



60 Years

Advancing Knowledge,
Education and Patient Care
Through Biomedical Research



1945-2005





“It is through The Cleveland Clinic Foundation ... that a continual policy of active investigation of disease will be assured. That is to say, we are considering not only our duty to the patient of today, but no less our duty to the patient of tomorrow.”

— Dr. George Crile, Founder,
The Cleveland Clinic,
at the opening of the first
Clinic building on February 26, 1921



Since its creation in 1921, The Cleveland Clinic has been committed to patient care, research and education. Dr. George Crile, one of the Clinic's founders, was dedicated to the investigation of the causes and novel treatments of disease as a vital component of the Clinic's mission and worked tirelessly to incorporate basic and applied science into the continuum of patient care.

That beginning heralded a unique model of collaboration – an environment in which laboratory-based and clinical researchers work closely together. The sense of scientific community and emphasis on partnership thrives even more strongly today at the Cleveland Clinic Lerner Research Institute. It is the key to successfully and quickly translating the discoveries in laboratories into novel therapies for patients worldwide.

The size and scope of research has grown substantially in the 60 years since the Division of Research was officially created in 1945. What started with a handful of researchers focused on cardiovascular diseases has expanded to include more than 120 Principal Investigators, several dozen junior faculty and hundreds of postdoctoral researchers, graduate students, technologists and support personnel. Today, laboratory-based researchers focus on cardiovascular, cancer, neurologic, musculoskeletal, allergic and immunologic, eye, metabolic and infectious diseases.

Initially funded solely by The Cleveland Clinic Foundation, the advances by the Division of Research soon attracted the attention of public and private contributors. In 1962, the Division received its first public funding with one of the first program project grants from the National Heart Institute. Today, the Lerner Research Institute is one of the top-ranked institutes nationally in National Institutes of Health funding, receiving an estimated \$83 million in 2005.

The Lerner Research Institute also is an essential component of the Cleveland Clinic Lerner College of Medicine of Case Western Reserve University. Its researchers hold key faculty positions, and Institute faculty helped formulate and teach sections of the novel five-year curriculum. The Institute provides the laboratory research environment and training opportunities for the physician-scientists-in-training. The first class of CCLCM doctors will graduate in 2009.

The Institute has undergone many changes since its inception 60 years ago. But its mission has never wavered: to promote human health by investigating the causes of disease, to discover novel approaches to prevention and treatment of diseases, to be productive collaborators with clinicians, and to train the next generation of biomedical researchers.

On behalf of The Cleveland Clinic, I congratulate the Lerner Research Institute on 60 years of world-class research and look forward to an exciting future of investigation and discovery.

A handwritten signature in black ink, appearing to read 'DMC'.

Delos M. Cosgrove, M.D.
Chief Executive Officer and President
The Cleveland Clinic

From its earliest days, the researchers who guided the Division of Research envisioned an environment of discovery that did not conform to artificial boundaries or organizational charts. Rather than compartments with their respective programs acting independently, innovators such as Irvine H. Page, M.D., and F. Merlin Bumpus, Ph.D., created an atmosphere that encouraged communication and collaboration among basic researchers and clinician scientists.



It was a unique organizational structure at the time. It is a research structure and culture that continues to serve the mission of The Cleveland Clinic extremely well after 60 years.

This culture of collaboration encourages faculty, trainees and other laboratory personnel to focus on disease-oriented programs, while answering the most basic of questions about the functioning of cells and organisms. One cannot understand disease without understanding how a cell or individual functions normally under healthy conditions. Because of the multidisciplinary and basic nature of many of the laboratories, individual discoveries often impact a number of diseases.

The leadership of The Cleveland Clinic has always understood the importance of creating and maintaining world-class facilities to attract and retain the very best biomedical researchers. In 1999, the Institute's scattered research space was, for the most part, consolidated in the new state-of-the-art Lerner Research Institute complex. The latest wing, which opened in 2005, is the Center for Genomics Research building – home to the new Genomic Medicine Institute and the proposed Regenerative Medicine Institute. Today, there is more than 656,000 square feet of laboratory space at the Clinic.

The Institute is expanding in many critical areas of research, and three areas offer great promise – human genomics, regenerative medicine and nanotechnology.

As it has for the past 60 years, the Lerner Research Institute will remain committed to its core purpose: to investigate the underlying causes of diseases and to find new treatments and cures through high-impact discoveries in the basic and applied sciences. We will continue to emphasize collaborative research in which basic and clinical researchers build on their partnerships to speed the translation of major discoveries in the laboratory to new therapies for patients.

I invite you along for the next 60 years of discovery and exploration.

A handwritten signature in black ink that reads "Paul E. DiCorleto". The signature is written in a cursive, slightly slanted style.

Paul E. DiCorleto, Ph.D.
Chairman
Lerner Research Institute



“The scientist values research by the size of its contribution to that huge, logically articulated structure of ideas which is already, though not yet half built, the most glorious accomplishment of mankind.”

— Sir Peter Brian Medawar (1915-1987),
British immunologist and
Nobel Prize winner in medicine

The Early Years



Basic and clinical research have been integral parts of The Cleveland Clinic's mission since its creation in 1921 when the founders, Drs. Frank E. Bunts, George W. Crile, William E. Lower and John Phillips, agreed to devote no less than one-fourth of the net income of their Clinic to research and indigent care.

All of the founders participated in research, but Dr. Crile took the most active role and was the strongest advocate, believing that laboratory discoveries were essential in providing a scientific basis for modern clinical practice. In the early years, research focused on biophysics, biochemistry, urology, endocrinology, hematology, comparative anatomy and physiology.

The original research building was opened in 1928, and several small research laboratories remained scattered about the campus through the end of World War II.

Hugo Fricke, Ph.D., was the first scientist to direct research in biophysics. Fricke and Maria Telkes, M.D., measured the thickness of cell membranes and showed their relationship to electrical charges in living cells – widely viewed as important contributions to a complicated field. Later, biochemistry became a central focus. In 1930, for example, D. Roy McCullagh, Ph.D., became a pioneer in the measurement of thyroid function through iodine levels in the blood, and his work on inhibin was among the earliest on the well-known family of statins.



Basic science laboratories, 1920s



Original research building entrance

“... It seems to me a pity either to weaken or lose the research approach to the patients’ problems, which has always been an integral part of good medical practice, or to lose the humanitarian philosophy of the good doctor.”

— Irvine H. Page, M.D., 1963



The Irvine H. Page Years



In 1945, Irvine H. Page, M.D., renowned for his groundbreaking research in hypertension, was named the Director of the newly created Division of Research. Dr. Page's philosophy of research was one of collaboration – scientists from several disciplines working together without the constraints of departmentalization – in areas ranging from hypertension and arteriosclerosis to surgical treatment of congenital and acquired heart disease and dialysis for kidney disease and transplantation. Clinical observations and research that included studies in the basic science laboratory blended together in a multidisciplinary approach, and laboratory scientists were encouraged to work side-by-side with clinical researchers – an approach that continues today in the Lerner Research Institute.

Initially, the focus of the Division of Research was primarily cardiovascular diseases. The increasing rates of heart attack, stroke and hypertension by the 1940s placed a new emphasis on the study of these diseases. The Division attracted more researchers in the fields of atherosclerosis and high blood pressure research.

It was during this period that Division of Research scientists made many influential advances:

- Prior to coming to The Cleveland Clinic, Dr. Page and colleagues had discovered a substance they initially called “angiotonin” – a name later refined to “angiotensin.” The discovery was made simultaneously by researchers in Brazil. Angiotensin plays a profound role in hypertension and is a chief regulator of hormone secretion from the adrenal glands. Dr. Page continued studies of the renin-angiotensin system at The Cleveland Clinic. The first chemical synthesis of the compound by F. Merlin Bumpus, Ph.D., and others at the Clinic contributed greatly to the development of antihypertensive medications used today.
- Dr. Page, along with Arda Green, Ph.D., and Maurice Rapport, Ph.D., identified a compound later called “serotonin” – an agent that profoundly impacts the brain as a transmitter of nerve impulses and plays an active role in the formation of certain intestinal tumors. The discovery would pave the way for modern medications for the treatment of anxiety, depression and other behavioral and physiological functions.

1945-
1966



Irvine H. Page, M.D. (right)

“Further, medicine must be as scientific about the care of patients as about the causes and mechanisms of disease.”

— Irvine H. Page, M.D., 1967



Early dialysis machine



Helen B. Brown, Ph.D. (left)

- Willem J. Kolff, M.D., Ph.D., of The Netherlands, relocated his research in artificial kidneys to The Cleveland Clinic. At first, the Clinic provided the sole financial support for the research, but private foundations, as well as the National Institutes of Health (NIH), soon saw the potential and began funding Kolff's projects.
- Dr. Page also developed the “mosaic theory” of hypertension that states that hypertension rarely has one cause; rather, it results from shifts among many conditions.
- Extensive study of the effects of antihypertensive drugs by Dr. Page and Harriet P. Dustan, M.D., and their colleagues was aided by the integration of patient care, clinical study and laboratory research.
- Robert Tarazi, M.D., and Subha Sen, Ph.D., were the first to show the effectiveness of various antihypertensive drugs in reversing cardiac hypertrophy.
- Other advances included atherosclerosis research that led to the then-landmark theory by Helen B. Brown, Ph.D., that fat levels could be modified by changing diet; the first effort to explain how cholesterol is deposited in blood vessel walls; proof that the brain regulates blood pressure; and the discovery of clot-like deposits caused by a protein in the blood called fibrinogen.

In 1945, Dr. Page along with local Cleveland businessmen founded the American Foundation for High Blood Pressure. It later became the Council for High Blood Pressure Research of the American Heart Association. The Lerner Research Institute would later establish the annual Irvine H. Page Lecture Series to honor the memory of the Division's first Director. The American Heart Association would later name one of its coveted, highly competitive prizes to young investigators after Dr. Page. Lena Lewis, Ph.D., advanced the understanding of lipoproteins and their

role in cardiovascular diseases, the effects of diet on serum lipids, cholesterol dynamics and atherogenesis. Dr. Lewis, a member of the Research Division, was on Staff from from 1941 to 1975.

The Division also was a pioneer in providing an environment of scientific discovery for women. The first five women to be full Staff members at the Clinic were in the Division of Research: Maria Telkes, Ph.D. (1928); Lena Lewis, Ph.D. (1941); Arda Green, M.D. (1945); Helen Brown, Ph.D. (1948); and Harriet Dustan, M.D. (1951).

At its start, The Cleveland Clinic was the sole source of funds for the Division of Research. By the late 1950s, however, increased competition, escalating costs and a desire to raise research's public profile encouraged the Clinic to seek alternate funding sources. In 1962, the National Heart Institute awarded one of its first major program project grants to investigators at the Clinic, starting a trend of federal grants being a critical part of the Division's growth. During this time, gifts from individuals and corporations also started to factor into the financial support of research.

“ I think it can be simply stated, if we don't pursue excellence, we won't have excellence. We have to care.

— Harriet P. Dustan, M.D., 1963,
Cleveland's "First Lady of Research"

“**S**cientific discovery will not stop ...
Science gives [us] tools to change life but
also those to control the change.”

— Irvine H. Page, M.D., 1972



“The leadership [of The Cleveland Clinic] always felt that the research division was an important part of the Clinic’s mission. It always has been a concept that research here should be applicable to clinical practice, more as it relates to advancing knowledge of the disease process. As the years have gone by, there’s more of an emphasis on trying to make the aims of research relevant to clinical problems.”

— Allen Ehrhart, Ph.D.,
former researcher (1964-99) in what is
now the Department of Cell Biology, 2005

The F. Merlin Bumpus Years



In the early 1950s, F. Merlin Bumpus, Ph.D., joined the Division of Research and would take the leadership role in synthesizing angiotensin – a major breakthrough that helped to spur development of antihypertensive drugs.

During the next nearly 20 years, the Division of Research expanded its scope and was organized into the departments of Cardiovascular Medicine, Immunology (a natural evolution in the Clinic's growing interest in organ transplantation, autoimmune diseases and cancer), Artificial Organs (including Biomechanics), Biostatistics and Clinical Science. Dr. Bumpus also expanded the development of outside funding.

During the 1960s, researchers like Harriet Dustan, M.D., helped to explain the role of renal vascular disease as well as the humoral, hemodynamic and neurologic aspects of hypertension. Dr. Dustan also would be named as Division Vice-Chair in 1971.

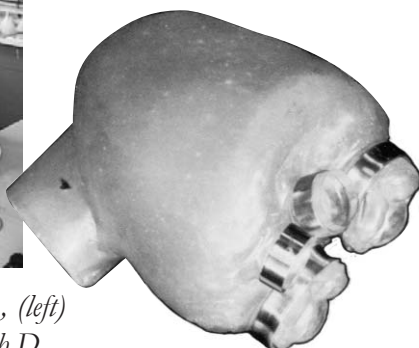
Yukihiko Nosé, M.D., Ph.D., the Chair of the Department of Artificial Organs, oversaw pioneering experimental and developmental work on artificial kidneys and hearts.

Starting in the mid-1970s, faculty were added to bolster research to study the immune response, immunological tolerance, cytotoxic white cells, leukemia and inflammatory bowel disease. In the early 1980s, Cleveland Clinic scientists were among the first to formulate the lipoprotein oxidation theory of atherosclerosis.

Because of Dr. Bumpus' interest in training young scientists, the annual F. Merlin Bumpus Junior Investigator Awards would be created to highlight excellence in research by graduate students and postdoctoral fellows in both basic and clinical areas.



Leonard A.R. Golding, M.D., (left) and Yukihiko Nosé, M.D., Ph.D.



1966-1985



F. Merlin Bumpus, Ph.D., (center) listening to Robert Smeby, Ph.D.



F. Merlin Bumpus, Ph.D. (left), Bernadine Healy, M.D., and Irvine H. Page, M.D.

“Think if you are going to care for patients, you have to have the passion to make that care better every day – to make therapies more effective for the patients of today and even better for those of tomorrow. From its founding, strong research and strong education were wrapped around the Clinic’s central mission of better care for the patient. Research programs so designed and so integrated inspire and inform scientists, no matter how basic their research, to keep their eyes on the patient’s problems. With this vision, and immersed in a powerful ever-improving clinical environment, research work becomes inherently translational – and exciting. After all, isn’t that why we invest in medical research, why the NIH has flourished and why The Cleveland Clinic has sustained its own special quality on behalf of those we serve?”

— Bernadine Healy, M.D., 2005

The Bernadine P. Healy Years



A cardiologist and experienced researcher, Bernadine P. Healy, M.D., became chair at a time when the Clinic was positioned to be an even stronger international player in biomedical research. Dr. Healy capitalized on the opportunity to transform research from endeavors with a physiological or biochemical focus to one using molecular biological approaches and the emerging field of genomics and gene sequencing. As part of the Research Division's strategic plan, interaction between biomedical research and clinical care continued to be emphasized, leading to a new name – the Cleveland Clinic Research Institute – which better reflected the enhanced stature.

Her philosophy was simple: superb talent, the latest technology and exceptional results would lead to increased peer-reviewed funding and growth in the research mission of the Clinic.

Dr. Healy encouraged the pursuit of creative efforts within the areas of the Clinic's medical priorities and greatest strengths. This would result in competitive work of the highest quality and interdisciplinary programs worthy of philanthropic investment.

During her years as Chair, the Institute underwent a major restructuring and expansion that supported Dr. Healy's goals:

- Created the Department of Molecular Biology
- Expanded the Department of Heart and Hypertension Research
- Created the Department of Vascular Cell Biology and Atherosclerosis
- Created the Department of Cancer Biology
- Combined the Departments of Artificial Organs and Musculoskeletal Research into the new Department of Biomedical Engineering and Applied Therapeutics

The plan paid off – the Cleveland Clinic Research Institute experienced a substantial growth in competitively awarded research grants, and saw NIH funds more than double between 1985 and 1991 (to more than \$17 million). Additionally, she helped the Clinic build a half-billion dollar endowment by the year 2000.

1985-
1991



*Shattuck Hartwell, M.D. (left),
Irvine H. Page, M.D., and
Bernadine Healy, M.D.*



Dr. Healy envisioned an integrated environment that combined research, education and patient care within one set of buildings. The first step was taken in 1991 with the completion of the John Sherwin Research Building, which housed three of the eight research departments. The subsequent opening of the Lerner Research Institute main building in 1999 and the Spring 2005 opening of the Center for Genomics Research building were extensions of her vision.

To encourage future researchers and promote the Research Institute's critical place in education, Dr. Healy established an affiliation with The Ohio State University School of Medicine. The creation of the Cleveland Clinic Lerner College of Medicine of Case Western Reserve University is a part of the further evolution of that vision in which research plays a significant part in the education of tomorrow's physician-scientists.

In 1991, Dr. Healy was appointed director of the NIH, and Amiya K. Banerjee, Ph.D., the Chairman of the Department of Molecular Biology, became acting chairman of the Research Institute and continued the evolution of research that embraced molecular genetics. He implemented growing collaborations with Case Western Reserve University (CWRU). Today the Lerner Research Institute has collaborative academic partnerships with CWRU, Cleveland State University and Kent State University.

“One of the greatest contributions [during the 1980s and early 1990s] is that we initiated molecular biological approaches in the Institute. That shift placed us at the forefront of biomedical research.”

— Amiya K. Banerjee, Ph.D., Head,
Section of Virology/Department of
Molecular Genetics; Acting Research
Institute Chair (1991-92), 2005

“The public likes science and will support science with the belief that they and their families will gain personal benefits from scientific advances. This is particularly true in biomedical research where patients understand very keenly the link between new developments and improvement in the health of themselves and their loved ones.”

— 1989 Annual Report



“A strong basic research establishment is a vital part of a strong academic clinical institution. You can’t have good translational research without good basic research.”

— George Stark, Ph.D., 2005

The George R. Stark Years



Partly based on his training and experience as a molecular biologist, the focus of the leadership of George R. Stark, Ph.D., emphasized building the depth of expertise in molecular biology, while maintaining the interaction between researchers and clinicians.

Dr. Stark capitalized on the strategic plan developed by Dr. Healy and recruited top-flight scientists with an eye toward establishing high-quality research in multiple areas that would continue to attract external funding. To that end, the Committee on Appointments and Promotions was restructured during Dr. Stark's tenure to assess more vigorously the competitive quality of researchers who were recruited and retained by the Institute.

The Department of Neurosciences was created in 1992, bringing together researchers and clinicians from neurology, neurosurgery, neuropathology and neuroradiology with cardiovascular neurobiologists, immunologists and molecular biologists. Bruce Trapp, Ph.D., from the Johns Hopkins University, was recruited to lead the new department.

Shortly after becoming chair, Dr. Stark also created the Research Core Services, a novel approach to providing shared technological resources for a variety of departments. Today there are more than 20 "cores" ranging from a proteomics and gene expression laboratory to a prototype design laboratory.

What were once called bridge programs also were created to link basic scientists more directly with physicians in the Taussig Cancer Center, the Mellen Center for Multiple Sclerosis, the Center for Digestive Disease Research, the Glickman Urological Center and other areas.

Centers for Anesthesiology Research and Surgery Research were created, and the Department of Ophthalmic Research was started in the Cole Eye Institute. Dr. Stark also helped create The Center for Structural Biology in collaboration with scientists at Case Western Reserve University and Cleveland State University.

The vision of a unified research facility was realized in 1999 with the dedication of the 420,000-square-foot Lerner Research Institute building, named after Al and Norma Lerner, major supporters of research at the Clinic and members of its Board of Trustees.

1992-2002





The tradition of creative scientific collaboration and innovation continued, and the Institute stressed interactions among departments. Among the advances during this time: a new class of drugs was developed called 2-5A antisense that targets and destroys disease-causing RNA in viruses and/or tumor cells; the role and importance of the factor myotrophin in hypertrophy was investigated further; the novel enzyme human chymase that helps regulate blood pressure was discovered; a signaling mechanism used by interferons was uncovered; the key regulatory enzyme nitric oxide synthase was better understood; and progress continued to be made on a total artificial heart.

Other achievements of note included a possible biomarker for ovarian cancer, raising the prospects for earlier detection; the development of the concept of neural pathogenesis as a contributor to multiple sclerosis; and the discovery that increased myeloperoxidase in blood plasma can increase the likelihood of coronary artery disease.



I love helping people. It vindicates what I have been working for all these years. I have always wanted to leave a legacy in the field of medicine, where I can have some contribution in both furthering and developing new research, along with helping sick people to get better treatment. That is what I hope my legacy is going to be.”

— Al Lerner

“My first priority was to strengthen the Institute. The Lerner Research Institute as it is right now is one of the three priorities of The Cleveland Clinic – clinical, research and education – a mission in which each component is equally important. During this time, we made the decision to officially adopt a new organizational approach that emphasized problematic research – every research project dealt with a clinical entity. Research is the single greatest investment that anyone can make in the world because research drives all of the changes in the quality of our lives and improves our active life expectancy. Research provides the aura around the entire health care delivery system.”

— Floyd D. Loop, M.D.,
Chief Executive Officer and
President (1989-2004)
The Cleveland Clinic
2005





“Every investigator in the Lerner Research Institute has developed a research program that is focused on important basic questions of biology or bioengineering, but with strong relevance to disease. Lerner Research Institute faculty members are committed to positively impacting the overall mission of the institution. The ability of ... investigators to contribute to the field of molecular medicine will only be enhanced through increased communication and the building of collaborations with our clinicians.”

— Paul E. DiCorleto, Ph.D., 2002

The Paul E. DiCorleto Years



Paul E. DiCorleto, Ph.D., was named the fifth Chairman of the Lerner Research Institute in 2002. He re-emphasized the Institute's goal of becoming the finest medical research institute in the country with biological discoveries of the highest significance and translation of these discoveries into improved healthcare. He received a commitment from the Clinic leadership to expand two translational research areas – human genetics/genomics and stem cell biology/regenerative medicine. The overall objective of the Lerner Research Institute remains the advancement of the means of prevention, diagnosis and treatment of diseases.

The long tradition of creative scientific interaction and innovation continues. Discoveries at the Institute during the early years of his tenure include:

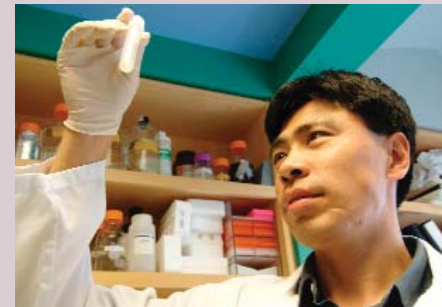
- Identifying genetic variations associated with premature coronary artery disease and heart attack
- Identifying novel diagnostics for both cardiovascular disease and cancer
- Explaining the novel genes and pathways that are involved in the development of multiple sclerosis and prostate cancer
- Discovering a “heart attack gene” that linked a “non-lipid” genetic mutation and heart attacks
- Detecting a molecule that could inhibit the activation of the enzyme that creates brain plaques, a hallmark of Alzheimer's disease

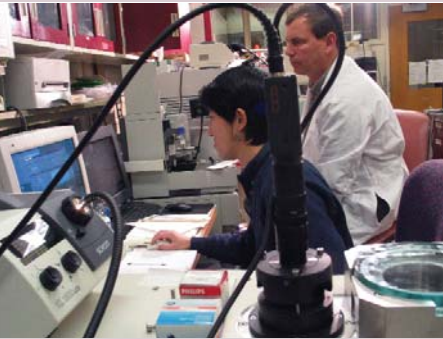
Great progress has also been made in many areas of applied research, such as the use of autologous stem cells to improve healing of bone fractures and the development of new imaging software to evaluate heart disease. Both have opened commercialization opportunities.

The status of the Lerner Research Institute is positioned for the challenges and opportunities of the future:

- Research is consolidated in 656,000 square feet of dedicated space.
- NIH funding increased from \$53.9 million in 2003 to an estimated \$83 million in 2005, placing the Lerner Research Institute among the top five in NIH funding of private research institutes.

2002-
Present





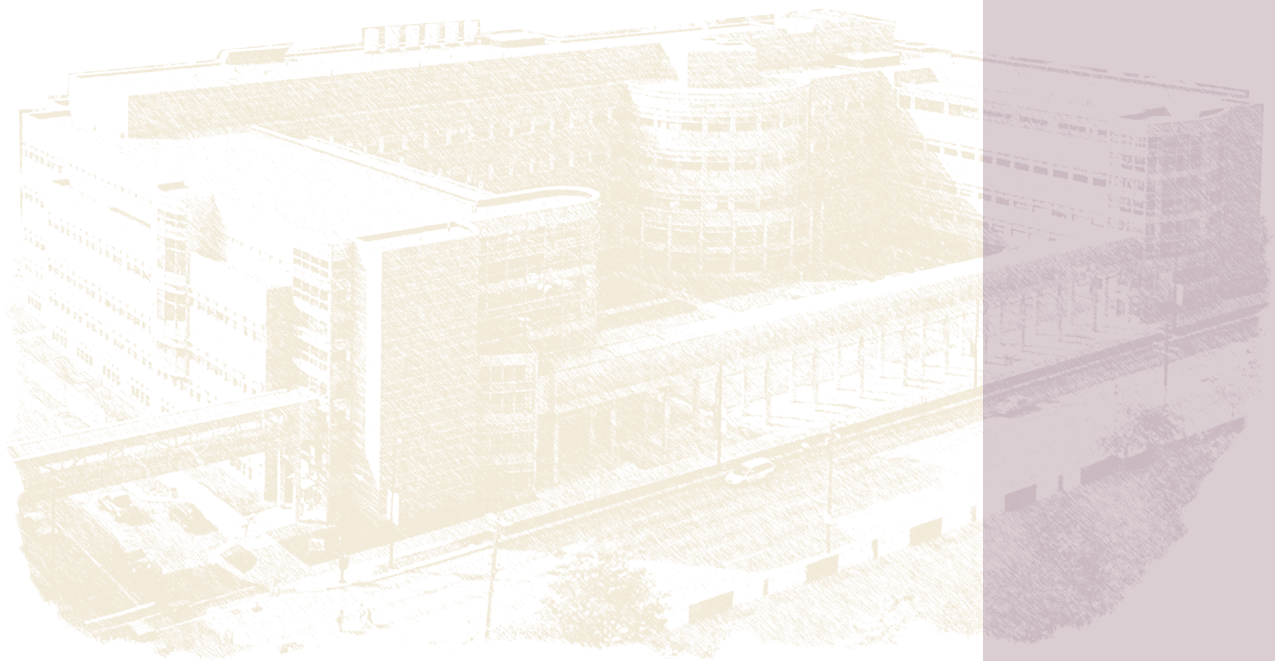
- The Lerner Research Institute was home to more than 120 Principal Investigators in 2005.
- NIH program project and specialized center grants support studies focused on atherosclerosis, interferon and cancer, multiple sclerosis, thrombosis, inflammation, bone marrow failure, ischemic heart disease and orthopaedic research.
- The Lerner Research Institute focuses on cardiovascular, cancer, neurologic, musculoskeletal, allergic/immunologic, eye, metabolic and infectious disease areas of study.
- New spin-off companies continue to develop the intellectual property generated in the Lerner Research Institute; for example, PrognostiX for inflammation biomarkers and Cleveland BioLabs for anti-cancer and radioprotection drugs.
- The 155,000-square-foot, \$44 million Center for Genomics Research building opened in Spring 2005 – a state-of-the-art facility that is home to the Genomic Medicine Institute, the proposed Regenerative Medicine Institute and other new programs.

The Lerner Research Institute continues its responsibility to encourage and educate tomorrow's researchers. As a principal participant in the Cleveland Clinic Lerner College of Medicine of Case Western Reserve University, the Lerner Research Institute is dedicated to training the next generation of physician-scientists. Additionally, it has strengthened its link to the area's colleges and universities, actively recruiting postdoctoral fellows and graduate students from around the world, and seeking new bridges to local high schools.

The Institute started the Friends of the Lerner Research Institute, a scientific lecture series that opened the doors of the Lerner Research Institute to public supporters of the Clinic's mission to investigate causes and discover cures to diseases.

“The reputation of [the Lerner Research Institute] is based on a unique model of an intricate partnership between clinical care and research and disseminating information to help patients with diseases.”

— Loyal Wilson,
Member of
The Cleveland Clinic Foundation
Board of Trustees, 2004





“The advances we’re making hold the bold promise of improving the health and quality of lives for countless people. There is a cycle in medicine – research leading to therapies leading to better patient care – in which the Institute plays a vital role. The disease-oriented research we conduct today lays the groundwork for new therapies and treatments for some of the most debilitating diseases. We’re part of an incredible medical institution – one that balances research and education with patient care. That commitment to collaboration – basic researchers working side-by-side with clinicians – is a unique environment that can’t help but encourage discovery and understanding. The Lerner Research Institute has built a reputation of sound fundamental research and groundbreaking biomedical discoveries. Years from now, the medical profession will look back and see the many contributions and advances that our researchers will have made to furthering patient care. They will see a research institute that always will have a significant impact in people’s lives.”

— Paul E. DiCorleto, Ph.D., Chair,
Lerner Research Institute, 2005

Nurturing the Best Kind of Research Culture

Discoveries do not happen in a vacuum. Researchers among many departments share ideas and insights. Laboratory-based and clinical researchers work together to transfer advances made at the laboratory bench to the patient's bedside. Investigation isn't segregated by department; rather, energies and innovation from many areas are focused on specific diseases. This is the future of the Lerner Research Institute.

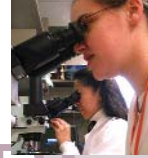
In the years to come, even more emphasis will be placed on disease-oriented research – bringing together the best minds from many disciplines to tackle cancer, neurological diseases, cardiovascular disease, infectious and other diseases. Basic and clinical researchers will continue to build on their partnerships to speed delivery of new therapies and treatments to patients.

The Lerner Research Institute also will expand its work in two critical areas of research: human genomics and regenerative medicine. The centerpiece of this work is the new Center for Genomics Research building.

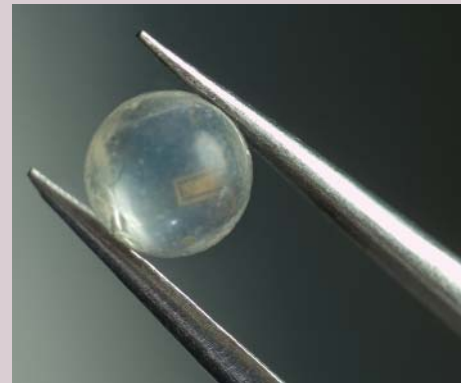
Genetics research will change the way medicine is practiced. One day, medicine will abandon the practice of “off the shelf” treatments in which a common regimen is used for everyone diagnosed with a particular disease. Instead, physicians will have at their disposal personalized medicine – screening and treatment programs based on an individual's unique genetic makeup and need.

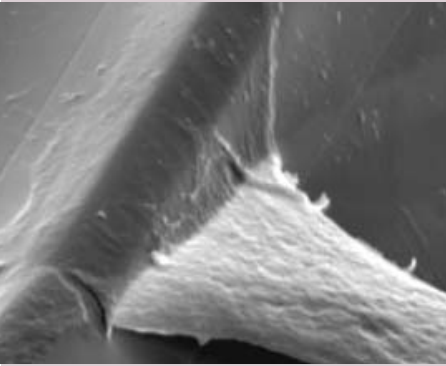
Regenerative medicine will discover how adult stem cells – cells that upon specific stimulation can be transformed into many other types of cells – can be used to repair injuries or regenerate tissue. A heart attack victim's stem cells will be used to help the injured heart tissue repair itself naturally and more completely. Bone and connective tissues will be regenerated. The diabetic's defective islets cells will be replaced naturally, enabling them to shed the need for injected insulin.

Nanotechnology will perfect microelectronics, microfabrication and micromachining technologies to create technology that improves medical diagnostics and therapies by reducing device size and cost. Nanotechnology will target cancer treatments specifically to tumors. Implantable devices will serve as scaffolds that allow stem cells to create bone and connective tissues. Miniature gauges will monitor pressure within the spinal cord following neck or back injuries. Surgical instruments like



The Future





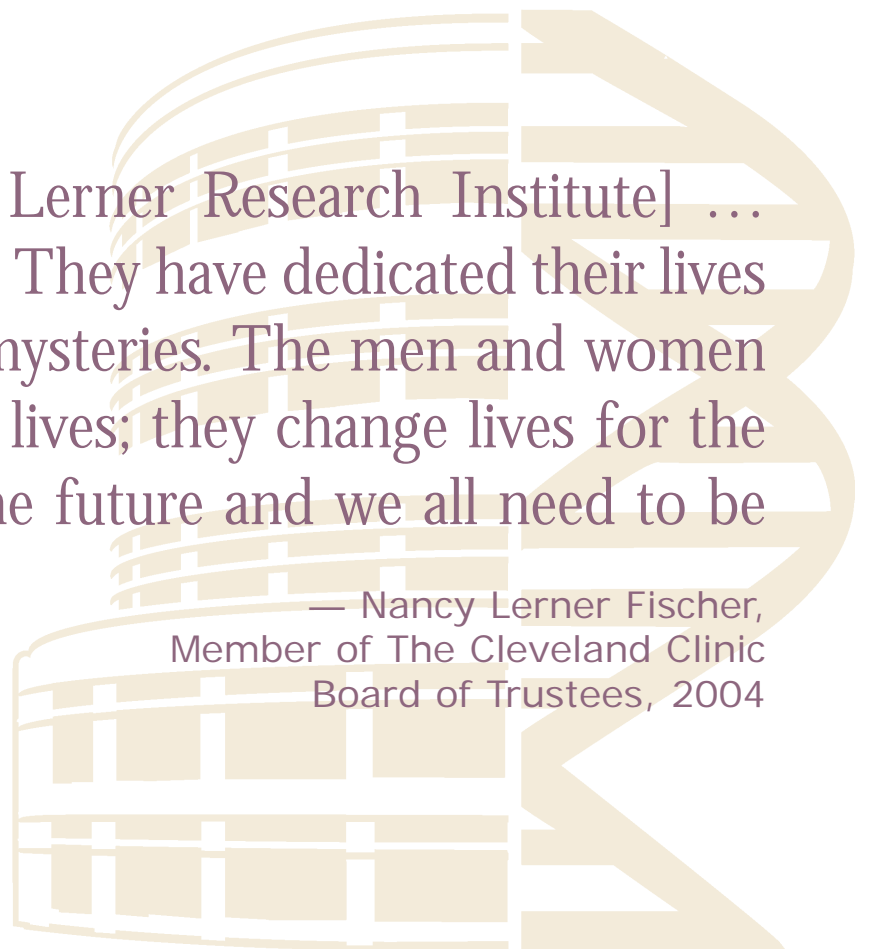
scalpels will be honed perfectly sharp – precision that will enhance delicate eye and vascular surgeries.

During the last 60 years, the Lerner Research Institute has built a reputation for excellence in biomedical research, attracting inquisitive and talented minds and making significant contributions to the health of patients.

The foundation of the Lerner Research Institute is built on energetic and exceptional investigators, first-rate facilities and the support and partnership with The Cleveland Clinic. Upon this foundation, the Lerner Research Institute will expand its participation in leading-edge biomedical research, its responsibility to teach and train the next generation of physician-scientists and its contributions to patient care.

“The scientists [at the Lerner Research Institute] ... have unbridled passion. They have dedicated their lives to unraveling medical mysteries. The men and women in this building change lives; they change lives for the better. Their work is the future and we all need to be part of that future.”

— Nancy Lerner Fischer,
Member of The Cleveland Clinic
Board of Trustees, 2004



The Cleveland Clinic Lerner Research Institute: A Timeline



1921

- The Cleveland Clinic is founded

1928

- The first research facility is built



1945

- Irvine H. Page, M.D., named first Chairman of Division of Research
- The Division focused on multidisciplinary approaches to disease of the heart and blood vessels, treatment of hypertension, arteriosclerosis, surgical treatment of congenital heart disease, dialysis of kidney disease and transplantation



1966

- F. Merlin Bumpus, Ph.D., named Chairman of Division of Research
- During the 1960s, the Division added the Departments of Cardiovascular Research, Immunology, Artificial Organs (including Biomechanics), Biostatistics and Clinical Science



1980s

- Bernadine P. Healy, M.D., named Chair of Division of Research (1985)
- Research Division is renamed the Cleveland Clinic Research Institute
- Department of Molecular Biology created, chaired by Amiya Banerjee, Ph.D.
- Department of Cardiovascular Research split into Department of Brain and Vascular Research (chaired by Carlos Ferrario, M.D.), the Department of Heart and Hypertension Research (led by Robert Graham, M.D.) and the Department of Vascular Cell Biology and Atherosclerosis (chaired by Paul E. DiCorleto, Ph.D.)
- The Department of Cancer Biology created, led by Bryan R.G. Williams, Ph.D.
- The Departments of Artificial Organs and Musculoskeletal Research are combined into a new Department: Biomedical Engineering and Applied Therapeutics, under J. Fredrick Cornhill, D.Phil.



1991

- John Sherwin Research Building opened
- Amiya K. Banerjee, Ph.D., serves as Interim Chairman of the Research Institute



1992

- George R. Stark, Ph.D., named Chairman of the Research Institute
- Department of Neurosciences created, led by Bruce D. Trapp, Ph.D.

1994

- The Joseph J. Jacobs Center for Thrombosis and Vascular Biology is established. It later merges with the Department of Heart and Hypertension Research to become the Department of Molecular Cardiology, with Edward F. Plow, Ph.D., as Chairman
- Thomas A. Hamilton, Ph.D., named Chairman of the Department of Immunology

1996

- Groundbreaking for new Research Institute facility on Carnegie Avenue between East 96th and East 100th Streets



1999

- Lerner Research Institute main building dedicated

2000

- Division of Clinical Research established
- Andrei V. Gudkov, Ph.D., D.Sci., named Chairman of the Department of Molecular Biology



2002

- Paul E. DiCorleto, Ph.D., named Chairman of the Lerner Research Institute
- Peter R. Cavanagh, Ph.D., D.Sc., named Chairman of the Department of Biomedical Engineering

2003

- Groundbreaking for Center for Genomics Research building

2004

- Department of Pathobiology created, led by Serpil C. Erzurum, M.D.
- Roy L. Silverstein, M.D., named Chairman of the Department of Cell Biology
- Department of Molecular Biology renamed Department of Molecular Genetics
- Cleveland Clinic Lerner College of Medicine of Case Western Reserve University enrolls first class



2005

- Center for Genomics Research building opens
- Genomic Medicine Institute created, led by Charis Eng, M.D., Ph.D.
- The Lerner Research Institute celebrates the 60th anniversary of its founding

Cleveland Clinic Lerner Research Institute

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Lerner Research Institute

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Investigating Causes
Discovering Cures

 **Cleveland Clinic**
Lerner Research Institute

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