could revolutionize the way oncologists detect, monitor and treat cancers in the future.

In clinical studies conducted by Dr. Haber and his team at MGH Cancer Center, the CTC-chip was used to identify circulating cancer cells in the blood of patients with metastatic cancers of the prostate, lung, pancreas, colon and breast. In some patients with lung cancer, where targeted cancer therapies have been designed to focus on the genetic lesions causing the cancer to grow, the CTC-chip can identify that genetic lesion and help identify which patient is likely to benefit from these novel drugs.

In the future, the CTC-chip may reduce the need for repeated biopsies or imaging studies.

"Going through chemotherapy is very difficult, but the biopsies for my cancer patients were even more painful," says Dr. Haber. "Now every time I see a cancer patient, I take a blood sample."

"As our cancer treatments become better and more focused on different types of gene abnormalities within each cancer, it will become absolutely essential for a doctor to know what an oncologist is treating when he/she is treating it," says Haber. He hopes the CTC-chip will one day make cancer treatments more like the treatment of infectious diseases, where drug sensitivity patterns can be predicted before antivirals or antibiotics are prescribed.

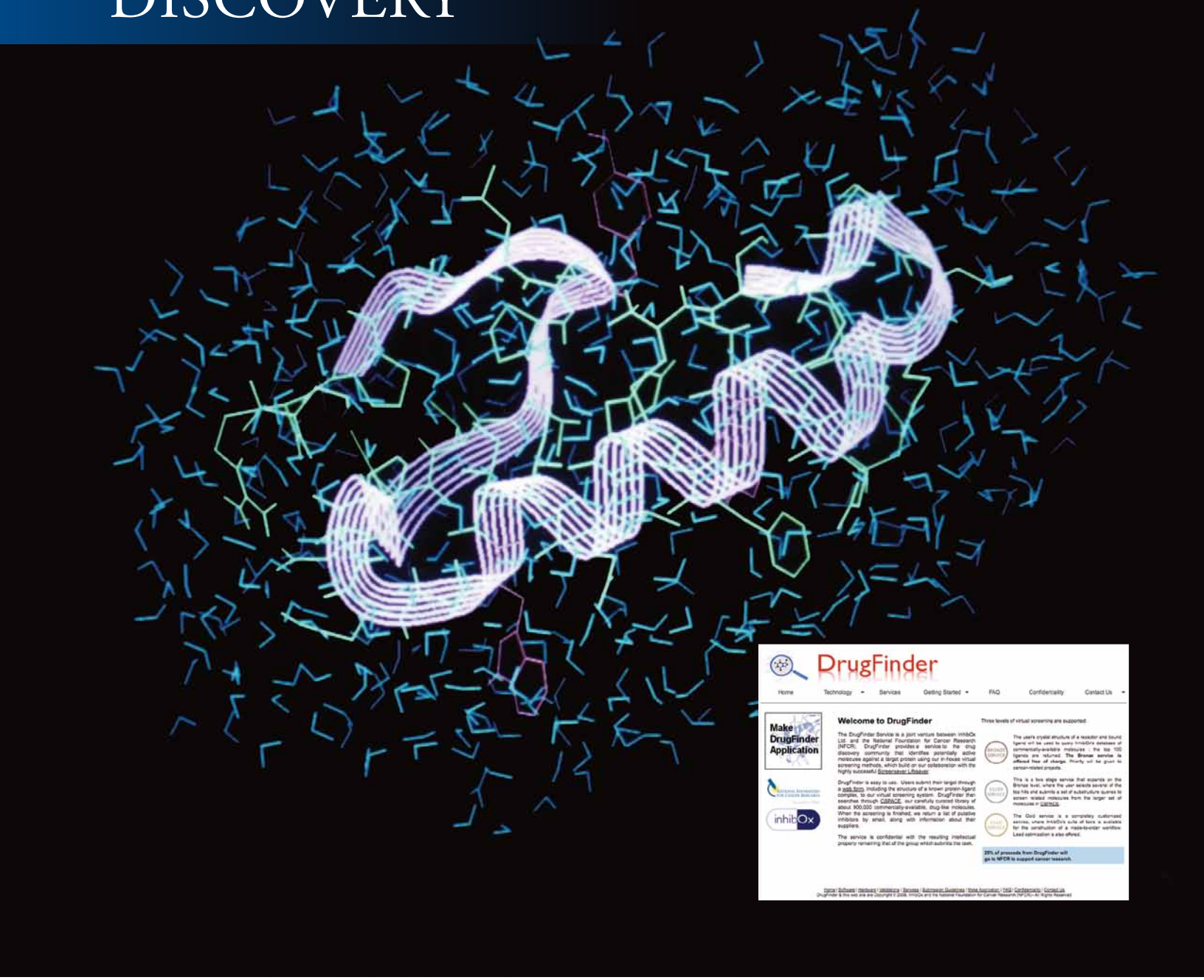
Although the CTC-chip has made a stunning debut, Dr. Haber stresses that currently, this technology is still in very early stages and it is still "very much a test in development."

The study of CTCs is in its infancy, both in terms of technology and in terms of understanding the clinical implications of what we find with that technology. There is no gold standard yet that tells us what type of information will be clinically useful and what information needs much more analysis before it can be applied. And while CTC-chips aren't ready for clinical use, NFCR is continuing to fund Dr. Haber and the further research needed to determine whether the differences in cancer cells detected by the CTC chip actually reflect which tumors are more invasive, in the case of the persistance/disappearance observation, or reveal important biological properties of the tumor.

Dr. Haber is also working to create a "plug-and-play" version of the machine that will be easy to use clinically, exploring options for large-scale production of the CTC-chip, and continuing to optimize the device to increase its speed and efficiency. With continuing support from NFCR, this new technology may one day become a reality for cancer patients.

Through support of a powerful synergy between scientists and physician-scientists at the bedside, the National Foundation for Cancer Research fosters innovation in basic, translational and clinical research.

ACCELERATING DISCOVERY



NEW COMPUTATIONAL DRUG SCREENING TOOLS

NFCR and InhibOx, a computational drug discovery company founded by NFCR scientists at the University of Oxford, joined forces to launch DrugFinder, a powerful new computational drug screening tool. DrugFinder enables scientists to leverage the power of computer-aided virtual drug screening technology for novel cancer drug discovery and development. It is estimated that this unique and powerful virtual screening tool could speed up the drug discovery process by as many as four years. In 2009, scientists in both academic and pharmaceutical settings successfully used DrugFinder to launch their initial phases of drug discovery.

NFCR RESEARCH DISCOVERY CENTERS

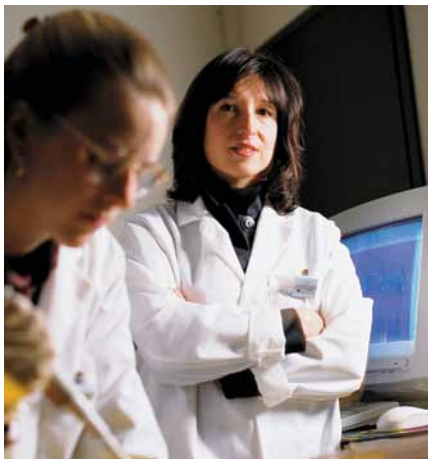
NFCR accelerates the pace of cancer research by recognizing innovative discoveries while they are still in their infancy, and providing scientists with the "adventure" funding to substantiate their discoveries. To maximize the productivity of its cancer research programs, NFCR has established an international network of *Research Discovery Centers,* each of which is directed by a highly accomplished cancer research leader. Together, these Centers constitute our "Laboratory Without Walls" – promoting the sharing of ideas and information across research institutions and engaging top research minds from a wide range of scientific disciplines.

Scientists at these NFCR Centers are connected to more than 30 lead NFCR researchers at other universities and research hospitals. Together, NFCR's scientists constitute a "research collaborative" working on cancer from diverse perspectives and actively sharing ideas and information with one another.

NFCR Center for Computational Drug Discovery – *University of Oxford, Oxford, UK, Graham Richards, Ph.D., Director*

Developing cutting-edge computer programs for ultrafast screening of new anti-cancer drug candidates. This NFCR center involves collaborators from the United States, United Kingdom, Spain, Portugal, Italy, South America, and China.

A novel 3-D Molecule Search Engine software developed by Center researchers, known as the **Ultrafast Shape Recognition (USR),** can search for virtual compounds as anti-cancer drug candidates with a speed up to 14,000 times faster than other similar technology. This novel method enables scientists to find drug-like molecules within a huge database in a few hours rather than a few years. In the past year, a new development has been the inclusion of a novel variant called CSR which can cope with chiral molecules, an important biological property. The Center's DrugFinder technology has been successfully applied by both the pharmaceutical and academic sectors during 2009.



NFCR Center for Anti-Cancer Drug Design and Discovery – *Yale University, New Haven, CT, Alana Schepartz, Ph.D., Bill Jorgenson, Ph.D., Directors*

Developed anti-cancer ß-peptide inhibitors to address one of the biggest challenges in drug discovery. ß-peptide inhibitors represent a new generation of anti-cancer drugs that are highly effective and specific in targeting almost any cancer-related protein-protein interactions. To date, Center researchers have identified ß-peptides against protein interactions involving hDM2, and are continuing to improve their therapeutic effects by making these peptides enter the tumor cells more easily. The new platform technology developed at the Center may positively impact the treatment of half of all cancers.

Corsortium for Clinical Diagnostics (CCDx) – *Brian Leyland-Jones, M.D., Ph.D., Director*

Biomarkers are revolutionizing cancer therapies and diagnostics. With the growing and urgent need for biomarker profiling and validation in cancer research today, the Consortium for Clinical Diagnostics (CCDx) is a partnership of scientists at research institutions and biopharmaceutical companies dedicated to facilitating genomic research and diagnostics. CCDx provides a centralized infrastructure and expertise in genomics and molecular imaging as well as translational medicine. The Consortium provides key capabilities in all aspects of predictive medicine, including identification and validation of disease susceptibility genes and genetic signatures, pharmacogenomics, and the development of medical response tests as well as new and improved diagnostic tests – especially in the area of cancer.

NFCR Center for Targeted Cancer Therapies – *Translational Genomic Research Institute, Phoenix, AZ, Daniel Von Hoff, M.D., Laurence Hurley, Ph.D., Directors*

Developing new targeted cancer therapies and improving treatment efficacies of existing therapies. In the past year, Center researchers discovered that inhibition of a gene that is overexpressed in pancreatic cancer tissues causes cell death. The gene may be a potential new drug target for pancreatic cancer. Using cutting-edge genome technology, Center researchers also identified genes that can improve patients' response to commonly used targeted therapies such as Gleevec™, Tarceva™, Sutent™, and Nexavar™. These results hold promise in improving clinical care of patients with breast, lung, kidney, pancreatic, and many other types of cancer.

Program of Action for Cancer Therapy

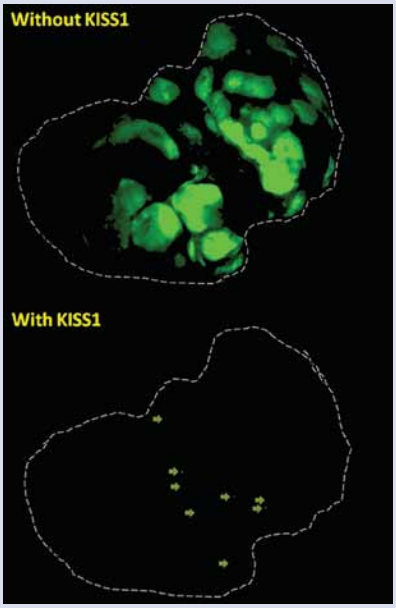
Today, in developing countries, cancer kills more people than HIV-AIDS, malaria, and tuberculosis combined. And while mortality rates for the latter three are coming down, deaths from cancer are increasing. In 2009, the International Atomic Energy Agency (IAEA) continued its Program of Action for Cancer Therapy (PACT) in partnership with NFCR to enable developing countries to provide patients with novel and effective cancer treatments. NFCR enables donors in the U.S. to help PACT deliver cancer treatment integrated with prevention, screening radiotherapy, and palliative care to patients in developing countries.

NFCR Center for Metastasis Research – *University of Alabama at Birmingham, AL, Danny Welch, Ph.D., Director*

Addressing metastasis, the most lethal aspect of cancer, which is related to more than 90% of all cancer deaths. Research at the Center is focused on identifying the fundamental molecular changes in cancer cells that enable them to metastasize, and developing strategies to stop this lethal process. To date, Center researchers and collaborators have discovered six metastasis suppressor genes. In the past year, scientists continued to investigate how these genes function in suppressing metastasis, and the data generated will be crucial for translating their laboratory discoveries into new anti-metastasis therapies for cancers including breast, prostate, colon, ovarian, pancreatic cancer and melanoma.

KISS1 GENE TURNED ON

The upper panel shows melanoma cells in a complex tumor model that have metastasized to lung tissue and formed cancerous tumors. In the lower panel, the *KISS1* Gene has been turned on. The arrows point to what appear to be tiny dots. These barely visible dots are single melanoma cells which the *KISS1* Gene has rendered dormant. These cells are unable to grow and form cancerous tumors.



NFCR Center for Therapeutic Antibody Engineering – *Dana-Farber Cancer Institute, Harvard Medical School, Cambridge, MA, Wayne Marasco, M.D., Ph.D., Director*

Discovering and engineering therapeutic antibodies for cancer research and clinical applications. The Center has established a library containing 1.6 billion different human sFv antibody-displaying phages, a tremendous resource for developing monoclonal antibody-based targeted therapies. Currently Center researchers are identifying high affinity human sFv antibodies against selected cancer targets.

NFCR Center for Molecular Imaging

Case Western Reserve University, Cleveland, OH, Jim Basilion, Ph.D., Director

Establishing a new technology platform – molecular imaging for early detection and improved treatment of cancer. The Center is currently focusing on developing advanced, highly sensitive imaging tools to detect single or multiple molecular markers specific to cancers such as breast, prostate, and brain cancer. This new technique, in particular the simultaneous imaging of multiple molecular markers, would identify cancer at very early and more treatable stage, significantly improving patients' chance of survival. Techniques developed at the Center can also help surgeons to determine tumor margins during operation and make it possible for more complete surgical removal of aggressive, infiltrated tumors.

CPAF – Cancer Patient Assistance Fund

Daniel Van Hoff, M.D., Director

Cancer patients whose doctors have told them their solid tumors are not responding to any standard therapies need not be without hope. NFCR has launched an innovative targeted cancer therapy program which matches each patient's tumor with specific phase I anti-cancer drugs designed to target genetic biomarkers expressed on that patient's cancer. This new approach to treating cancer is the focus of clinical research being directed by Dr. Daniel Von Hoff at the Translational Genomics Research Institute in Scottsdale, Arizona.

The key to treating cancer is to look deep into the tumor genome in search of its Achilles' heel, a mutation that defines the tumor's vulnerability and provides a therapeutic target. "Rather than wait for the next agent to come along," clinical researchers at TGen will select an anti-cancer drug that is thought to have selectivity for a molecular target in a patient's cancer on the basis of either preclinical studies or activity in other cancers containing the same vulnerability.

"With this new approach, and by sequencing every patient's tumor, phase I trials can be more therapeutic." Contrary to conventional clinical trials designed to produce statistical results pertinent to large populations, a trial with one patient addresses the needs of "the individual patient seeking help," the individual cancer patient hoping to find what may be a final opportunity for extended life.

Although not every patient is appropriate for Dr. Von Hoff's breakthrough Single Genome Sequencing approach to treating cancer – and while there is no certainty that a vulnerability discovered in a tumor genome is the one that drives the tumor – oncologists must start somewhere.

And for eligible patients seeking help, it is not too late to try. Dr. Von Hoff compared his approach to the little boy who, when chastened by an old man for trying to save hundreds of starfish washed onto a beach, tossed one last one into the sea and responded, "It made a difference for that one."

NFCR Center for Proteomics and Drug Actions – *Vanderbilt University, Nashville, TN, Larry Marnett, Ph.D., Dan Liebler, Ph.D., Richard Caprioli, Ph.D., Directors*

Developing advanced proteomics techniques to understand drug efficacy and toxicity. The Center is aimed to determine if novel anti-cancer drugs work and how the drugs produce therapeutic effects or cause undesired side effects. Research at the Center will provide essential information for directing the right drugs to patients who will benefit most from them. Last year, Dr. Marnett designed a new way to image the COX-2 enzyme in growing tumors. This technique will help scientists better understand the role of the enzyme in inflammation and cancer, and give physicians a new way to identify and treat cells at risk for cancer in their patients.

NFCR–TMUCIH Joint Tissue Bank

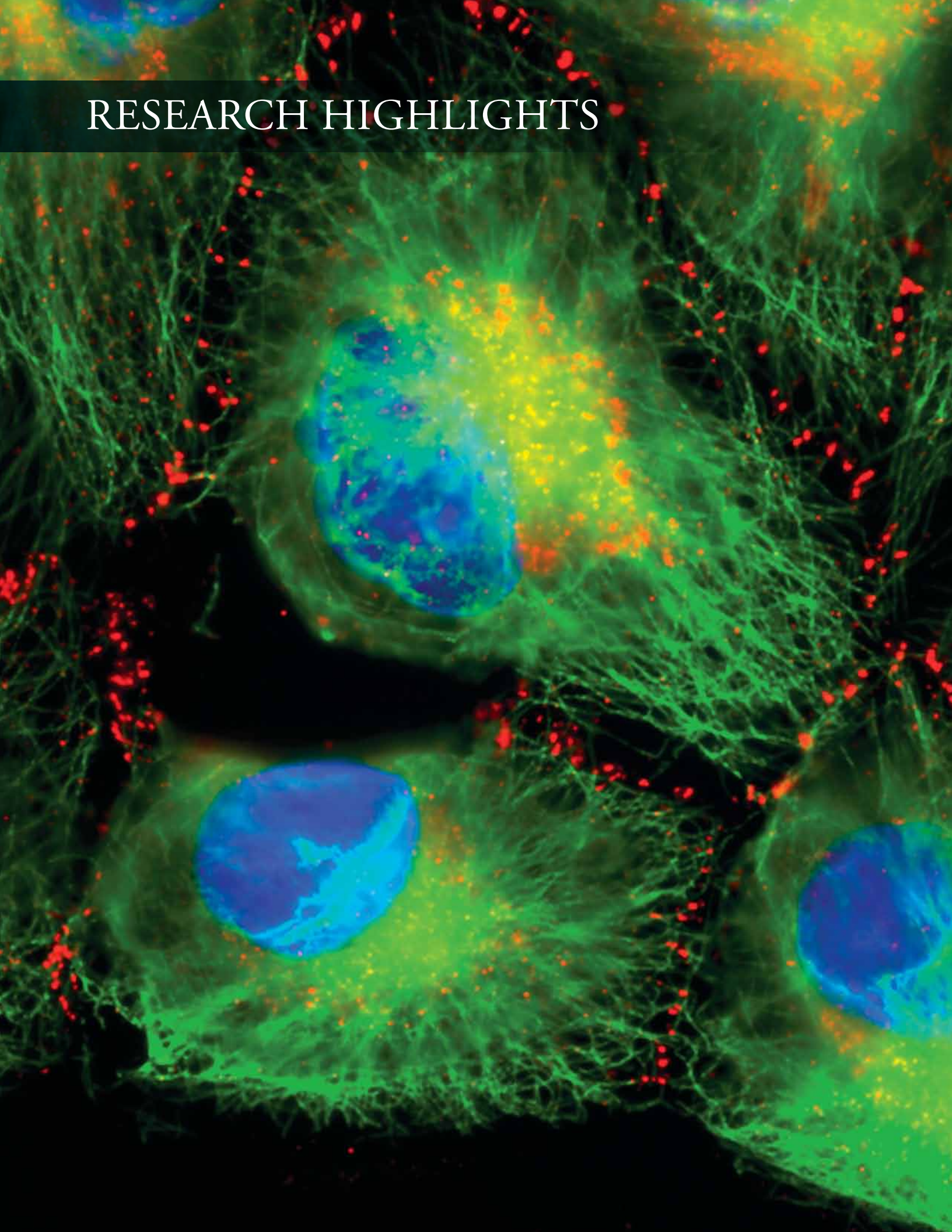
— Hao Xi-Shan, M.D., Ph.D., President, Tianjin Medical University

The TCBA is a group of biorepositories connected to a tissue bank database, hosted at a central facility in China, and managed by the National Foundation for Cancer Research. All participating members of the International Tumor Bank Consortium, and their collaborating research partners, have online access to the database from wherever they are in the world to determine the availability of suitable tissue samples, examine available data, and request information and research support.

Launched in 2004 as a Joint Tissue Bank at the Tianjin Medical University Cancer Institute and Hospital, the TBCA has grown and now includes China Medical University (Shenyang) and its affiliated cancer hospitals, Hong Kong University, and the pharmaceutical companies Amgen and Pfizer. The Ludwig Institute for Cancer Research at the Hospital Alemao Oswaldo Cruz and Instituto Nacional de Cancer Banco Nacional deTumores e DNA in São Paulo, Brazil, and Tata Memorial Hospital in Mumbai, India have expressed interest in joining this truly International Tumor Bank Consortium.

With access to many different cancer types collected and stored in research hospital facilities meeting the highest international biorepository standards, the TBCA is a true public/private partnership with major tissue collections including breast, lung, liver and prostate cancers, and pediatric brain tumors.

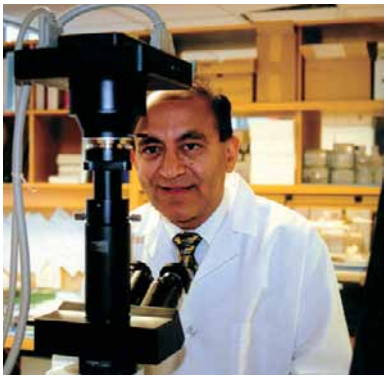
RESEARCH HIGHLIGHTS



In laboratories across the United States, Europe, and China, NFCR scientists and their research teams are working at the cutting-edge of cancer research today. Highlighted here is a sampling of the important research breakthroughs in fiscal year 2009. To learn more about the latest research by NFCR scientists, visit www.NFCR.org.

ANTI-ANGIOGENESIS: SHUTTING DOWN CANCER

Harold F. Dvorak, M.D. – *Beth Israel Deaconess Medical Center,* is an NFCR Fellow and Albert Szent-Györgyi Prize winner for his discovery of vascular permeability factor/vascular endothelial cell growth factor (VPF/VEGF). Dr. Dvorak's work has led to the development of the anti-angiogenic therapies, a new generation of anti-cancer drugs that target tumor blood vessels. Dr. Dvorak's recent discoveries demonstrate that the therapeutic effects of individual anti-angiogenic drugs distinguish among different types of tumor blood vessels. His team has now identified several potential new therapeutic targets for inhibiting angiogenesis. Dr. Dvorak's work has a significant clinical impact on the research community as it identifies the strengths and weaknesses of anti-angiogenic drugs for treating cancer, guiding the development of this critical component of effective targeted therapy.



Rakesh K. Jain, Ph.D. – *Massachusetts General Hospital,* is investigating ways to repair the highly abnormal tumor blood vessels with anti-angiogenic therapies, opening new windows for chemotherapy and radiation therapy to reach the tumor cells and destroy them. In addition, the group has identified a set of markers in patients' blood that may be directly involved in tumor resistance to current therapy. Dr. Jain's breakthrough discovery is changing the way cancer is treated and may benefit tens of thousands of cancer patients.

Stanley Cohen, M.D. – *Stanford University School of Medicine,* identifies genes that regulate the proliferation and metastasis of cancer cells. The growth factor VEGF has a central role in formation of blood vessels in and around malignant tumors or angiogenesis. In the past year, Dr. Cohen has identified genes in breast cancer that when inactivated, result in the increased expression of VEGF. Identification of novel targets of tumor angiogenesis could further lead to new strategies that offer possibilities for treating breast cancer by inhibiting the vascularization, and consequently metastasis of tumors.

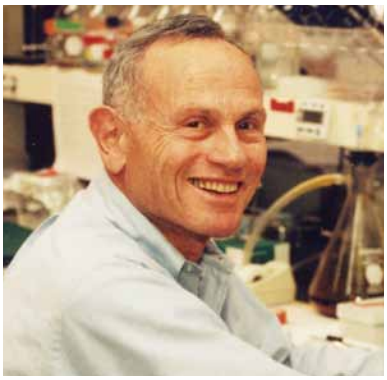
TARGETING OVARIAN CANCER

Robert C. Bast, Jr., M.D. – *M.D. Anderson Cancer Center,* discovered that the protein Salt Inducible Kinase 2 (SIK2) plays a critical role in cell division thereby enhancing the response of ovarian cancer to chemotherapy. By depleting SIK2 from ovarian cancers, Dr. Bast was able to sensitize the cancer cells to taxane, a commonly prescribed chemotherapeutic agent that inhibits cell division, making the drug more effective in stopping the cancer's growth. These findings demonstrate that combination therapies targeting different phases of the cell division cycle are vital for new and better approaches to treating cancer.

The discovery that SIK2 plays a role in cell cycle regulation is groundbreaking as previously the protein had only been linked to cellular metabolism and energy balance. And now, in addition to improving the response of some cancer to taxane, these findings add support to emerging evidence that cancer cell metabolism and cell division functions are coupled.

This research breakthrough has now set in motion the drug discovery process to identify inhibitors of SIK2. Ovarian cancer patients are in great need for new approaches to effective treatments and this new understanding of how to enhance treatment looks very promising.

CANCER PREVENTION



Michael B. Sporn, M.D. – *Dartmouth Medical School,* developed new triterpenoid compounds for the prevention and treatment of cancer. His highly fruitful research has resulted in several triterpenoid compounds which have potent preventative effects against liver cancer, melanoma, and highly aggressive lung cancer and two triterpenoids have been evaluated in clinical trials for cancer treatment. He is now testing if the triterpenoid compounds can prevent the development of pancreatic cancer in complex tumor models. Convincing results of preventing pancreatic cancer in the laboratory can be rapidly translated to the clinics to evaluate effective prevention for people who are at high risk of developing this devasting disease.

Janos Ladik, Ph.D. – *University Erlangen-Nurnberg, Germany,* is investigating the cancer prevention effects of DNA intercalating agents. Certain cellular conditions disrupt the normal electronic status of DNA and its surrounding proteins, which can lead to a cancerous state of the cell. Dr. Ladik is investigating DNA intercalating agents which may reverse these detrimental effects and prevent cancer initiation.

Waun Ki Hong, M.D. – *M.D. Anderson Cancer Center,* is a world-renowned cancer researcher who has long been studying the role of smoking on lung cancer development. Dr. Hong is leading his team in building "risk prediction models" from results of their collective research which includes identifying prognostic biomarkers, genetic variations that may indicate patients at risk for lung cancer recurrence, and chemoprevention agents. The risk prediction models are near completion and clinicians may soon be able to provide personalized chemoprevention programs for the best care for smokers or previous smokers who are at high risk to develop lung cancer or for their lung cancer to return.

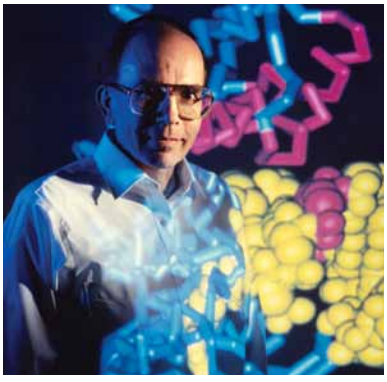
Helmut Sies, M.D. – *Heinrich-Heine-Universität, Germany,* is well recognized for his research on the skin cancer prevention effects of the carotenoid lycopene, the antioxidant found in tomatoes and carrots. His recent research has shown another carotenoid, astaxanthin, which can be found in the skin and tissues of a variety of sea creatures including salmon, trout, and lobster as well as some birds, may be another safe measure for the prevention of UVA-induced skin damage.

PERSONALIZED MEDICINE

Kathryn B. Horwitz, Ph.D. – *University of Colorado Health Science Center,* is working with pregnant women who have pregnancy-associated breast cancer (PABC), the most common cancer during pregnancy, that tends to be more aggressive, more advanced, and have a poorer prognosis than breast cancer in non-pregnant women of the same age. Dr. Horwitz has identified 144 genes in PABC that are significantly overexpessed. Such genes may provide specific therapeutic targets for women with PABC so doctors can provide improved treatment and survival.

Alan C. Sartorelli, Ph.D. – *Yale University School of Medicine,* designed and synthesized Cloretazine, a promising new anti-cancer drug which is showing promise for patients with AML (Acute Myeloid Leukemia), brain tumors, lung, and other types of cancer. In the era of personalized medicine, Dr. Sartorelli's research strives to ensure that doctors select only those patients for whom this drug will work. Cloretazine is only effective in treating patients whose cancers have low levels of a protein called AGT. To assist oncologists in matching patients patients for whom this new anti-cancer drug will work, Dr. Sartorelli developed an assay to accurately measure cell AGT protein levels in cancer patients. Further research shows that an analysis of the AGT gene in tumor samples may also give researchers the ability to determine when and how often certain cancers "turn off" the gene, causing these tumor types to be exceptionally responsive to Cloretazine. The research being done by Dr. Sartorelli will determine a set of the tumor types sensitive to the drug – and this will assist oncologists select and treat cancer patients with a high likelihood of responding well to Cloretazine.

PROTEIN PRODUCTION AND CANCER



Paul Schimmel, Ph.D. – *Scripps Research Institute,* is seeking answers to why cancer occurs more frequently as people get older. Dr. Schimmel discovered that errors in protein

production accumulate over time and occur more often as a cellsage, which can eventually lead to cancer. His recent results with a tumor model demonstrate that defects in the enzyme that normally edits out errors in new proteins do indeed promote the formation of cancer. This novel mechanism of carcinogenesis may introduce new concepts for preventing and treating cancer in aging populations.

NANOSCALE TUMOR-TARGETING DRUG DELIVERY SYSTEM

Esther H. Chang, Ph.D. – *Georgetown University,* developed a nanoscale, liposome-based tumor-targeting drug delivery system that can carry anti-cancer agents directly to both primary and metastatic tumor cells, significantly enhancing a tumor's sensitivity to chemo and radiation therapy. Dr. Chang and her team successfully delivered tumor suppressor gene p53 and anti-HER2 siRNA to tumors, including breast and pancreatic cancer. Currently, the p53 nanocomplex is in clinical trials for patients with solid tumors with very promising preliminary results, and the anti-HER2 nanocomplex may soon enter clinical trials for treatment of breast cancer patients.

MICRORNAS AS MASTER SWITCHES FOR BLOOD CELL MATURATION

Curt I. Civin, M.D. – *University of Maryland, Baltimore,* is elucidating how the survival, proliferation, and differentiation of normal and malignant blood stem cells are regulated, and then translating the results into useful clinical tools. Dr. Civin's team discovered a set of microRNAs functioning as powerful "master switches" that control the maturation of adult blood-forming stem cells. Breaking the code of blood cell maturation may one day enable scientists to grow new blood cells for transplant into patients with cancer or other bone marrow disorders. In the past year, Dr. Civin's research suggests two microRNAs may function in normal blood cells to also suppress the development of leukemias. Stay tuned for the development of the clinical potential of microRNAs for treating leukemia as these scientists unravel the functions of these master biological switches.

CHINESE HERBAL MEDICINES AS BENEFICIAL ADJUNCT TO CANCER CHEMOTHERAPY

The therapeutic effects of traditional Chinese medicines have been documented for centuries. Nowadays, scientists like **Yung-Chi Cheng, Ph.D.,** *Yale University School of Medicine,* are exploring their new applications in modern medicine. Dr. Cheng discovered that PHY906, a Chinese herbal medicine formula described 1,700 years ago, enhances activity of a variety of anti-cancer drugs, while decreasing their toxicity. This formula is currently being studied in clinical trials with colon, liver, and pancreatic cancer patients. If proven effective, PHY906 could become one of the first FDA-approved oral herbal medicines for anti-cancer treatment.

BONE MARROW-DERIVED CELLS AND PROSTATE CANCER

David Lyden, M.D., Ph.D. – *Cornell University,* found that a specific subset of bone marrow-derived cells (BMDCs) facilitate tumor growth by contributing to the formation of new blood and lymph vessels within tumors. A simple blood test measuring BMDCs and its protein VEGFR1 can help to predict which individuals have prostate cancer as well as to determine whether a patient would respond well to standard therapies. In addition, promising new therapies could be developed to target BMDCs and VEGFR1, offering more effective treatment to the patients.

IMMUNOTHERAPY AND VIROTHERAPY

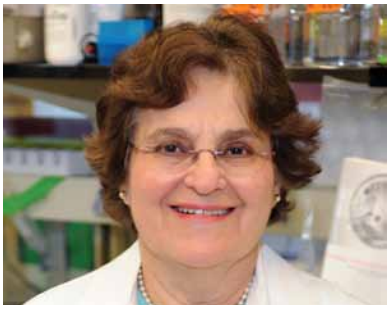
Paul B. Fisher, M.Ph., Ph.D. – *Virginia Commonwealth University School of Medicine,* developed an innovative gene therapy to treat early stage and metastatic prostate cancer. This new therapeutic is a genetically reprogrammed virus which is designed to specifically infect and destroy tumor cells. A smart control system installed into the virus ensures that the viruses only fire on tumor cells and leave normal cells unharmed.

Howard Kaufman, M.D. – *Mount Sinai School of Medicine,* developed a cancer vaccine, MVA-5T4, for the treatment of kidney cancer. During this year, a Phase II clinical trial was completed in which MVA-5T4 was administered along with standard therapy in patients with late stage (metastatic) kidney cancer. The vaccine induced clinical benefit in almost half of the patients and demonstrated a boost in their immune responses. Dr. Kaufman has also identified the first ever biomarkers that can predict how effective the new treatment might be – ushering in a new era of personalized treatment program for patients with kidney cancer.

SOFT TISSUE SARCOMA RESEARCH

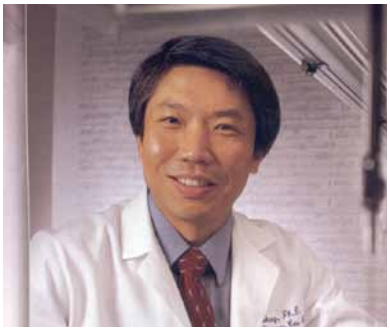
Dina C. Lev, M.D., *M.D. Anderson Cancer Center,* is leading her research team in identifying key molecular players in an aggressive soft tissue sarcoma, known as malignant peripheral nerve sheath tumor (MPNST). Using the unique tissue microarray technology in the past year, the team has identified proteins AKT, mTOR, c-Met, and VEGFR2 as key anti-MPNST therapeutic targets. Dr. Lev is currently evaluating effective inhibitors of these proteins as novel therapeutic approaches to stop MPNST metastasis, for which there are presently none, and save more patients' lives.

DRUG RESISTANCE OF TUMORS



Susan Band Horwitz, Ph.D., *Albert Einstein College of Medicine,* is deciphering how tumors develop drug resistance to Taxol, and is developing new strategies to overcome the drug resistance problem of tumors. Her research has shown Taxol and the natural product, discodermolide, have complimentary effects on stopping cell division, explaining why combining Taxol with discodermolide can enhance the therapeutic activity of Taxol and may even reduce the emergence of drug resistance. The availability of such drug combinations for the treatment of lung, breast, and ovarian cancers could make a significant difference for those patients whose tumors are resistant to Taxol.

IDENTIFICATION OF NEW THERAPEUTIC TARGETS

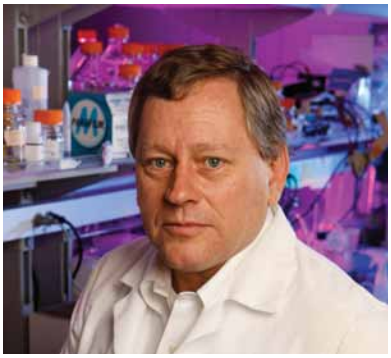


Wei Zhang, Ph.D., *M.D. Anderson Cancer Center,* is conducting an in-depth investigation of key cancer-promoting genes in colorectal cancer. Through a series of analyses using tumor samples from colorectal cancer patients, Dr. Zhang discovered that NGAL, a protein expressed in other cancer types, is also produced in abnormally high amounts in colorectal cancer. During the past year, his team has discovered that NGAL serves as a key driving force in the migration and invasion of colon cancer cells to other tissues. NGAL may be developed as a potential therapeutic target for more effective colorectal cancer diagnosis and treatment, giving these patients the best chance of early detection and survival.

Bin Teah Teh, M.D., Ph.D., *Van Andel Research Institute,* is identifying new molecular signatures of kidney cancer and developing new treatment strategies for this lethal disease. A systematic study of more than 170 human kidney cancer samples yielded a novel molecular target, STK6. Further laboratory tests demonstrated that drugs that inhibit STK6 stop the growth of kidney cancer cells. These findings show that STK6 and its associated proteins have an important role in kidney cancer and may be potent prognostic markers and therapeutic targets for this disease.

Jiayuh Lin, Ph.D., *Children's Research Institute,* is working with his team of scientists in developing more effective anti-cancer compounds to combat the most deadly cancer killer – pancreatic cancer. Dr. Lin's team has developed targeted compounds against a novel drug target, the Stat3 protein, in pancreatic cancer. Further research will evaluate whether a combination of these new targeted therapeutics with conventional chemotherapy drugs could achieve more powerful anti-cancer effects.

TARGETING THE AGGRESSIVE BRAIN CANCER, GLIOBLASTOMA



Webster K. Cavenee, Ph.D., *Ludwig Institute for Cancer Research,* and his team, previously identified EGFRvIII, a variant version of the EGFR (Epidermal Growth Factor Receptor) that is commonly present in the highly aggressive brain cancer, glioblastoma. While anti-cancer therapies targeting this growth factor are initially effective, many times the cancers develop resistance to targeted therapies, allowing the tumors to grow again. In 2009, Cavenee discovered a unique gene in glioma cells, KLHDC8A or SΔE1, which may be the molecule that enables the gliomas to resist EGFR-targeting drugs and continue to grow through an alternative molecular pathway. Approaches to combining current targeted cancer therapies against EGFR with drugs that would block this escape pathway may greatly increase the effectiveness of these approaches to treating glioblastoma, and give patients a chance against this lethal brain cancer.

SZENT-GYÖRGYI PRIZE FOR PROGRESS IN CANCER RESEARCH

Ronald A. DePinho, M.D. accepting the award. Pictured here with his wife, Lynda Chin, M.D.

The 4th Annual *Szent-Györgyi Prize for Progress in Cancer Research* was awarded to Ronald A. DePinho, M.D., Professor and Director at the Belfer Institute, Department of Medicine and Genetics, Dana Farber Cancer Institute and Harvard Medical School. Dr. DePinho won the prize for his groundbreaking discoveries regarding fundamental molecular and biological mechanisms governing cancer and aging.

P*h*RMA President and CEO Billy Tauzin opened the prize ceremony with a keynote address highlighting his personal appreciation for the role NFCR plays in funding research that is leading to better, new approaches to treating cancer. A cancer survivor, Tauzin described how, "after being diagnosed with abdominal cancer, nothing else was working, so I took my doctors' best advice and took a chance on a new medicine" which choked off the supply of blood to his tumor. The new anti-angiogenesis treatment made possible with NFCR's discovery of the protein VEGF was true progress in the war against cancer, and "cancer blinked."

While he said he was lucky to be alive, Billy Tauzin exhorted everyone that we still have a long way to go to cure cancer.

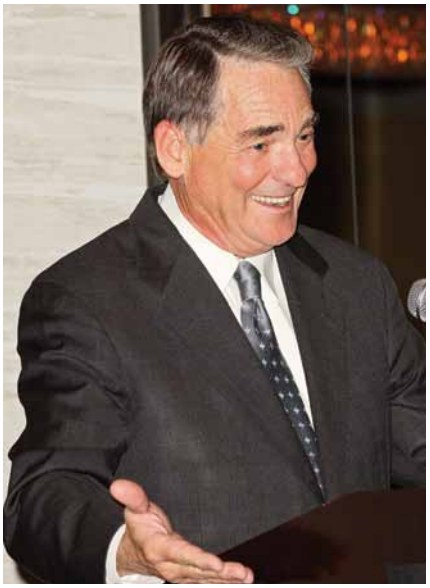
This is reason and more to appreciate Dr. DePinho's research which has resulted in advances across many areas of science and have culminated in several cancer drug discoveries. "Dr. DePinho's research on genetic events in the life history of a cancer cell has advanced our understanding of cancer farther than almost any scientific work in this decade. His work will continue to provide the platform for discoveries and developments for many years and represents a significant leap forward in our understanding of the nature of cancer," said Carlo M. Croce, M.D., Chair for the 4th Annual Albert Szent-Györgyi Prize Selection Committee.

Dr. DePinho's experiments and concepts laid the foundation for use of the inducible cancer model in both research and industry for the exploration of host-tumor interactions and identification of validated drug targets and biomarkers. His discoveries have illuminated the intimate link between advancing age and cancer – a lasting mystery for the cancer field. His research is paving the way for the discovery of new cancer genes and the development of agents in clinical trials – including the use of telomerase inhibitors in cancer.

In accepting this award, Dr. PePinho said he "believed the ideals of this Prize are certainly important, and that Dr. Szent-Györgyi was so instrumental in highlighting the role of basic science in breaking apart cancer's mysteries. Winning this Prize, named in his honor, means a great deal to me personally. I am humbled to have been selected by my peers to receive it, and to have my name added to the other winners whom I admire. It is my continued desire to see the discoveries I have advanced, make a significant long-term impact on those patients who suffer from cancer. The support of the National Foundation for Cancer Research over the years, both for this Prize and for basic cancer research, has been a vital part of many significant research discoveries."

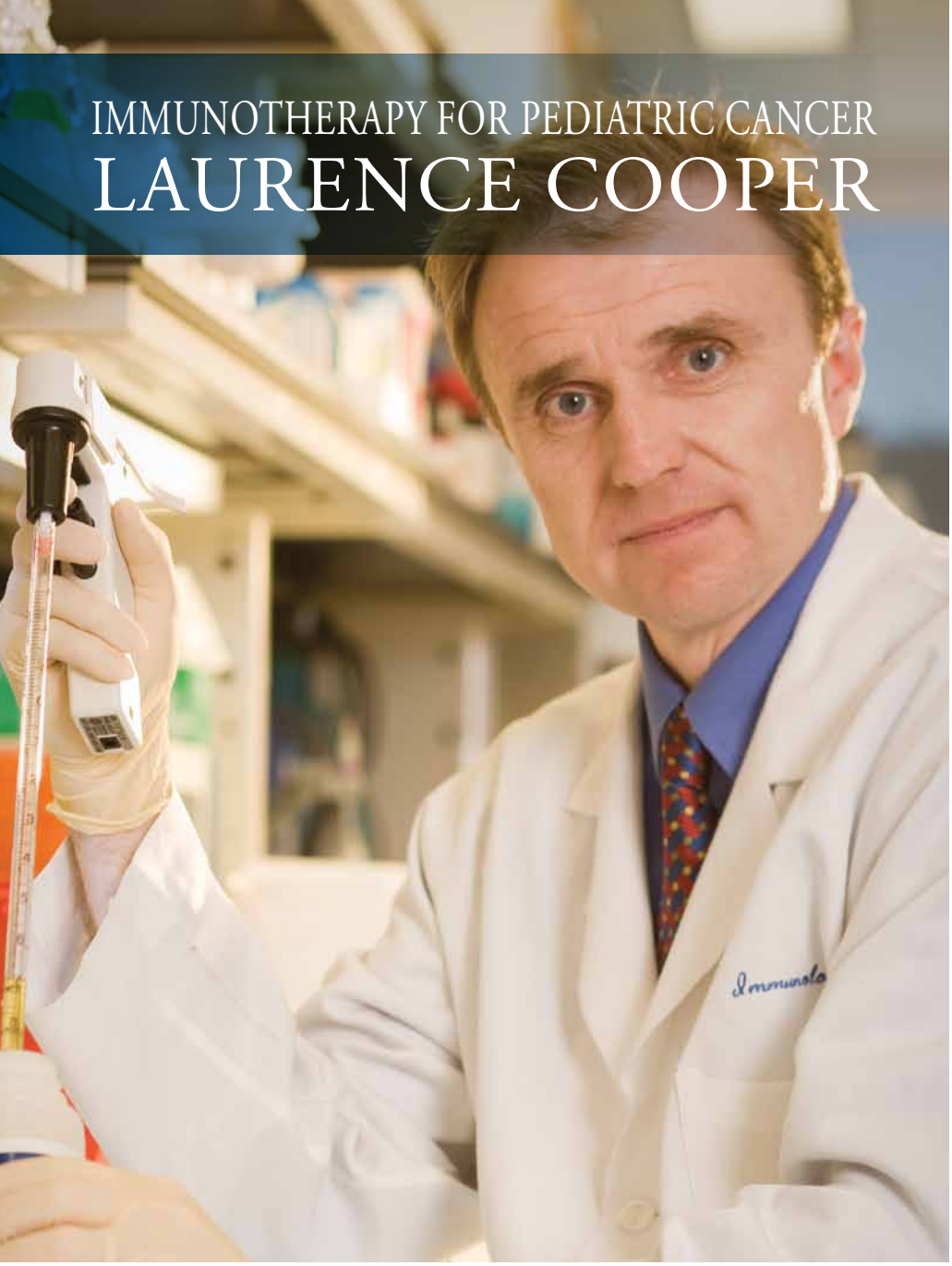
Albert Szent-Györgyi, M.D. won the Nobel Prize for Physiology and Medicine in 1937 for his discovery of on Vitamin C. In 1973, Dr. Szent-Györgyi changed the face of cancer research by helping found NFCR, to provide scientists with the financial support necessary to pursue innovative, basic cancer research.

The 4th Annual Albert Szent-Györgyi Prize selection committee was co-chaired by the most recent prize recipient, Carlo M. Croce, M.D. and Sujuan Ba, Ph.D. Committee members included Paul Fisher, Ph.D.; Richard Gaynor, M.D.; Doug Hanahan, Ph.D.; Curtis C. Harris, M.D.; Richard O'Reilly, M.D.; Peter Vogt, Ph.D.; and Daniel Von Hoff, M.D. FACS.



Keynote speaker, PhRMA President and CEO Billy Tauzin.

IMMUNOTHERAPY FOR PEDIATRIC CANCER
LAURENCE COOPER



NFCR Researcher Dr. Laurence Cooper is "tipping the scales" in favor of children beating cancer.

While breakthroughs in cancer research have resulted in new approaches to treating many cancers, effective treatments are not yet available for 20–25% of children diagnosed with cancer – and few new drugs appear to be coming anytime soon.

Granted, cancer during childhood and adolescence has been transformed since the 1950s from a death sentence into long-term survival for many children. Progress has come mainly through more intense use of decades-old drugs developed originally for adult cancers. Our ability to move ahead has waned, and overcoming the most difficult cancers with higher doses is not likely to succeed anymore.

So why are pediatric oncologists still having to use anti-cancer drugs developed in the 1950s and 1960s? Because they have no better choices. And for some types of children's cancer, there are no cures.

Nowhere is this more true than for children with acute lymphoblastic leukemia (ALL), one of the most common pediatric cancers. Children with ALL are still being treated with anti-cancer drugs developed fifty to sixty years ago.[1] Unquestionably, these chemotherapies in combination have produced improvements in survival rates, but while these drugs kill a lot of cancer cells, they don't kill them all, and those that survive regroup and adjust and multiply and return with a vengeance. Many hematologists don't even want to use them in children for they feel it just prolongs the agony, making them suffer and with serious side-effects.

This is the dark side associated with so many aggressive chemotherapies responsible for improved survival rates in pediatric cancers. The molecular and biological characteristics of most childhood cancers differ substantially from those of adults, and studies of survivors of pediatric cancer demonstrate that approximately 40% of patients in their adult years experience health complications which are serious enough to warrant medical intervention. In many cases, these complications are chronic and debilitating and can be traced directly to their earlier treatment.

Despite being able to markedly increase survival in pediatric cancer patients, there is still much work to do. We need better science to unravel the molecular underpinnings that drive childhood cancer. We need better anti-cancer drugs for children who do not respond to currently available treatments. We need better clinical trial designs to increase efficiency of the drug development process and to optimize how we treat children with the new generation of molecularly targeted anti-cancer drugs.

NO PROFIT IN PEDIATRIC CANCER

Despite so many tantalizing leads from basic science, there is a near-complete void in new anti-cancer drugs for pediatric cancers. So why aren't there any new agents with therapeutic potential for pediatric cancers? The short answer is money. As devastating as cancer is in children, the numbers affected are too small to drive new drug discovery and innovation for pediatric cancers.

With the average cost of research and development to bring one drug to market

at $802 million – and given that 1 in 1,000 new compounds that enter preclinical testing ever make it to human testing, and only 1 in 5 agents that enter human trials receive FDA approval[2] – it is little wonder that pharmaceutical companies would hesitate to invest in pediatric cancer treatments. The total number of new pediatric cancer diagnoses is miniscule compared with the total number of new adult cancer diagnoses. Whereas 10,730 new cases of pediatric cancer were expected to occur in the United States in 2009, a staggering 1,479,350 adults were expected to be diagnosed with cancer in the United States.

And once pediatric cancers are broken down by individual diagnoses, their numbers relative to adult cancers become exceedingly small. Basic economics clearly favors investment in a treatment for the estimated 194,000 adults diagnosed in 2009 with breast cancer over a treatment for a mere 375 children diagnosed with rhabdomyosarcoma.[3]

Yet cancer is the most common cause of nonviolent death for children in the United States. One in 300 children will be diagnosed with cancer by the time they are twenty. Public health officials have even developed a measure by which to calculate the high incidence of "life years" lost to childhood cancers, and in the United States today the cumulative number of lost "life years" in pediatric cancers far exceeds the "life years" lost to cancer in adults.

While perhaps not sufficient to warrant the enormous investments required to develop new anti-cancer treatments, at NFCR we believe these "life years" lost to children with cancer demands that we reenergize ourselves to improve the treatment of pediatric cancer by developing new and more effective anticancer drugs designed especially for children. Any child's death from cancer warrants our resolve to support research that will prevent this from happening.

Although many obstacles remain to pediatric cancer drug development, none are insurmountable. Our little patients require the ingenuity, creativity, cooperation, and perseverance of individuals and organizations dedicated to putting themselves out of business.

Today many pediatric oncologists, especially those operating in large cancer hospitals, often learn about new anti-cancer drugs when adult cancer patients are recruited for clinical trials. Occasionally, these new cancer therapies designed for the treatment of adult tumors "trickle down" into the pediatric oncology clinical setting. However, even this can be erratic, and many times anti-cancer drugs designed to improve the 5-year survival rate for adults with cancer do not work for pediatric cancer patients for whom we work and pray to make decades of cancer-free survival possible.

So with support from the National Foundation for Cancer Research, cancer researchers at the M.D. Anderson Cancer Center in Houston, Texas have launched a research initiative to generate new targeted therapies for childhood cancers. They agree with NFCR that waiting for new anti-cancer drugs to "trickle down" to pediatric oncologists treating children with cancers simply takes too long.

NFCR is taking the lead in developing a new model designed to break this impasse, accelerate our response to promising laboratory results, and move promising new anti-cancer treatments into clinical trials as quickly as possible. This "results oriented" model is exemplified by Laurence Cooper, M.D., Ph.D., whose research promises to bring new hope to children suffering from many different pediatric cancers.

Dr. Cooper has embarked on a program to generate anti-cancer "drugs" using a child's own immune system. In particular, he has developed technologies to turn T cells, a type of white blood cell, into potent anti-cancer weapons. Dr. Cooper has developed a gene-based method for modifying a child's own T cells to redirect the T-cell's anti-Cancer specificity so that it relates to a given tumor type. These genetically-modified T cells can be grown in the laboratory using specialized "feeder cells" developed from a child's tumor cells. These feeder cells are referred to as "artificial antigen presenting cells," or AAP cells, and when added to the genetically-modified T cells, these AAP cells cause the tumor-specific T-cells to multiply in great numbers so that they can be packaged and then infused into the child.

Not only has Dr. Cooper developed the necessary pre-clinical data for this new class of therapies, but, as a pediatric oncologist,

(Continued on Page 19)

[1] Pediatric oncologists treating children with ALL must rely on drugs like vincristine, 6-mercaptopurine developed in the 1950s, or asparaginase or doxorubicin developed in the 1960s. These anti-cancer chemotherapeutic agents continue, by default, to be regularly used by pediatric oncologists still today.

[2] DiMasi JA, Hansen RW, Grabowski HG, "The price of innovation: new estimates of drug development costs", J Health Econ 2003;22:151–85.

[3] Jemal A, Tiwari RC, Murray T, *et al.,* "Cancer statistics, 2004", CA Cancer J Clin 2004;54:8–29; Miller RW, Young JL, Jr., Novakovic B., "Childhood cancer". Cancer 1995;75:395–405.

TAKING ACTION AGAINST CANCER

Donor-initiated and corporate-sponsored special events are great ways to show support for cancer research and turn a passion to cure this disease into action. These events and programs help raise funds and awareness while also serving as a catalyst for many top supporters of cancer research and prevention education to collaborate, expand their knowledge, and increase their commitment to helping NFCR find cures for all types of cancer. Below are a few examples of how people around the globe took action against cancer:

"HELP STRIKE OUT SUN DAMAGE" PROGRAM

New York Yankees' first baseman, Mark Teixeira, the makers of COPPERTONE®, and NFCR, teamed up for "Help Strike Out Sun Damage," a campaign to raise awareness about the risks of incidental sun exposure – the kind one can get from playing sports outside, or even just enjoying a game from the stands – and the importance of staying protected. Teixeira, NFCR, and COPPERTONE SPORT® invited Americans to visit **www.coppertone.com** to take the "Help Strike Out Sun Damage" pledge. For every person who took the pledge, COPPERTONE SPORT® donated one dollar, up to $30,000, to the NFCR to fund skin cancer research.

Dr. Elizabeth Hale, Clinical Associate Professor of Dermatology at the New York University School of Medicine, and Mark Teixeira of the New York Yankees, with the Coppertone® - DermaPhoto Booth™

DAFFODILS AND DIAMONDS LUNCHEON

Diamonds dazzled, daffodils bloomed, and professional models strutted the runway at the 28th Annual Daffodils and Diamonds Luncheon at Congressional Country Club in Bethesda, MD. This event has been a spring ritual in the D.C. area since 1981, drawing hundreds of women and raising more than $500,000 since its inception to fund breast and ovarian cancer research. This year's event was emceed by Maureen Bunyan, WJLA-TV News Anchor, co-chaired by Polly Sturm and Lynn Novelli, featured fashions from Etcetera, with jewelry by Judy Bliss, and included guest of honor Tim Quinn, the Celebrity Make-Up Artist for Giorgio Armani Beauty. Sponsors included Gucci, Lancôme, and P*h*RMA.

CANCER RESEARCH: IT'S PAR FOR THE COURSE!

The 6th Annual *Golf for a Cure Classic* was held at the Kenwood Golf and Country Club in Bethesda, MD. The tournament raised over $80,000, and brought nearly 150 golfers from around the world together for a fun day and a great cause. "It was an exhilarating day! It was a successful outing for a great cause," exclaimed Co-Chair Sarah Funt, Long & Foster. "Both players and sponsors recognize how, by supporting NFCR's cutting-edge research, we are making possible new approaches to treating cancer." The tournament was sponsored by Calmark, Inc., with other significant sponsorships from the American Chemical Society–Tech Catalyst, YM Biosciences, Medelis, Inc., Merkle Inc., and CP Direct. To learn more, visit **www.GolfforaCure.org** or email *golf@nfcr.org*.

THE LUCY FUND

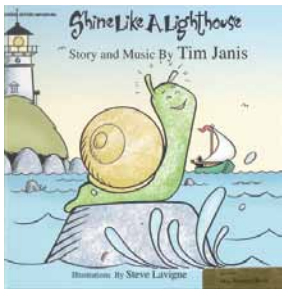
Lucy Stanovick, a college professor and mother of two, was diagnosed with Stage IV metastatic breast cancer at the age of 42. "There is no cure for cancer at this late stage," explains Lucy. An estimated 90% of all cancer patients die from metastasis – the spread of cancer like Lucy's – yet less than 1% of all research is focused on it. When asked why this is, NFCR Scientist, Dr. Danny Welch, explains, "It's hard. It doesn't come with immediate gratification. In fact, there are only a handful of people masochistic enough to do it." Inspired by Dr. Welch, Lucy created the annual "The Lucy Fund," raising over $20,000 to date for Dr. Welch's research.

MUSICIAN JIM COLE SPEAKS OUT TO SILENCE CANCER

Jim Cole, an International Christian Recording Artist who has garnered six top-three radio singles and performed before thousands across the country, offered his Special Edition CD Merciful God, to help raise funds for the Cancer Patient Assistance Program. "It is a pleasure and an honor to endorse the work that the National Foundation for Cancer Research is doing in cancer research. Everyone is touched by a friend or loved one who is struggling with this disease, or whose life has been taken." Through his CD Matching Gift Challenge, Jim has helped raise over $360,000 dollars for the Cancer Patient Assistance Fund. Visit **www.nfcr.org/jimcole** to learn more.

BARBARA BUSH CHILDREN'S BOOK HELPS FIGHT CANCER

Former First Lady and reading advocate Barbara Bush joined composer Tim Janis and the National Foundation for Cancer Research on a new children's book, *Shine Like a Lighthouse.* The book is an empowering story about a snail who uses his positive attributes to "shine". 100% of net proceeds from the sale of the book go to the Cancer Patient Assistance Fund at NFCR. "Children are a bright light in the world and every child is so special. It is my sincere desire that this book will become a beacon of light to those whose families, children and other loved ones are suffering from cancer," said Barbara Bush. Books can be purchased online at **www.nfcr.org/shine** or by calling (800) 321-CURE (2873).



COMPOSER TIM JANIS RAISES THE BAR FOR CANCER RESEARCH

Tim Janis is an American composer with 10 Billboard charting CDs, over one million albums sold, four National Public Television Specials, and a constant touring presence. Tim also has a passion for making a difference: he has dedicated four Special Edition CDs to the National Foundation for Cancer Research, with proceeds to benefit cancer patients. Says Tim, "All of our lives are precious and special in some way, and nothing is more precious than the good health we need to be able to do the things we love." Tim also presented a CD Matching Gift Challenge to the cancer research community, which has raised nearly one million dollars for the National Foundation for Cancer Research. Visit **www.nfcr.org/timjanis** to learn more.

IMMUNOTHERAPY FOR PEDIATRIC CANCER *(cont.)*

he recognizes with NFCR the urgent need to test this therapeutic approach in children with cancer. Dr. Cooper has assembled the necessary infrastructure to manufacture these tumor specific T cells so that they can be used in clinical trials.

Using this new technology to target tumors in children is another example of how NFCR scientists promote the movement of laboratory discoveries directly into clinical trials, speeding the development of new anticancer drugs designed specifically for children.

This breakthrough was made possible by Dr. Cooper's fundamental understanding of immunology, as well as an appreciation for how new therapeutic candidates can be introduced into the clinical setting. This is not something that he learned in medical school as part of his MD/PhD studies. Rather, Dr. Cooper has learned through practical experience how to refashion his laboratory to mimic some of the qualities of a biopharmaceutical company, albeit one that operates within the non-profit setting of MDACC. With NFCR, he is combining research with development and so streamlining the process to move quickly into a manufacturing mode and on to the child's bedside.

To understand the therapeutic potential of genetically modified T-cells, Dr. Cooper needed to build a team within his

laboratory that is skilled in conducting correlative studies. This made it possible for Dr. Cooper and his colleagues to understand the persistence of the infused T cells and their ability to travel to tumor sites, and to determine the nature and extent of any anti-tumor effect.

It would not be possible to infuse T cells into medically fragile children in a typical clinical environment, so Dr. Cooper worked with his colleagues to bring the skilled physician, nursing, pharmacist, and allied health personnel on board to complete the multidisciplinary team needed to provide quality compassionate care for children receiving these cutting edge immunotherapies.

This type of translational science is complex and challenging. It requires a thorough understanding not only of scientific issues, but also of the translational hurdles that need to be overcome to advance the research into the clinic. And this means understanding the myriad rules and regulations that impact the way new therapies are developed and tested in the United States.

Unlike a pharmaceutical company with legions of personnel dedicated to the regulatory process, Dr. Cooper had to develop his own regulatory team to liaise with both internal and governmental review boards overseeing drug development so that his technology could be tested in children in a timely manner. All of these skills and talents had to be brought together within the Children's Cancer Hospital at MDACC to work as a seamless unit in order to translate the Cooper Laboratory's research on modified T cells.

National Foundation for Cancer Research funding makes it possible for innovative cancer researchers like Dr. Cooper to seamlessly translate their discoveries from pre-clinical development into clinical testing. With NFCR support, Dr. Cooper is now successfully moving his ideas "from the bench to the bedside", giving hope and promise to many children with his new approaches to treating pediatric cancers.

Dr. Cooper's NFCR research is improving treatment outcomes and giving back lost "life years" to children with cancer.

EXTRAORDINARY SUPPORT

The NFCR Legacy Society: Donors Committed to the Conquest of Cancer

The Legacy Society recognizes donors who have chosen to create a substantial legacy in cancer research by leaving a gift to NFCR through their estate, or by utilizing other planned gift vehicles to support NFCR's cutting-edge cancer research. We are grateful to these donors for their dedication and foresight, and are proud to recognize them through membership in the NFCR Legacy Society.

Members of the Legacy Society may designate their gifts to NFCR in general, to a specific NFCR research program, for work focused on a specific cancer type, or to a favored aspect of cancer research.

Estate gifts are made through a will or trust. Planned gifts are generally made from a donor's assets. Important financial, tax, and estate planning goals should be taken into consideration as such commitments are made in order to maximize the benefit to both the donor and NFCR. Therefore, NFCR encourages donors to consult with their tax or legal advisors before making a planned gift commitment. Inquiries from advisors are welcome.

Enrollment in the NFCR Legacy Society is simply a matter of advising NFCR of the creation of a legacy gift: a bequest in a will or through a living trust, designation of NFCR as a beneficiary of a retirement plan or IRA, an investment or savings account, or a life insurance policy. Society members receive invitations to special, Legacy Society events, as well as frequent cancer updates from NFCR containing information on the newest developments in the fight against cancer. We, of course, honor requests for donor anonymity, but hope that by sharing the names of our generous Legacy Society donors, others will be inspired to join them and make their own lasting contribution to cancer research.

We are proud to welcome these new members into the NFCR Legacy Society who made their intentions known by December 31, 2009.*

**List of NFCR Legacy Society Members can be found at www.NFCR.org*

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