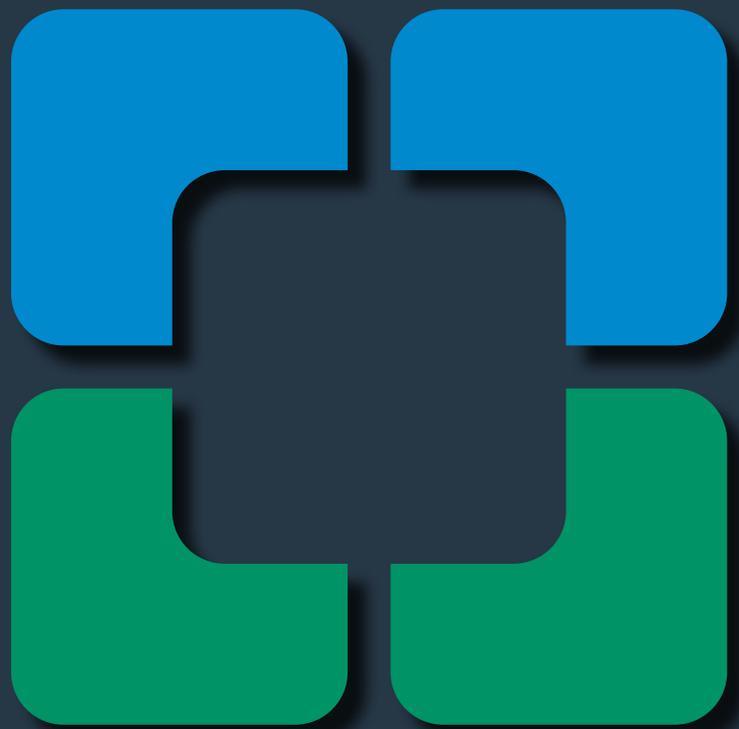


# The Cleveland Clinic Way

2013  
ANNUAL  
REPORT





THE CLEVELAND CLINIC WAY

Lessons in  
Excellence from  
One of the  
World's Leading  
Healthcare  
Organizations

Dear Friends,

Cleveland Clinic experienced another successful year in 2013. We saw more patients and welcomed more new patients than at any time in our history. All indicators of our financial health rose significantly. The world looks to us as a model of quality, efficiency and service.

But healthcare is changing. The nation is moving from a fee-for-service approach to one that rewards outcomes, efficiency, quality and population health. We can expect a more complex regulatory environment, lower reimbursements and continuing uncertainty.

For many, this is a time of anxiety. At Cleveland Clinic, it is a time for action. We are leveraging our resources, expanding our networks, and building on a vast and growing knowledge base. We are preparing to address the great challenge of our time — to invent the healthcare system for the 21st century.

Cleveland Clinic is well-positioned to lead in this endeavor. We are committed to clinical excellence. We have a unique, patient-centered organization. We have the will and momentum to effect change.

Yesterday we pioneered for today. Today we pioneer for tomorrow. The current crisis is our opportunity to create a better healthcare system. All you can ask for in life is an opportunity. We have that opportunity now. We will create ready access, drive superior quality and make healthcare more affordable. We will “act as a unit” to give every patient the best outcome and experience. That is the future of healthcare. That is the Cleveland Clinic way.

Sincerely,

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

**Delos M. Cosgrove, MD**  
CEO and President, Cleveland Clinic

A handwritten signature in black ink, appearing to read 'Robert E. Rich Jr.'.

**Robert E. Rich Jr.**  
Director and Chairman of the Board

# “What is the Cleveland Clinic Way?”

Ninety-two years ago, four physicians founded a new medical center in Cleveland. It was a nonprofit group practice where doctors from many specialties could collaborate for efficiency and better patient care. Their mission was “to care for the sick, investigate their problems and educate those who serve.”

## Integration

Today, Cleveland Clinic is a main campus, eight community hospitals and more than 75 outpatient locations (including 16 family health centers) in northern Ohio, and facilities in Florida, Nevada, Toronto and Abu Dhabi. Our locations are linked by health information technology and critical care transport, getting patients to the right facility, at the right time, for the right care. Our integrated structure enables us to control costs, measure and improve quality, and provide access to high-quality healthcare services across a broad regional system.

## Collaboration

All Cleveland Clinic staff physicians receive a salary with no bonuses or other financial incentives. The hospital and physicians share a financial interest in controlling costs. Physicians get no financial benefit from ordering unnecessary tests or using expensive devices.

## Patient Focus

Cleveland Clinic is organized into patient-centered institutes based on single diseases or organ systems. Each institute combines medical and surgical services at the same location under the same leadership to improve patient care and experience.

## Quality Improvement

Each institute is required to establish benchmarks and measure and improve quality. Institutes are also required to publish annual outcomes books showing volumes, results, innovations, publications and other information relevant to patients and referring physicians.

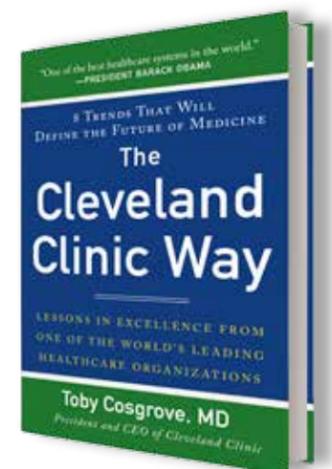
## Information Technology

Cleveland Clinic integrates its far-flung system with an extensive electronic medical records system. This system includes participating community physicians and patients, who are able to access test results and portions of their medical record remotely via the Internet.

## Value

Cleveland Clinic’s model of medicine has made it possible for us to achieve cost savings on a vast scale over the past several years. We were able to mobilize physicians and employees into hundreds of teams to address specific expenses. These teams cut costs from the operating room to the storeroom with a minimum of intramural friction.

Our mantra is “Patients First.” Our motto is “To Act as a Unit.” Our goal is to give every patient the best outcome and experience. That’s the Cleveland Clinic way.



To learn more, read *The Cleveland Clinic Way* by Toby Cosgrove, MD.

Available wherever books are sold.

“Do I really need another test?”



THE CLEVELAND CLINIC WAY

## The Group Practice Model

Cleveland Clinic’s caregivers work as a team to lower costs and improve outcomes.

Cleveland Clinic is a nonprofit group practice. Our doctors work on one-year contracts. They are paid a salary. Every caregiver — from the greeter to the gastroenterologist — is on the same team. We all share the same mission, vision and values. That’s the Cleveland Clinic way.

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**The group practice model means Cleveland Clinic’s doctors have no financial incentive to order unnecessary treatments or tests.**

## 2013 Clinical and Research Achievements

2013 found caregivers meeting the challenges of patient care, research and education at the highest levels of commitment and expertise. Hard work was the keynote, as caregivers at every level maintained the daily pace of a leading academic medical center, making major contributions to science, medicine, and the efficiency and effectiveness of care.

This annual report presents a few highlights of this very productive year. A chronicle as limited as this cannot comprehensively record every achievement. This year, as in every year, Cleveland Clinic's caregivers saved many lives and enhanced the quality of life for many more. What follows is a sample of their work, along with quotes and high-impact publications.

### Development of New Risk Adjustment Index

In this age of value-based healthcare, patients, payers and regulators need to compare hospital performance. However, large variations in the makeup and complexity of patient populations have made apples-to-apples comparisons difficult. To address this problem, a Cleveland Clinic team has developed a risk stratification index that accurately adjusts for differences in baseline patient and procedure risk. This method can accurately and fairly compare outcomes among institutions. The multidisciplinary team led by Daniel Sessler, MD, the Michael Cudahy Professor and Chair of the Department of Outcomes Research, had previously developed a risk stratification index to compare performance, individual patient heterogeneity and procedural risk. To improve the accuracy of this risk adjustment system, Dr. Sessler and his colleague Jarrod Dalton, PhD, have added timing of diagnoses and procedures. In a new paper, they demonstrate that the modified index is highly predictive for comparing duration of hospitalization and mortality.

Published in: *Anesthesiology*

***"After risk adjustment, outcomes in hospitals that do very different types of surgery in patients with very different baseline characteristics can be fairly compared."***

— Daniel Sessler, MD, Department of Outcomes Research



Mark Sabo

Transplanted viscera

### Pioneering Pediatric Multivisceral Transplant

A 4-year-old boy with a rare genetic disorder was transplanted with a new liver, intestine, pancreas and duodenum, by a team led by Kareem Abu-Elmagd, MD, PhD, Director of Cleveland Clinic's Transplant Center. It was the first pediatric multivisceral transplant to be performed at Cleveland Clinic and the first in the world to treat Martinez-Frias/Mitchell-Riley syndrome. Medical care was provided by a team from pediatric gastroenterology in Cleveland Clinic Children's.

As a result of the syndrome, the patient had neonatal diabetes, duodenal atresia, gallbladder agenesis, hypothyroidism, thalassemia, and iron overload with cholestatic liver disease. Since birth, he required intravenous feeding and multiple daily doses of insulin, and he is the only known patient with this syndrome to have survived past 20 months.

The 15-hour surgery was successful; the patient has been discharged and has excellent graft function. His diabetes has been cured, and he enjoys an unrestricted oral diet with no need for intravenous nutrition. This unprecedented case involved collaboration among surgeons, pediatric dietitians, nutritionists, transplant coordinators and other caregivers.

Dr. Abu-Elmagd has been instrumental in the development and clinical introduction of multivisceral transplantation since 1991.

***"I'm certain he won't have recurring disease with the new organs. I want to see the boy healthy, to have a normal life and to go back home to enjoy his family and siblings."***

— Kareem Abu-Elmagd, MD, PhD, Director of the Transplant Center



Four-year-old Khaled Mahamid, received a new liver, intestine, pancreas and duodenum in a pioneering transplant performed by Kareem Abu-Elmagd, MD, PhD, of Cleveland Clinic's Transplant Center.

## 2013 Clinical and Research Achievements



Nima Sharifi, MD, (left) with Kai-Hsiung Chang, PhD

### First ERCP/EUS Pancreatic Rendezvous Here

Endoscopists in Cleveland Clinic's Digestive Disease Institute are the first group to have combined specific diagnostic and imaging techniques for the treatment of biliary and pancreatic disease. ERCP (endoscopic retrograde cholangiopancreatography) uses a tiny catheter to deliver contrast fluid to the ducts of the bile system, gallbladder and pancreas and then produce X-ray images. Sometimes ERCP cannot be performed because these ducts are blocked by previous surgeries, stenosis or tumors. In such cases, the patient might be percutaneously drained or undergo open surgery. An alternative technique, called "rendezvous," uses EUS (endosonography) to thread a guide wire through the liver to the duodenum — where ERCP can be performed or a stent put in place. This technique is less invasive than surgical drainage and does not require an external drainage tube as with percutaneous drainage.

Tyler Stevens, MD, and John Vargo, MD, MPH, successfully performed Cleveland Clinic's first pancreatic ERCP/EUS rendezvous in 2013.

### Genetic Mutation Identified for Virulent Prostate Cancer

Metastatic prostate cancer is fed by hormones known as androgens and is often treated by cutting off the body's ability to produce these hormones (medical castration). A particular form of prostate cancer resists this treatment and creates androgens within the tumor cell. Researchers led by Nima Sharifi, MD, of Cleveland Clinic's Lerner Research Institute, Taussig Cancer Institute, and Glickman Urological & Kidney Institute, have discovered the genetic mutation behind this often deadly form of cancer. The mutation occurs in the tumor cell's androgen-synthesizing enzyme and allows it to hyperactively generate its own hormones. The mutation may occur within the tumor or be inherited from maternal and paternal genes. The discovery of tumor-promoting enzyme mutations in other cancers has led to the development of targeted drug therapies. This discovery may lead to a similar breakthrough for this form of prostate cancer.

Published in: *Cell*

*"With this finding, we have the opportunity for matching a mutant disease-driving biomarker with a pharmacologic inhibitor."*

— Nima Sharifi, MD, Lerner Research Institute

### World's First Robotic Peripartum Hysterectomy

Hysterectomy may be required shortly after giving birth (peripartum) when life-threatening conditions are present such as abnormal placentation, retained placenta, uterine rupture or severe hemorrhage. Most cases are emergent and performed through open laparotomy.



Mehdi Kebria, MD

Mehdi Kebria, MD, of Cleveland Clinic's Ob/Gyn & Women's Health Institute, performed the world's first robotic peripartum hysterectomy. The patient was 21 weeks into pregnancy, with a placenta that had grown into the uterine wall (placenta accreta). Immediately following delivery, the patient was taken to the operating room with placenta in place. Once the vascular supply to the uterus was secured using the robotic approach, the placenta was extracted and then the hysterectomy was completed. This method led to minimal blood loss during surgery and expedited the recovery, with minimal scarring. The success of this surgery suggests that it may be considered as an alternative to open surgery in appropriate patients.

Published in: *Obstetrics & Gynecology*

### Unexpected Risk of LVAD Thrombosis

The HeartMate II® left ventricular assist device (LVAD) is a mechanical pump capable of taking over some or most of the function of the left ventricle of a severely failing heart. It has been approved by the FDA as a bridge to transplant or long-term support for heart failure patients who don't qualify for transplant. Randall Starling, MD, MPH, and colleagues from Cleveland Clinic's Sydell and Arnold Miller Family Heart & Vascular Institute detected an apparent increase in the rate of thrombosis (blood clots) in patients using the HeartMate II, as compared with preapproval clinical trial results and initial experience. Collaborating with teams from Duke University and Washington University, they reported that the rate of pump thrombosis related to the device has been increasing and is

associated with substantially poor outcomes. As a result of this finding, other centers are examining the rate of pump thrombosis, and additional collaborative research is underway to identify patients at risk and potential causes of this life-threatening complication. The potential use of this heart pump in less ill patients is now under close scrutiny based on this research.

Published in: *New England Journal of Medicine*

### Genetic Screening Helps Colorectal Cancer Outcomes

Data-driven risk stratification is essential to improving outcomes and controlling costs. A team led by Charis Eng, MD, PhD, Chair of Cleveland Clinic's Genomic Medicine Institute, has established that genetic screening can improve outcomes for patients with Lynch syndrome, the most common hereditary adult-onset colorectal cancer. This syndrome can lead to other colorectal cancers and uterine cancer. Dr. Eng and her team found that improved screening for Lynch syndrome can lead to earlier detection and even prevention of colorectal cancers and other cancers associated with the syndrome. They showed that universal screening at Cleveland Clinic is complex but feasible and a worthwhile public health initiative.

Published in: *Journal of Clinical Oncology*

*"Instituting high-risk surveillance early and routinely can save lives and is an example of value-based delivery of healthcare."*

— Charis Eng, MD, PhD, Chair, Genomic Medicine Institute

## 2013 Clinical and Research Achievements



Stanley Hazen, MD, PhD

### Gut Flora Studies Generate More Surprises

A series of discoveries at Cleveland Clinic involving gut flora has significantly enhanced scientific understanding of cardiovascular disease and the means for detecting it.

### Red Meat, Eggs and Heart Disease

Stanley Hazen, MD, PhD, of Cleveland Clinic's Lerner Research Institute and Miller Family Heart & Vascular Institute, has discovered that carnitine and choline, natural components of red meat, egg yolk and high-fat dairy products, are converted by bacteria in the gut into a substance that promotes atherosclerosis and coronary artery disease.

Dr. Hazen found that when intestinal bacteria digest the common food substance lecithin (which contains choline) or carnitine, they produce an organic compound called TMAO (trimethylamine N-oxide), and that TMAO levels in the blood are an accurate marker for cardiovascular disease. Dr. Hazen found that TMAO is a byproduct of the digestion of meat, eggs and other animal-based foods, which accelerated heart disease in an animal model. Expanding on these findings, Dr. Hazen's lab is learning even more surprising facts about gut flora and heart disease.

(The American Heart Association and American Stroke Association have named Dr. Hazen's discovery of the link between gut flora and cardiovascular disease one of the Top 10 major advances in cardiovascular and stroke science for 2013.)

### High TMAO Predicts Heart Attack and Stroke

A new study by Dr. Hazen involving more than 4,000 subjects has proven that it is possible to assess an individual's risk for cardiovascular disease by measuring the levels of TMAO in the

blood, and further, that it can predict the risk of heart attack, stroke and death in persons not otherwise identified by traditional risk factors and blood tests. Studies by Dr. Hazen and his team confirmed that gut flora are essential in forming TMAO in humans, and demonstrated a relationship between TMAO levels and future cardiac events such as heart attack, stroke and death — even in the absence of prior cardiac disease risk.

Published in: *New England Journal of Medicine*

*"These findings strongly suggest that further research into the involvement of gut microbiome in the development of cardiovascular disease could lead to new avenues of prevention and treatment of heart disease."*

— Stanley Hazen, MD, PhD, Lerner Research Institute and Miller Family Heart & Vascular Institute

### Femtosecond Laser Cataract Surgery

Michael Millstein, MD, of Cleveland Clinic's Cole Eye Institute, completed the first year of using femtosecond laser cataract surgery. This technique was among Cleveland Clinic's Top 10 Medical Innovations for 2013. The technique uses superfast laser pulses of near-infrared light in a bladeless procedure. The laser can help produce a perfect circular hole in the lens capsule, split the lens into sections, and soften and break up the cataract. It makes it possible to reduce astigmatism and improve distance vision through small laser-etched incisions on the cornea. Femtosecond laser surgery was introduced in the United States in 2010.

## Growing Affiliations Expand Cleveland Clinic Influence

Healthcare providers around the world seek Cleveland Clinic's expertise. Cleveland Clinic has entered into a variety of relationships with other organizations to share insights and improve patient care. Relationships of this type will become more important in years to come, as Cleveland Clinic expands its relationships and networks nationally and internationally. Here are some examples of current clinical relationships forged by Cleveland Clinic's No. 1-ranked Miller Family Heart & Vascular Institute and No. 2-ranked Glickman Urological & Kidney Institute, along with their year of initiation:

### Clinical and Research Alliance

MedStar Heart Institute; Washington, D.C. | 2013

### Heart & Vascular Institute Affiliates

The Bellevue Hospital; Bellevue, Ohio | 2013

Cadence Health (formerly Central DuPage Hospital); Winfield, Ill. | 2010

CHRISTUS St. Michael Health System; Texarkana, Texas | 2014

Fisher-Titus Medical Center; Norwalk, Ohio | 2013

Novant Health Forsyth Medical Center; Winston-Salem, N.C. | 2012

Novant Health Presbyterian Hospital; Charlotte, N.C. | 2012

Saint Francis Medical Center; Cape Girardeau, Mo. | 2014

Saint Vincent Health System; Erie, Pa. | 2012

### Heart Surgery Affiliates

Cape Fear Valley Health; Fayetteville, N.C. | 2007

Fairview Hospital; Cleveland, Ohio | 2004

Hillcrest Hospital; Mayfield Heights, Ohio | 1998

Lake Health; Willoughby, Ohio | 1997

MetroHealth; Cleveland, Ohio | 1998

Rochester General Hospital; Rochester, N.Y. | 2004

### Glickman Urological & Kidney Institute

Charleston Area Medical Center (CAMC); Charleston, W.Va. | 1988

*The only kidney transplant center in West Virginia, CAMC's Kidney Transplant Center, led by Glickman Urological & Kidney Institute transplant surgeons, treats patients with advanced kidney disease. The partnership has performed more than 1,000 kidney transplants to date.*

St. Vincent Indianapolis Hospital; Indianapolis, Ind. | 2009

*This partnership provides kidney and pancreas transplants and has performed more than 200 kidney transplants to date.*

“The other hospital told me  
I was too old for surgery.”



THE CLEVELAND CLINIC WAY

## Multispecialty Care

Cleveland Clinic’s caregivers collaborate to treat thousands of patients turned away elsewhere.

Cleveland Clinic recruits the best doctors from around the country and around the world. They represent more than 130 specialties and subspecialties. Working together in patient-centered institutes, they treat more of the sickest patients than any comparable hospital in America. That’s the Cleveland Clinic way.

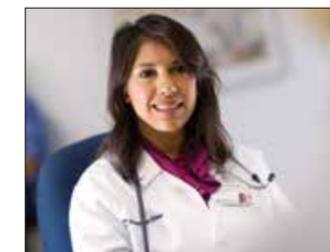
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**Cleveland Clinic treats many patients other hospitals would consider too old, sick or frail for certain treatments.**

## 2013 Clinical and Research Achievements



Steven Nissen, MD (right)



Sangeeta Kashyap, MD

### First Cleveland Clinic POEM

Cleveland Clinic's first POEM (peroral endoscopic myotomy) was performed by Matthew Kroh, MD, and Amit Bhatt, MD, of Cleveland Clinic's Digestive Disease Institute. The minimally invasive procedure is used to treat achalasia and spastic esophageal disorders where tightness prevents food from moving naturally from the esophagus to the stomach. Taking an oral approach without incisions, the surgeons use an endoscope to enter the wall of the esophagus and remove a layer of constricting muscle. The patient has immediate relief of symptoms and is discharged within 23 hours.

*"This is another example of our cutting-edge, collaborative efforts in the Developmental Endoscopy Group."*

— Matthew Kroh, MD, Digestive Disease Institute

### Blood Pressure Drug Slows Coronary Disease

A drug that is prescribed for hypertension may have an additional benefit for some patients: slowing the progress of cardiovascular disease. The drug, aliskiren (Tekturna®), affects a hormone system that not only regulates blood pressure, but plays an important role in the development of atherosclerosis. Aliskiren is approved to treat hypertension in patients who are at the high end of what is called prehypertension (140/90 mm Hg). The Miller Family Heart & Vascular Institute led a trial — known as AQUARIUS (Aliskiren Quantitative Atherosclerosis Regression Intravascular Ultrasound Study) — designed to test whether

renin inhibition could slow or reverse coronary artery disease in patients whose hypertension was controlled in the prehypertensive range. In these patients, the drug tended to slow coronary artery disease progression and reduce the risk of death, stroke and heart attack by about 50 percent. These conclusions suggest that prehypertensive patients could benefit from aggressive treatment to bring their blood pressure even lower than current guidelines suggest.

Published in: *Journal of the American Medical Association*

*"While these findings are encouraging, we have to be cautious interpreting our results on cardiovascular events because this trial was not formally designed to look at these outcomes."*

— Steven Nissen, MD, Chair, Robert and Suzanne Tomsich Department of Cardiovascular Medicine, Miller Family Heart & Vascular Institute

### Rheumatology Biobank and Patient Registries

Cleveland Clinic's Department of Rheumatic and Immunologic Diseases has created a biobank and patient registries to evaluate patients with many rheumatic diseases, including psoriatic arthritis, vasculitis and other autoimmune diseases. These conditions profoundly affect health status and produce disability. Improving quality of life for patients with rheumatic disease and improving survival rates continues to be a challenge for rheumatologists and others treating these conditions. Cleveland Clinic's new biobank and registries will help researchers learn more about these conditions and aid them

in finding cures. These projects will gather data on the disease and its progression, as well as biological samples. They will facilitate interaction between basic research and clinical medicine to analyze factors potentially involved in disease onset, therapeutic effectiveness and development of disease complications. The biobank will also support the search for biomarkers that may predict disease activity and potential organ involvement.

### New Clinic for Adult Autoinflammatory Diseases

Autoinflammatory diseases, or periodic fever syndromes, are hereditary conditions that create challenges for patients and caregivers. Collaborators from four Cleveland Clinic institutes have launched a new program to diagnose and manage these conditions. Led by Qingping Yao, MD, PhD, of the Orthopaedic & Rheumatologic Institute, the Clinic for Adult Autoinflammatory Diseases is one of the few centers in the United States to offer expert knowledge and management of these disorders, supported by genetic testing, genetic counseling and research.

Autoinflammatory diseases (not to be confused with autoimmune diseases) are newly grouped rheumatic conditions. These periodic fever syndromes include NOD2-associated autoinflammatory disease, Blau syndrome, familial Mediterranean fever, cryopyrin-associated periodic syndromes, and tumor necrosis factor receptor-associated periodic fever syndrome, among other diseases, and may be involved in cases of undiagnosed fever, rash, joint pain or swelling. Felicitas Lacbawan, MD,

of the Robert J. Tomsich Pathology & Laboratory Medicine Institute; Christine McDonald, PhD, of the Lerner Research Institute; and Rocio Moran, MD, of the Genomic Medicine Institute, work with Dr. Yao to offer the full range of care for patients with autoinflammatory diseases, and their families.

### Bariatric Surgery Beats Diabetes Through Belly Fat

The STAMPEDE (Surgical Therapy and Medications Potentially Eradicate Diabetes Efficiently) study showed that bariatric surgery can cure diabetes in some obese patients. A subsequent substudy of STAMPEDE suggests the mechanism. Sangeeta Kashyap, MD, of Cleveland Clinic's Endocrinology & Metabolism Institute, and her team investigated the mechanism for this effect. They found that gastric bypass surgery reverses diabetes by eliminating toxic-hormone-producing belly fat. Once these toxic hormones are removed from the gastrointestinal tract, the damaged pancreas returns to its normal function.

In the STAMPEDE study, both the sleeve gastrectomy and gastric bypass techniques of bariatric surgery were tested. The gastric bypass patients lost more belly fat and hence experienced greater improvement in pancreatic function.

Published in: *Diabetes Care*

*"Gastric bypass can resurrect a failing pancreas."*

— Sangeeta Kashyap, MD, Endocrinology & Metabolism Institute

## Education Institute Highlights

Cleveland Clinic and Case Western Reserve University (CWRU) are collaborating to build a new Health Education Campus at Cleveland Clinic. The new building will house the CWRU School of Medicine and Cleveland Clinic's Lerner College of Medicine, along with other CWRU-related medical school and professional training programs.

"This landmark project offers us the opportunity to be innovative in thinking about how medical students learn, what tools they need and what competencies will prepare the healthcare leaders of tomorrow," says James K. Stoller, MD, MS, the Jean Wall Bennett Professor and Chair of the Education Institute. "By building a campus that accommodates various medical education programs, we envision tremendous idea sharing, collaboration and innovation among the various students and faculty, and across disciplines."

The Health Education Campus is being designed by the architectural firm of Foster + Partners and will be located on 11 acres between East 93rd and East 100th streets, across from the Sydell and Arnold Miller Family Pavilion.

Cleveland Clinic's Lerner College of Medicine continues to attract applicants from the highest test scorers in the nation. More than 1,800 prospective students applied for the 32 available positions in the 2014 incoming class. Lerner College of Medicine student Robert Koeth's published research on gut flora and heart disease was selected as one of the Top 10 advances in heart disease and stroke in 2013 by the American Heart Association and American Stroke Association. Graduates of the class of 2013 were matched with Brigham and Women's Hospital; Cleveland Clinic; Hospital of the University of Pennsylvania; McGaw Medical Center of Northwestern University; NewYork-Presbyterian Hospital; University of California, San Francisco Medical Center; Yale-New Haven Hospital and other prestigious institutions. Most entered residencies in internal medicine, followed by pediatrics and orthopaedic surgery. Of the program's 35 graduates, nine stayed in Cleveland for their residencies, and of those, six remained at Cleveland Clinic.

The Education Institute continues to operate one of the largest graduate medical education programs in the nation. Nearly 1,800 clinical and research residents and fellows trained across Cleveland Clinic in 2013.

Offering continuing education programs to a global audience is a key component of the Education Institute's mission. More than 386,000 professionals participated in some 1,700 continuing medical education activities sponsored by the institute's Center for Continuing Medical Education in 2013.

Since the Education Institute established two executive leadership programs in 2011 — the Executive Visitors' Program and the Samson Global Leadership Academy — it has welcomed 321 emerging leaders from 30 countries. Its internal Leading in Health Care Program expanded in 2013 to include not only emerging leader physicians but also administrators and nurses.

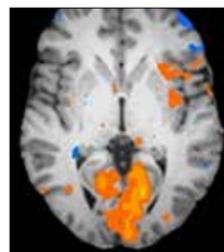


Architectural rendering of interior space in new Health Education Campus at Cleveland Clinic

In 2013, the Center for International Medical Education welcomed 750 international physicians and medical students to Cleveland Clinic to participate in highly coveted observerships.

The *Cleveland Clinic Journal of Medicine* enjoys a circulation of more than 100,000 and ranks second in readership among journals directed to office-based internists and cardiologists. Each year, the online version is read by more than 1.8 million people around the world. In 2013, the journal website had 2.5 million visits from 2.1 million unique visitors. Last year, the journal published its entire archives online, allowing open access to 4,000-plus articles — 24,000 pages of content — including Cleveland Clinic co-founder George Crile Sr., MD's early writing on cancer; William Proudfit, MD's memoriam to F. Mason Sones, MD, the father of coronary angiography; and much more.

## 2013 Clinical and Research Achievements



fMRI image

### More Patients Statin-Tolerant Than Previously Believed

A 15-year study has shown that many more patients than previously believed are able to tolerate statin therapy. Statins are prescribed to patients with high cholesterol to lower their risk of cardiovascular disease. However, historically, 5 to 10 percent of these patients have been taken off the drug after reporting side effects including muscle aches and liver enzyme abnormalities. The study found that 72.5 percent of these statin-intolerant patients could eventually tolerate some level of statin therapy when administered daily or intermittently under the close care of a physician. Moreover, these patients enjoyed significant cholesterol-lowering benefits from the restarted therapy. Leslie Cho, MD, of the Miller Family Heart & Vascular Institute, led the study. Dr. Cho points out that while these findings expand the number of patients who may be eligible for statins, 30 percent of the patients in the study remained statin-intolerant.

Published in: *American Heart Journal*

***“Even if patients cannot tolerate a daily dose of a statin, it’s possible to see a significant reduction in cholesterol levels from taking the drug less often, even as infrequently as once a week.”***

— Leslie Cho, MD, Miller Family Heart & Vascular Institute

### Epilepsy Surgery First

One of the major forms of epilepsy, focal epilepsy, can be cured by surgical removal of a portion of the brain. The challenge is to identify the correct portion to be removed with the minimum risk to the patient. Stephen E. Jones, MD, PhD, and Jorge Gonzalez-Martinez, MD,

PhD, of the Neurological Institute, developed a novel method to identify the correct portion of the brain by combining two leading-edge technologies — intracranial electrode implantation and functional MRI (fMRI) — in the operative environment. They were first in the world to successfully use this technique, which maps neural activity in the brain in real time. It will allow neurosurgeons to better identify regions of the brain responsible for causing focal epilepsy. This will improve surgical outcomes and benefit thousands of patients.

Presented at: 51st Annual Meeting and The Foundation of the American Society of Neuroradiology Symposium 2013

(Winner: 2013 outstanding presentation award in general neuroradiology)

### Best Treatment for Carotid-Coronary Disease

Patients with severe coronary artery disease combined with carotid artery disease are often treated with one of three treatment options. All involve open heart surgery and all are effective. But which is best? Cleveland Clinic researchers led by Mehdi Shishehbor, DO, MPH, of the Miller Family Heart & Vascular Institute, researched this question by comparing:

1. carotid stenting followed by surgery,
2. carotid endarterectomy followed by surgery and
3. combined carotid endarterectomy and surgery.

Dr. Shishehbor and his team found differences in the long- and short-term results. In the short term, patients who had either treatment 1 or treatment 3 had a lower risk of death, stroke or heart attack than those who had treatment 2. In the long term, however, treatment 1 — stenting

followed by surgery — offered the lowest risk of serious events. “Our study shows that carotid stenting followed by open heart surgery should be the first-line strategy for treating patients with severe carotid and coronary artery disease,” says Dr. Shishehbor.

This finding could have a major effect on the management of these patients worldwide. Currently only 3 percent of patients with these conditions receive the now-recommended treatment.

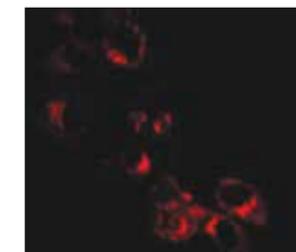
Published in: *Journal of the American College of Cardiology*

***“We are collaborating across disciplines to identify the lowest-risk treatment option for each patient.”***

— Mehdi Shishehbor, DO, MPH, Director of Endovascular Services, Miller Family Heart & Vascular Institute

### Postoperative Mortality-Glucose Link Found

A study led by Basem Abdelmalak, MD, of Cleveland Clinic’s Anesthesiology Institute, looked at one-year mortality rates for patients undergoing elective noncardiac surgery in relation to diabetes and blood glucose concentration before surgery. There was a significant difference between diabetics and nondiabetics in preoperative blood sugar levels and deaths one year after surgery. The researchers found that patients with diabetes and normal blood sugar had a higher risk of postsurgical mortality vs. nondiabetics with the same normal blood sugar. On the other hand, patients with diabetes and high blood sugar had a lower risk of postsurgical mortality vs. patients without diabetes and the same high blood sugar. Finally, the study showed no significant difference in the likelihood of immediate



Respiratory syncytial virus

postsurgical complications between patients with or without diabetes.

***“Knowledge of a higher risk of dying may stimulate further research that potentially could affect how diabetics with hyperglycemia are managed for their noncardiac surgery. Patients who are not diagnosed with diabetes and yet have high sugar levels, because of the mortality risk, may now receive the attention and research during their hospitalization formerly reserved for patients with a prior diabetes diagnosis.”***

— Basem Abdelmalak, MD, Anesthesiology Institute

### Mother-Child in Utero Transmission of Lung Virus

The most common form of pediatric lower respiratory tract infection may be transmitted from a mother to her as-yet-unborn child. Respiratory syncytial virus (RSV) is the primary cause of infant pneumonia and may be implicated in asthma. Giovanni Piedimonte, MD, Chair of the Pediatric Institute & Cleveland Clinic Children’s, led an NIH-funded study in animal models replicating the human infection. The team found that RSV is able to spread across the placenta from the respiratory tract of the mother to the fetus. Until now, it was generally believed that RSV was acquired after birth. This new finding suggests that because it is acquired in utero, the disease may have severe and lasting effects on fetal development.

Published in: *PLOS ONE*

***“The prenatal effects of the virus could interfere with a baby’s critical developmental processes.”***

— Giovanni Piedimonte, MD, Chair, Pediatric Institute & Cleveland Clinic Children’s

**2013 Clinical and Research Achievements**

**Best Treatment for Metastatic Cancer in the Liver**

The most common sites for breast cancer metastasis are the bones, lungs and liver. Metastatic cancer in the liver is often treated with systemic therapy such as chemotherapy or hormone therapy. There are also local options, such as laparoscopic radiofrequency ablation (RFA), that treat the area of the tumor alone. Laparoscopic RFA uses high-frequency radio waves to destroy tumor tissue. The benefits of local plus systemic vs. systemic therapy alone are not well-established. Eren Berber, MD, of Cleveland Clinic's Endocrinology & Metabolism Institute and Digestive Disease Institute, and Halle Moore, MD, of the Taussig Cancer Institute, have led the first study comparing laparoscopic RFA to systemic therapy alone in the treatment of breast cancer metastasis to the liver. The patients receiving RFA had all previously had systemic therapy with partial or no response. The study found that the five-year survival rate after diagnosis was 29 percent in the RFA group and zero percent in the systemic therapy-only group. It concluded that survival after laparoscopic RFA plus systemic therapy is better than systemic therapy alone for selected patients with liver-dominant disease.

Published in: *HPB* (Journal of the International Hepato-Pancreato-Biliary Association)

**World's First Robotic Natural Orifice Surgery**

Surgeons led by Jihad Kaouk, MD, of Cleveland Clinic's Glickman Urological & Kidney Institute, have performed the first robotic living-donor nephrectomy using a natural orifice. This surgery marks the first-ever clinical application of

robotics for natural orifice surgery. The kidney was removed transvaginally from a 61-year-old living donor using a da Vinci® Si Surgical System.

This clinical achievement builds on knowledge gained through the team's pioneering laparoscopic transvaginal living-donor nephrectomy of 2009. The patient had an uneventful discharge after 48 hours in the hospital. The recipient of the donor organ had no postsurgical infection.

Published in: *Urology*

**New Method of Complex Nasal Reconstruction**

Michael Fritz, MD, and surgeons from Cleveland Clinic's Head & Neck Institute have pioneered a new technique for the reconstruction of complex nasal lining defects using the free vascularized anterolateral thigh fascia lata flap. The skin was used to replace nasal lining in five patients with total or subtotal rhinectomy defects. No flap failure or lining loss was observed, and harvest site morbidity was negligible. Patients achieved satisfactory nasal form and patent nasal airways without requiring revisions.

Potential advantages offered by this technique compared with more established methods include (1) single-stage replacement of nasal lining, structure and skin coverage; (2) fewer additional stages of reconstruction to achieve functional and aesthetic results; (3) thin lining to allow for optimal airway contour; (4) less harvest site morbidity; and (5) development of composite soft tissue, cutaneous and/or muscle flaps to repair adjacent defects.

Published in: *JAMA Facial Plastic Surgery*

**2013**

*U.S. News & World Report*

**In the "HONOR ROLL" Top 4**

Cleveland Clinic 4th | 10 years in a row

**RANKED NO. 1**

Cardiology & Heart Surgery 1st | 19 years in a row

**IN AMERICA'S TOP 2**

Urology 2nd | 14 years in a row  
 Gastroenterology & GI Surgery 2nd | 11 years in a row  
 Nephrology 2nd | 3 years in a row  
 Diabetes & Endocrinology 2nd | 2 years in a row  
 Rheumatology 2nd | 2 years in a row

**IN AMERICA'S TOP 10**

Gynecology 3rd | 10 years in a row  
 Orthopaedics 3rd | 22 years in a row  
 Pulmonary 3rd | 10 years in a row  
 Ear, Nose & Throat 6th | 15 years in a row  
 Neurology & Neurosurgery 6th | 24 years in a row  
 Geriatrics 7th | 15 years in a row  
 Ophthalmology 7th | 2 years in a row  
 Pediatric Neurology & Neurosurgery 8th | 6 years in a row  
 Cancer 9th | 4 years in a row  
 Pediatric Gastroenterology & GI Surgery 10th | 2 years in a row

**IN AMERICA'S TOP 50**

Pediatric Urology 21st | 5 years in a row  
 Pediatric Cancer 23rd | 4 years in a row  
 Pediatric Cardiology & Heart Surgery 29th | 5 years in a row  
 Pediatric Pulmonology 29th | 3 years in a row  
 Pediatric Diabetes & Endocrinology 48th | 5 years in a row



“Wait. I can check my medical record now.”



THE CLEVELAND CLINIC WAY

## Information Technology

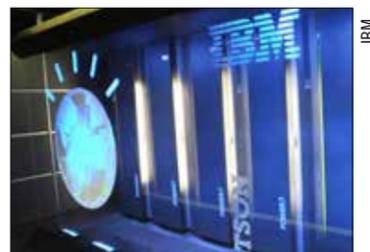
Cleveland Clinic's patients and caregivers can access patients' medical records anywhere.

Cleveland Clinic's comprehensive electronic medical records system links patients, caregivers and facilities in a seamless web of secure, accessible information. We are leading the application of big data to lower costs and improve population health. That's the Cleveland Clinic way.

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Patients can check their medical records on their smartphones, tablets or home computers, wherever they are.

## 2013 Clinical and Research Achievements



IBM's Watson

### Top Angiogenesis Gene Identified

A multidisciplinary cardiovascular research team led by Qing Wang, PhD, of the Lerner Research Institute, has discovered the most upstream master regulatory gene involved in the formation of blood vessels and blood cells. The discovery may be of great clinical potential for regenerative medicine based on stem cells for the treatment of various hematologic and vascular diseases.

Published in: *Blood*

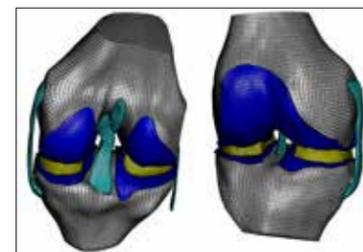
### More Collaboration with IBM's Watson

IBM and Cleveland Clinic's Lerner College of Medicine have been collaborating in efforts to enhance the cognitive abilities of Watson, IBM's supercomputer, for ultimate application in the clinical environment. Watson's core physician team at Cleveland Clinic includes J. Eric Jelovsek, MD, of the Ob/Gyn & Women's Health Institute; and Neil Mehta, MD, and Julie Tebo, PhD, of the Education Institute. This year, two new Lerner College of Medicine-Watson projects were launched:

**WatsonPaths** — WatsonPaths, as IBM explains it, explores a complex scenario and draws conclusions much like people do in real life. When presented with a medical case, WatsonPaths extracts statements based on the knowledge it has learned as a result of being trained by medical doctors and from medical literature. The system works its way through chains of evidence — pulling from reference materials, clinical guidelines and medical journals in real time — and draws inferences to support or refute a set of hypotheses. This

ability to map medical evidence allows medical professionals to consider new factors that may help them create additional differential diagnosis and treatment options. As medical experts interact with WatsonPaths, the system will use machine learning to improve and scale the ingestion of medical information. WatsonPaths incorporates feedback from the physician, who can drill down into the medical text to decide if certain chains of evidence are more important, provide additional insights and information, and weigh which paths of inferences will lead to the strongest conclusions. Through this collaboration loop, WatsonPaths compares its actions with those of the medical expert so the system can get "smarter." WatsonPaths, when ready, will be available to Cleveland Clinic's faculty and students as part of their problem-based learning curriculum and in clinical lab simulations.

**Watson EMR Assistant** — EMRA, as it is called, is being developed to help physicians find and use the full range of information available in electronic medical records for better and more efficient patient care. The amount of information in the EMR is increasing rapidly and is available in both free text and discrete fields. Watson's ability to process natural language gives it a deep semantic understanding of this structured and unstructured data. It can quickly analyze the data in the EMR and retrieve information and relationships within the data in a visualization tool that can be used in clinical decision-making. IBM is working with Cleveland Clinic's physicians to better collate key details from medical histories and offer physicians a problem list of clinical concerns — highlighting key lab results and relevant medications,



Virtual knee model

along with important events from the patient's chronological timeline. In addition, the team is developing tools for semantic searching of the unstructured data and for interpretation of the cause of abnormal laboratory results.

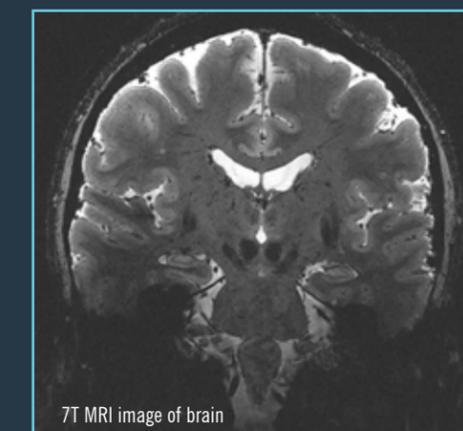
### Open Knee(s) Project in Biomedical Engineering

A researcher at Cleveland Clinic is drawing on the "wisdom of the crowd" to create computerized models of the human knee that can move and respond to loads much like a real knee. The project is called "Open Knee(s)." Ahmet Erdemir, PhD, and his team at Cleveland Clinic's Lerner Research Institute have created a first-generation virtual knee model that has been downloaded by more than 350 people worldwide. Researchers everywhere are invited to tinker with the knee and enrich it with additional data — much as users add to and enrich crowd-sourced websites such as Wikipedia. The goal is to use the Open Knee(s) and models like it to understand how stress affects knee tissues at different scales, and use that knowledge to develop better preventive therapies and prosthetics to address the rising demand for joint replacement.

Dr. Erdemir, Director of the Computational Biomodeling (CoBi) Core in the Department of Biomedical Engineering at Lerner Research Institute, is working on the Open Knee(s) project in collaboration with scientists at Simbios, an NIH Center for Biomedical Computation at Stanford University, and investigators at the University of Utah. His next step is to crowd-source the basic development of six virtual knee models, representing different ages, genders and disease states.

### Ultra-High-Definition Scanner Up and Running

The Imaging Institute completed installation of a remarkable new piece of equipment in 2013 — an ultra-high-field 7T MRI scanner. It is the only device of its kind in Northeast Ohio and one of about a dozen in the United States. While the Imaging Institute has several 1.5T and 3T MRI scanners, the 7T MRI "provides high spatial resolution that permits us to see smaller details," says Mark Lowe, PhD, Cleveland Clinic's Director of High Field Imaging. "A lot of brain tumors and other pathologies are not visible with the lower-field-strength MRIs. With the 7T, for example, we can better see the margins of some brain tumors." The 7T MRI will be used for biomedical research for neurologic and psychiatric conditions such as multiple sclerosis, Alzheimer's disease, bipolar disorder, Parkinson's disease, depression and traumatic brain injury. With 350 miles of superconducting wire, the 7T MRI weighs 40 tons and is housed in a specially constructed building next to the Mellen Center for Multiple Sclerosis.



7T MRI image of brain

## 2013 Clinical and Research Achievements



Online risk assessor

### Raising HDL Produces no Benefit

High levels of HDL — the “good” cholesterol — are associated with lower risk of cardiovascular disease. Drugs are being developed that are able to raise patients’ HDL levels, with the hope that higher levels of HDL will mean less cardiac risk. A research team at the Miller Family Heart & Vascular Institute performed a study to test this hypothesis using RVX-208, which increases HDL levels by inducing the production of apolipoprotein A1, a major protein in HDL. They enrolled patients who were already taking statins to reduce their LDL or “bad” cholesterol levels. The results showed that while RVX-208 could raise HDL, it did not slow the progression of coronary artery disease compared with placebo. Presented at: European Society of Cardiology Congress 2013

### Most Robotic Parathyroidectomies and Adrenalectomies

Patients requiring parathyroid removal now have the option of scarless robotic surgery. The Robotic Endocrine Surgery program, under Director Eren Berber, MD, has reported the world’s largest experience in this procedure. Additionally, robotic adrenalectomy has become an alternative to the laparoscopic removal of the adrenal glands for appropriate patients at Cleveland Clinic. Dr. Berber’s team has reported the world’s largest series of robotic adrenalectomy cases in the world.

### First Interactive Risk Assessor for Female Incontinence

Patients like to know their risk of getting common diseases and disorders. Most risk profiles, however, address whole populations, not individuals. For instance, it is known that approximately 24 percent of women are likely to develop pelvic floor disorders that significantly impact quality of life. However, the odds for any individual woman may be quite different. To help women better understand their risk and plan for the future, J. Eric Jelovsek, MD, of Cleveland Clinic’s Ob/Gyn & Women’s Health Institute, has developed the first interactive, web-based tool to predict a woman’s individual probability of developing different types of incontinence after her first delivery. It includes four statistical prediction models vetted through internal and external validation. The physician interprets the results, which estimate the patient’s risk of both fecal and urinary incontinence. The interactive prediction models for postpartum urinary and fecal incontinence in primiparous women will be integrated into Cleveland Clinic’s electronic medical record. They are available on Cleveland Clinic’s website at no cost.

*“We did this not just for the enterprise but to help inform patients and obstetricians across the United States. Our prediction models are on our website at no cost and are available to any clinician.”*

— Matthew Barber, MD, Vice Chair, Clinical Research, Ob/Gyn & Women’s Health Institute



Athletic trainer adjusts C3 App

### Unparalleled Focus on Concussion

Cleveland Clinic’s Concussion Center — directed by Jay Alberts, PhD — in collaboration with departments and institutes across the organization, has launched a historically unparalleled effort to improve the prevention, diagnosis and management of concussion. Active clinical initiatives include implementation of the evidence-based, EMR-integrated Concussion Care Path and the refinement and distribution of Cleveland Clinic’s Concussion (C3) App for use in emergency settings and by schools and communities nationwide — all using proprietary Cleveland Clinic intellectual property. Active research includes the Boxing Biomechanics Study, a comprehensive investigation of impact dynamics in combat sports, a Federal Aviation Administration-funded study of loss of consciousness, and development of the Intelligent Mouthguard to gather real-time data in fights. Additional research includes:

- New findings from the Lerner Research Institute on measurement of brain proteins in the blood to assess the effect of repeated blood-brain barrier disruption.
- Use of advanced MRI techniques by the Neurological Institute to better understand how the brain changes with concussion.
- Collaboration with Cleveland Clinic Children’s to adapt the C3 App for athletes 5-12 years old.

These efforts bring together clinicians and researchers from Cleveland Clinic’s Orthopaedic & Rheumatologic Institute, Neurological Institute, Lerner Research Institute, Pediatric Institute, Medicine Institute and other areas in an unprecedented push to address concussion.

National attention for these efforts this year were capped by the announcement of “The Trust” — a collaboration among Cleveland Clinic, the NFL Players Association and two universities whose goal is to care for and improve the brain health of retired NFL players. The Trust will identify sports-related brain trauma and the issues it may cause early on in the course of a player’s life, so treatment and interventions can begin sooner.

### First New Otolaryngology Anesthesia Text in 21 Years

Cambridge University Press has published *Anesthesia for Otolaryngologic Surgery* by Basem Abdelmalak, MD, and D. John Doyle, MD, PhD, of Cleveland Clinic’s Anesthesiology Institute. The comprehensive overview of anesthetic and management strategies for otolaryngologic and bronchoscopic procedures includes contributions from 24 Cleveland Clinic experts. It is the first textbook on this topic in 21 years.

## A National Leader in Healthcare Internet

Cleveland Clinic's website (clevelandclinic.org) enjoyed 52 million visits in 2013 — more than a 50-percent increase from the year before. It is the first hospital website in history to receive more than 50 million visits in a single year. More than 111,000 people contacted Cleveland Clinic through the website in 2013, and more than 56,000 online appointment requests were submitted.

Marketing and Communications is responsible for Cleveland Clinic's Internet, email, mobile and social media presence, under the leadership of Chief Marketing Officer Paul Matsen and Scott Linabarger, Senior Director of Multichannel Content Marketing. Cleveland Clinic's official blog, HealthHub from Cleveland Clinic, which provides health, wellness and medical news and insight to health care consumers, received more than 8.2 million visits in 2013 — an increase of more than 1,000 percent from the year before. HealthHub also averaged nearly 1.2 million monthly visits during the fourth quarter of the year.

In 2013, Multichannel Content Marketing reached consumer and physician inboxes 2.2 million times with email newsletters. The newsletters, including *Be Well*, *The Beating Edge*, *Speaking of Women's Health* and *Competitive Edge*, had click-through rates as high as 50 percent.

Cleveland Clinic was the fastest-growing hospital presence in social media in 2013, adding nearly 600,000 Facebook fans and 80,000 Twitter followers last year alone.

### 2013 End-of-Year Stats:

Facebook fans — 770,000

Twitter followers — 165,000

YouTube views — 4.5 million

Google+ followers — 50,600

Videos on Cleveland Clinic's YouTube channel were reviewed 3 million times in 2013, with the leading attraction being "Empathy: The Human Connection to Patient Care," a multi-award-winning video produced by the Office of Patient Experience and Media Production (and featured in the 2012 Cleveland Clinic Annual Report). The video received more than 1.2 million views and has been picked up by other YouTube users, and gained hundreds of thousands of additional views across the Internet.



770,000  
fans



165,000  
followers



4.5 million  
views



50,600  
followers



## The Growing Influence of Mobile

- Only 26 percent of visitors to clevelandclinic.org in the fourth quarter of 2012 used mobile devices (smartphones or tablets) to access the site. Over the next year, that number rose to 48 percent.
- Less than one-half percent of all visits to clevelandclinic.org in 2011 came from iPads and other tablets. A little over two years later, more than 12 percent of all visits were via tablet.
- In the first quarter of 2014, mobile users made up more than 58 percent of all visits to clevelandclinic.org. Among HealthHub users during that same period, more than 70 percent of visits were made by way of a tablet or smartphone.

In April 2014, Cleveland Clinic launched an updated version of its popular mobile app, Cleveland Clinic Today. The app is a daily interactive link to Cleveland Clinic experts and caregivers. Users can find a doctor, make appointments, access medical records through MyChart, find directions to Cleveland Clinic, and get up-to-date medical information and infographics and innovative story-telling modalities. Cleveland Clinic Today is free and downloadable from the Apple App Store and Google Play.

## 2013 Clinical and Research Achievements



Chemotherapy compounding robot

### Breath Test Reveals Heart Failure

It is now possible to detect heart failure by analyzing compounds in patients' exhaled breath. A single-center prospective study used a breath analyzer to search for hundreds of volatile organic compounds in patients' exhalations. Raed Dweik, MD, of the Respiratory Institute, led the study, in collaboration with W. H. Wilson Tang, MD, from the Miller Family Heart & Vascular Institute. The findings provide insight into heart failure and may help reduce hospital readmissions by identifying those patients most at risk.

Published in: *Cardiology News*

***"The noninvasive nature and ease of application of this test suggest that it may have broad potential."***

— Raed Dweik, MD, Respiratory Institute

### First Study of Chemotherapy Compounding Robot

Cleveland Clinic's Department of Pharmacy has a robotic system to prepare individualized chemotherapy doses in a variety of infusion bags and syringes. Angela Yaniv, PharmD, and Scott Knoer, PharmD, have published the first study analyzing the effectiveness of such a robot in the clinical setting. The robot is programmed to recognize the physical parameters of syringes and vials and uses photographic identification, barcode identification, and gravimetric measurements to ensure that the correct ingredients are compounded and the final dose is accurate. While the study observed some mechanical material-related issues, it found that

"through staff training, information technology improvements, and workflow adjustments, the robot's throughput has been steadily improved." Implementation of the system was deemed successful at the Taussig Cancer Center Pharmacy, and the robot performed compounding tasks safely and accurately. Dr. Knoer is Chief Pharmacy Officer of Cleveland Clinic.

Published in: *American Journal of Health-System Pharmacy*

***"IV robotics for chemotherapy compounding clearly improves the safety of high-risk drug compounding for some of our most vulnerable patients and for our valued employees."***

— Scott Knoer, PharmD, Chief Pharmacy Officer

### Lupus Clinic Established

Cleveland Clinic's collaborative approach to healthcare is exemplified under the leadership of Abby Abelson, MD, Chair of the Department of Rheumatic and Immunologic Diseases in the Orthopaedic & Rheumatologic Institute, where a new Lupus Clinic has been established. Systemic lupus erythematosus (SLE) is a chronic, inflammatory autoimmune disease that can manifest itself across a range of body systems. The multidisciplinary service is led by rheumatologists with streamlined access to nephrologists, dermatologists, neurologists and preventive cardiologists to address all areas of patient need. The clinic offers consultation and

long-term management, including treatment of arthritis, dermatitis, nephritis and other associated conditions in patients with SLE.

### Most Post-PCI Mortality Unrelated to Procedure

Mortality is very low for percutaneous coronary intervention (PCI, or angioplasty). In an effort to lower the number even further, Cleveland Clinic researchers led by Mehdi Shishehbor, DO, MPH, of the Miller Family Heart & Vascular Institute, examined the records of more than 4,000 patients who had the procedure to determine the extent to which mortality could be attributed to complications from the procedure or from other factors. They found that only 42 percent of the deaths occurring within 30 days of PCI involved complications from the procedure. Further, they found that outcomes reporting and death certificates for these cases largely failed to make this distinction. They recommended that outcomes reporting for PCI be classified according to cause of mortality, so that the risks of PCI will not be overestimated and hospitals and doctors will be held more accurately accountable for their outcomes.

Published in: *Journal of the American College of Cardiology*

***"It's important to classify causes of death into categories that truly reflect a physician's and an institution's competence and act as an indicator of performance."***

— Mehdi Shishehbor, DO, MPH, Miller Family Heart & Vascular Institute

### Cleveland Clinic Children's — New Name, New Look

Cleveland Clinic Children's rolled out a new name and a new logo in 2013. Cleveland Clinic Children's is recognized as one of the top pediatric hospitals in the country by *U.S. News & World Report*.

Cleveland Clinic Children's earned national rankings in seven specialties, with two rated among the top 10 in the country. The hospital's Neurology and Neurosurgery program ranked eighth in the country, and its Gastroenterology & GI Surgery program was ranked 10th best. The hospital also ranked nationally in Cancer, Cardiology and Heart Surgery, Diabetes and Endocrinology, Pulmonology and Urology.

***"It's a great accomplishment to be recognized among the top children's hospitals in the country. We're dedicated to growing our services across all specialties and throughout the region so we can continue delivering world-class care to our children."***

— Giovanni Piedimonte, MD, Chair, Pediatric Institute & Cleveland Clinic Children's



“I’m back on the road  
to independence.”

THE CLEVELAND CLINIC WAY

## Driving Innovation

Cleveland Clinic moves new ideas into new businesses.

Cleveland Clinic’s caregivers are continually refining, adapting and inventing new software, devices and techniques for better patient care. Cleveland Clinic Innovations speeds the patenting, testing and commercializing of bright ideas. Patients everywhere benefit. That’s the Cleveland Clinic way.

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**Cleveland Clinic is the first civilian user of the CAREN (Computer Assisted Rehabilitation Environment) system to improve balance and gait in neurologically impaired patients.**

## 2013 Clinical and Research Achievements



Gene Barnett, MD

### Radiation Heart Disease Doubles Postsurgical Danger

Eliminating cancer and preventing its recurrence is the overriding goal of radiation treatment. But there are trade-offs. Radiation can cause or contribute to heart problems, some of them serious enough to require surgical treatment. The trade-offs continue even after surgery, according to a study led by Milind Desai, MD, of the Miller Family Heart & Vascular Institute. Dr. Desai and his team found that patients who have open heart surgery for heart disease caused by radiation cancer treatment are nearly twice as likely to die in the years following their surgery compared with similar patients who did not undergo radiation treatment. Not all patients are at the same risk. Dr. Desai looks ahead to research that will study the population and stratify the risk. This will help identify the most effective ways of treating this complex disease.

Published in: *Circulation* (American Heart Association)

***“Chest radiation, even if the patient had it years or decades earlier, puts heart surgery patients at much higher risk for long-term events.”***

— Milind Desai, MD, Miller Family Heart & Vascular Institute

### Centers Study MRI-Guided Brain Tumor Treatment

A new treatment that destroys brain tumor tissue through controlled blasts of laser heat has been studied by a consortium including researchers from Cleveland Clinic, its partners in the Case Comprehensive Cancer Center (University Hospitals Health System, Case Western Reserve University), and the University of Manitoba. Gene Barnett, MD, of Cleveland Clinic's Neurological

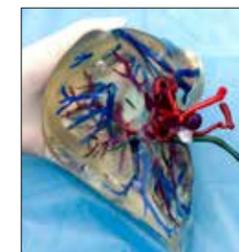
Institute, was the principal investigator. The thermal therapy system (NeuroBlate®, formerly AutoLITT®) is conducted with the patient in an MRI machine. This allows the operators to plan and steer the device in real time. Uniquely, it also allows operators to observe different effects of the heat treatment in real time, so that the treatment can be adjusted while underway. The phase I study contributed to the FDA's approving the technique for use as a routine clinical therapy.

***“Unlike other radiation-based minimally invasive procedures that have proven ineffective in large trials, this treatment results in tumor death at the time of the procedure.”***

— Gene Barnett, MD, Neurological Institute

### Vascular Anomalies Program Treats Birthmarks

Port wine stains are one example of a group of congenital conditions categorized as vascular anomalies. Characterized by an abnormal cluster of swollen or sinuous blood or lymphatic channels, vascular anomalies can appear at birth or develop at different ages, and they are associated with a wide range of tumors (including hemangiomas) and malformations that can seriously affect a child's health or appearance. Only a few national centers address these conditions. Cleveland Clinic Children's has established a Vascular Anomalies Program under the co-directorship of Abraham Levitin, MD, of Cleveland Clinic's Imaging Institute, and Gaby Doumit, MD, and Joan Tamburro, DO, of Cleveland Clinic's Dermatology & Plastic Surgery Institute.



3-D liver model

### First Complete 3-D Printed Livers

The rising demand for liver transplantation and the scarcity of deceased-donor livers have led to an increase in live-donor transplants. To enhance the safety of donors and recipients of live-donor transplants, a Cleveland Clinic transplant and biomedical engineering team led by Nizar Zein, MD, has developed a protocol for creating detailed 3-D models of patient livers to aid in planning surgery and identifying potentially difficult anatomy in advance. The models are particularized and detailed right down to the complex vasculature and biliary structures inside the liver.

The team reported the replication of the native livers of six patients: three living donors and three respective recipients who underwent live-donor liver transplantation — the first complete 3-D printed livers in the world. The printed models provide more accurate anatomical reproduction of the liver for the purpose of surgical planning than does screen-based 3-D imaging. Using standardized assessments, the team demonstrated identical anatomical and geometrical landmarks in the 3-D printed models and native livers. The researchers are now expanding their initial work to include models of other organs for surgical guidance in complex surgeries, including resection of cancerous tumors and other organ transplantation.

Published in: *Liver Transplantation*

The team includes specialists in dermatology, radiology, interventional radiology, reconstructive surgery, genetics, pediatric cardiology, pathology, hematology, ophthalmology and orthopaedics, who collaborate to accurately diagnose and properly treat vascular anomalies. The team meets regularly for case discussions of referred patients and to promote research and further knowledge of these conditions.

### New Transplant Dermatology Program

Medications taken to prevent the rejection of transplanted organs can compromise patients' immune systems, leaving them vulnerable to many diseases — including skin cancer. These patients often develop multiple skin cancers and more aggressive skin cancers with higher recurrence rates and a greater risk for metastasis than in the general population. For some skin cancers, the risk can be as high as 250 times greater.

The Dermatology & Plastic Surgery Institute has established a new Transplant Dermatology Program to address this risk. Directed by Alexandra Zhang, MD, the multidisciplinary clinic provides early detection, monitoring and treatment for pre- and post-transplant patients, offering them education and risk assessments with follow-up. The program has seen more than 1,390 patients and treated more than 560 tumors since 2011. Patients have access to the full range of treatments from Mohs micrographic surgery, cryosurgery and wide local excision to chemotherapy and radiation.

## Cleveland Clinic Innovations Makes Waves

Gary Fingerhut was appointed Executive Director of Cleveland Clinic Innovations in 2013. Innovations converts inventors' ideas into technologies that improve patient care. He takes charge of an enterprise with a portfolio of 66 spin-off companies. Last year, Innovations saw its Healthcare Innovation Alliance — a coalition that includes some of the most renowned healthcare organizations — grow to seven members. Here are more 2013 Innovations achievements:

- Secured \$3 million in Series A funding for Shield Biotech. Shield Biotech is developing a vaccine to prevent breast cancer, developed by Vincent Tuohy, PhD, of the Lerner Research Institute. Funding will be utilized to initiate clinical studies.
- Launched Cleveland Diagnostics with a preseed investment from Ohio BioValidation Fund, which is developing a diagnostic test for prostate cancer based on the prototype by Mark Stovsky, MD, of Cleveland Clinic's Glickman Urological & Kidney Institute.
- Conducted the 11th Annual Medical Innovation Summit, marking the grand opening of the Global Center for Health Innovation. The summit had a record registration of 1,600, with attendees from 40 states and 20 countries.
- Received \$10 million NIH award (National Heart, Lung and Blood Institute) to take technologies out of research and into commercialization as part of a multi-institutional Ohio consortium.
- Wael Barsoum, MD, and Bret Hartzell, MS, from Cleveland Clinic's Orthopaedic & Rheumatologic Institute, and Douglas Johnston, MD, of the Miller Family Heart & Vascular Institute, developed an orthopaedic fixation device for use in the chest cavity. In June, Jace Medical LLC was formed based on the foundational intellectual property licensed from Cleveland Clinic.
- Stephen Ellis, MD, of the Miller Family Heart & Vascular Institute, and Shubhayu Basu, PhD, of the Global Cardiovascular Innovation Center, developed a novel embolic filter design for placement in the ascending aorta. Drawing on a wide range of resources from Innovations, Medical Device Solutions and commercial development firms, intellectual property rights were secured, and development included prototype refinement and testing through preclinical studies conducted in the Atrial Fibrillation Innovation Center. In April, Cleveland Clinic secured a license with Keystone Heart, providing a 20-fold return on the direct expenses of developing and testing the prototypes. The project is a model example of broad teamwork across the full spectrum of clinical, developmental, evaluative and commercialization functions of Cleveland Clinic.



- Stanley Hazen, MD, PhD, of the Lerner Research Institute, developed novel biomarkers produced by microbes in the gut to detect increased risks of a cardiovascular event. This technology was optioned to Procter & Gamble to evaluate its inclusion in their consumer product line.
- Cleveland Clinic Innovations closed financing for spin-off Talis Clinical to commercialize the ARKS/DSS platforms developed by Wolf Stapelfeldt, MD, and George Takla, PhD. The two technologies — the Anesthesia Automated Record Keeping System (ARKS) and Decision Support System (DSS) — work in tandem and will be packaged as Advanced Clinical Guidance-Anesthesia.
- Cleveland Clinic Innovations kicked off an alliance with the Innovation Institute in early 2013. The Innovation Institute provides an independent vehicle through which hospitals can cooperate with like-minded partners and execute their strategic initiatives on an expedited basis. St. Joseph Health, a \$5 billion system based in Orange County, Calif., became its first founding member.

## 2013 Clinical and Research Achievements



Diagnostic lung cancer imaging



Breath analyzer

### Drug Designed to Reduce Heart Risk Does Opposite

An experimental drug that reduces vascular inflammation has been found to increase the risk of cardiovascular events such as sudden death, heart attack and stroke. It was hoped that this drug, by reducing vascular inflammation, would inhibit the progression of cardiovascular disease in patients who had experienced unstable angina or had a heart attack. The trial, led by the Miller Family Heart & Vascular Institute, was halted early to prevent possible harm.

Published in: *Journal of the American Medical Association*

***“We know that inflammation plays a significant role in the development of coronary artery disease, but the complexity of the inflammatory process continues to confound our efforts at taming it.”***

— Steven Nissen, MD, Miller Family Heart & Vascular Institute

### Lung Cancer Guidelines Studied, Endorsed

Current guidelines recommend that the first invasive test for patients with suspected lung cancer should be a sample of the lymph nodes of the mediastinum, an area in between the lungs. This test allows for the simultaneous diagnosis and staging of the cancer. Francisco Aécio Almeida, MD, of the Respiratory Institute, analyzed a year’s worth of nonmetastatic lung cancer patients at a major cancer treatment center (not Cleveland Clinic) to determine the effectiveness of this recommended practice. The study determined that only 22 percent of patients

were receiving guideline-consistent care. However, those who did had fewer invasive tests and fewer complications than did patients with guideline-inconsistent care. An accompanying editorial on the study in the journal *Chest* agreed that following the guidelines provided “bigger bang for the buck” and urged that they be more widely followed.

Published in: *Chest*

### New Pediatric Cardiac Catheter Gets Approval

Alex Golden, MD, of Cleveland Clinic Children’s, helped the nonprofit company PediaWorks develop a new pediatric catheter that received FDA approval in 2013. Cardiac catheterization in infants is complicated by the size of the intravascular sheath that is inserted in the femoral artery. The new catheters allow regular use of sheaths that have a significantly reduced diameter, making these procedures safer for the smallest patients. Cleveland Clinic Children’s was the first hospital in the U.S. to use the new catheters — the only intravascular catheters currently cleared by the FDA for use in children.

### Novel Role for Cardiac Hypertrophy Enzyme

A team led by Sathyamangla V. Prasad, PhD, of the Lerner Research Institute, found a novel role for an enzyme involved in the development of cardiac hypertrophy — a condition that leads to heart failure. They showed that, in addition to the well-known kinase-dependent functions of the enzyme phosphoinositide 3-kinase, its lesser-studied scaffolding function also

contributes to hypertrophy. Their results suggest that noncatalytic functions of enzymes play important roles and should be considered when studying the involvement of enzymes in diseases.

Published in: *Science Signaling*

### Study May Help Assess Pitching Injury Risk

Severe arm and shoulder injuries can end amateur and professional baseball pitchers’ careers. A study led by Joshua Polster, MD, of Cleveland Clinic’s Imaging Institute, has analyzed and determined that pitchers with a low level of upper arm bone “twisting” are more prone to such injuries. This study was conducted with ImageIQ Inc., a Cleveland Clinic Innovations spin-off. The study concluded that pitchers with lower degrees of twisting in the long arm bone (running from shoulder to elbow) are more prone to severe arm and shoulder injuries.

Published in: *American Journal of Sports Medicine*

***“Simple measurements from standard image data sets were too limited to capture the complex interplay of 3-D anatomic structures involved in sports injuries. We needed a more sophisticated approach. We hope this approach helps reduce pitching injuries in professional baseball.”***

— Joshua Polster, MD, Imaging Institute

### Use of Breath Analysis to Detect NAFLD in Children

Nonalcoholic fatty liver disease (NAFLD) is a pathological fatty buildup in the liver that is not associated with alcohol use. Its occurrence is reaching epidemic proportions among overweight and obese children and adolescents. This disease both presents and is treated differently in children than in adults. Until recently, its diagnosis involved imaging, blood testing and liver biopsy. Naim Alkhoufi, MD, of Cleveland Clinic Children’s and the Digestive Disease Institute, led a study that determined a quick and easy way to detect NAFLD in children by using breath analysis of volatile organic compounds. In this study, the technique demonstrated 90 percent diagnostic accuracy. If adopted widely, this method of diagnosis could be an invaluable tool for the detection and treatment of this increasingly prevalent condition.

Presented at: Digestive Disease Week 2013

### New Target for Potential Anti-Obesity Drug

A protein that helps regulate food cravings and fat distribution has been identified in a study led by Jonathan Mark Brown, PhD, of the Lerner Research Institute. Dr. Brown discovered that blocking the action of this protein in an animal model reduced obesity and insulin resistance induced by a high-fat diet. It also protected against high-fat diet-induced hepatic steatosis. If these findings are confirmed by human testing, the protein could be a promising target for an anti-obesity drug.

Published in: *Cell Reports*

“Thank you for answering all my questions.”



THE CLEVELAND CLINIC WAY

## Patient Experience

Cleveland Clinic practices and teaches empathy.

Cleveland Clinic is transforming the patient experience. Our Office of Patient Experience works to improve everything from the patient gown to quiet at night to healing services for the spirit and emotions. Patient satisfaction scores are up — but we’re working to make them even better. That’s the Cleveland Clinic way.

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**Cleveland Clinic’s doctors and other caregivers are offered special training to strengthen their listening and communications skills.**

## 2013 Clinical and Research Achievements



James Merlino, MD

### Lidocaine Reduces Pain After Spinal Surgery

Ehab Farag, MD, and Andrea Kurz, MD, of Cleveland Clinic's Anesthesiology Institute, led the first randomized study of the use of lidocaine during spine surgery. They and their colleagues tested the hypothesis that lidocaine administration, both during and eight hours after spinal surgery, could not only reduce pain but reduce the need for opioid painkillers in the 48 hours after surgery. They also looked at complications, quality of life, nausea and other secondary outcomes. Their study showed that lidocaine reduced pain significantly compared with placebo and was as effective as opioids but with slightly fewer complications.

Published in: *Anesthesiology*

### Big Data and Infectious Disease Specialists

As healthcare providers seek ways to lower costs, they are looking closely at the impact of specialties on patient outcomes. A team led by Steven Schmitt, MD, an infectious disease specialist in Cleveland Clinic's Medicine Institute, investigated how infectious disease (ID) specialists impact mortality, utilization and costs, using a Medicare claims data set of more than 270,000 hospitalizations. The study found not only that ID interventions were associated with improved patient outcomes, but that early ID interventions were associated with reduced costs through lower mortality, readmissions, hospital length of stay, ICU length of stay and Medicare charges.

Published in: *Clinical Infectious Diseases*

### Delivering an Extraordinary Patient Experience

Since launching the Office of Patient Experience (OPE) in 2007, Cleveland Clinic has become the acknowledged leader of patient experience initiatives and education worldwide. In 2013, Cleveland Clinic was contacted by more than 260 hospitals and medical centers seeking input on patient experience programming. Chief Experience Officer James Merlino, MD, has been invited to speak on patient experience to officials at leading providers nationwide.

OPE currently offers the most comprehensive physician communication training program in the country. By April 2014, it had been validated on more than 3,000 staff physicians and 1,500 house staff. Thirty-five staff physicians have been trained to deliver the program. Classes are being offered at Sheikh Khalifa Medical City in Abu Dhabi, and OPE is in discussions with medical centers and private industry to license and offer the program elsewhere.

Communicate with H.E.A.R.T. is OPE's foundational service excellence program for delivering a consistent experience to patients, visitors and other caregivers. It has been delivered to more than 43,000 caregivers at Cleveland Clinic. OPE is collaborating with outside organizations to validate the model and market it to providers worldwide.

OPE's fourth annual Patient Experience: Empathy + Innovation Summit welcomed 853 attendees in 2013, from 34 states, 30 countries and nine of the 10 top-ranked (*U.S. News & World Report*) hospitals. It is the largest independent summit of its kind in the world.

### Making Everyone a Caregiver

The cover of the May 2013 issue of the *Harvard Business Review (HBR)* featured "Health Care's Service Fanatics," an article by James Merlino, MD, Chief Experience Officer of Cleveland Clinic, and Ananth Raman, the UPS Foundation Professor of Business Logistics at Harvard Business School. A comprehensive overview of Cleveland Clinic's patient experience initiatives over the past seven years, Dr. Merlino and Professor Raman's article was *HBR's* most-downloaded article of the year. Below is a brief excerpt.

### Health Care's Service Fanatics Making Everyone a Caregiver

At most hospitals the primary relationship is considered to be between the doctor and the patient; the rest of the staff members see themselves in supporting roles. But in the eyes of patients, all their interactions are important.

To understand how many people a patient typically encounters, [Colorectal Surgeon and Chief Patient Experience Officer James] Merlino asked one patient, a woman undergoing an uncomplicated colorectal surgery, to keep a journal of everyone who cared for her during her five-day stay. It turned out that there were eight doctors, 60 nurses, and so many others (phlebotomists, environmental service workers, transporters, food workers, and house staff) that the patient lost track. Few of her 120 hours at the Clinic were spent with physicians. Moreover, her journal did not even take into account employees in nonclinical areas, such as billing, marketing, parking, and food operations, people who did not interact directly with her but might have had a big impact on her stay. Merlino realized that all employees are caregivers, and that the doctor-centric relationship should be replaced by a caregiver-centric one.

To get everyone in the organization to start thinking and acting accordingly, Merlino proposed having all 43,000 employees participate in a half-day exercise. Randomly assembled groups of eight to 10 people would meet around a table with a trained facilitator; a janitor might be seated between a neurosurgeon and a nurse. All would participate as caregivers, sharing stories about what they did, and what they could do better, to put the patient first and to help the Clinic deliver world-class care. They would also be trained in

basic behaviors practiced by workers at exemplary service organizations: smiling; telling patients and other staff members their names, roles, and what to expect during the activity in question; actively listening to and assisting patients; building rapport by learning something personal about them; and thanking them. The cost of the half-day program, including the employees' salaries, would be \$11 million.

[CEO and President Toby] Cosgrove embraced the idea, but some members of the executive team were skeptical. Physicians on the team believed that doctors would never go along with the plan and should not have to take time from their busy schedules ... Cosgrove listened to the discussion in silence and then spoke. Making any exceptions, he said, would undermine one of the program's main aims: to eliminate the divide between doctors and the rest of the staff and create a unified culture in which everyone worked together to do what was best for the patients. And yes, the ROI was unclear. "But what will be the cost [for patients and the organization] of not proceeding?" he asked ...

The program was launched in late 2010. It took a full year for everyone to go through it. A handful of physicians asked to be excused but were refused. As hoped, the program had a profound impact. Nonphysician employees were amazed by the experience of sitting with doctors and discussing how they, too, were caregivers. Participants shared frustrations about not always being able to provide a nurturing environment. Even doctors who had been skeptical about the exercise felt it was worthwhile.

### Zielony Nursing Institute Highlights

The Stanley Shalom Zielony Institute for Nursing Excellence oversees the practice and education of more than 11,000 nurses in all aspects of Cleveland Clinic's health system, including inpatient, outpatient, rehabilitation and home care fields. Under the leadership of Executive Chief Nursing Officer K. Kelly Hancock, MSN, RN, NE-BC, Cleveland Clinic's nurses are committed to giving every patient the best experience and outcome.

In 2013, Cleveland Clinic earned Magnet® recognition for the third consecutive time from the American Nurses Credentialing Center. The four-year designation is the highest honor an organization can receive for professional nursing practice and places Cleveland Clinic in an elite group of 55 healthcare institutions worldwide that have been recognized with this credential three times or more.

"Achieving Magnet recognition again is truly a tremendous honor and is a direct reflection of our nursing staff's ongoing commitment to quality and putting patients first," says Ms. Hancock. "Cleveland Clinic has become synonymous with world-class care, and our nurses continue to raise the bar, ensuring the organization delivers on that promise."

Cleveland Clinic's main campus was initially designated a Magnet hospital in 2003. This redesignation encompasses not only Cleveland Clinic's main campus, but also Cleveland Clinic's family health centers and Cleveland Clinic Children's Hospital for Rehabilitation. Cleveland Clinic's Fairview Hospital, which received Magnet recognition in 2009, was also redesignated in 2013.

Cleveland Clinic's nurses are comprehensively measuring and assessing all their processes and activities to improve the quality, safety and patient-centeredness of their care. They measure their progress by internal benchmarks and outside measures such as Centers for Medicare & Medicaid Services' Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores and Core Measures scores. Nurses at Cleveland Clinic combine compassionate caregiving with established protocols and evidence-based practices. As responsible stewards, the Zielony Nursing Institute has worked with Cleveland Clinic's Supply Chain Department to reduce costs by \$2 million. Nurses are working to improve quality and outcomes through multidisciplinary initiatives such as "Keep the Pressure On" — an educational program to prevent pulmonary embolism, venous thromboembolism and deep vein thrombosis.

#### Optimizing the Patient Experience

Cleveland Clinic's nurses continue to improve patient satisfaction scores (HCAHPS). They increased scores in Nurse Communication, Nurse Rounding, Discharge Communication, Pain Management, Staff Responsiveness and Quiet at Night across the system in 2013.

Core Measures reflect the application of evidence-based protocols to specific conditions. In the categories of Heart Failure, Pneumonia, Heart Attack and Surgical Processes, systemwide scores are approaching the goal of 100 percent.





“I turned 60 and needed to make a change.”

THE CLEVELAND CLINIC WAY

## Wellness

Cleveland Clinic promotes “well care,” not “sick care.”

Caring for the sick is good. Preventing sickness is even better. Cleveland Clinic has developed protocols to keep patients with chronic disease out of the hospital. Our Wellness Institute has programs for patients, caregivers and the community. Lower costs by promoting wellness. That’s the Cleveland Clinic way.

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**Cleveland Clinic’s Wellness Institute offers lifestyle programs to lose weight, improve health and boost outlook on life.**

## 2013 Clinical and Research Achievements



Injured player

### Go! Healthy Programs Thrive

The Wellness Institute continues to enhance its offerings under the Go! Healthy™ banner. Go! Healthy began with the launch of the Go! Foods® retail food labeling initiative almost 10 years ago. Go! Foods certifies retail food products with a green label indicating that they have been approved by Wellness Institute nutrition specialists for having minimal saturated fat, no trans-fat, minimal added sugars and syrups, 100 percent whole grain and minimal sodium. Food sellers from supermarkets to stadiums have participated in the program over the years. In 2013, Orlando Bakery's True Grains® product line earned Go! Foods certification. In 2012, Dave's Markets added Go! Foods labeling to two of its city neighborhood stores, joining Heinen's and Buehler's Fresh Foods supermarkets on the roster of Northeast Ohio chains using the labels.

Other Go! Healthy programs include Go! to Sleep®, an interactive online program developed by the Wellness Institute in collaboration with the Sleep Disorders Center. Stress Free Now, a clinically based, six-week online program provides tools to reduce stress based on mindfulness practice. The 5 to Go!™ program offers students and families in the community an easy countdown of steps for good health, fitness, civility and media mindfulness. Go! Foods for You® is an interactive online program based on the Mediterranean diet.

*"These Go! Programs take what we have learned from helping our employees reduce the burden of chronic disease and its cost to them and to us, and spread these benefits to our patients, corporate partners and broader communities."*

— Michael Roizen, MD, Chair, Wellness Institute

### Football Players at Risk of Long-Term Brain Injury

Concussions aren't the only danger to the brains of football players. A study led by Damir Janigro, PhD, of the Lerner Research Institute, shows an association between the number of hits a player has absorbed and the presence of an autoimmune response that is a marker for head injury — even in the absence of concussion. Number of hits was assessed by watching game videos. The autoimmune response marker is also associated with epilepsy, dementia and other brain disorders. The findings could help lead to locker room blood testing for brain trauma in athletes who sustain head hits.

Published in: *PLOS ONE*

*"While concussions get a great deal of attention, this study shows that common 'subconcussive' hits can cause damage too."*

— Damir Janigro, PhD, Lerner Research Institute

### Anti-Diabetes Benefits of Bariatric Surgery Last

Cleveland Clinic's STAMPEDE study proved that bariatric surgery effectively treats diabetes and reduces cardiovascular risk factors. A separate study has now shown that overweight and obese patients with type 2 diabetes continue to experience these benefits for up to nine years after the procedure. The researchers, led by Stacy Brethauer, MD, of the Digestive Disease Institute, also identified the factors that result in a higher rate of long-term diabetes remission: long-term weight loss, shorter duration of diabetes pre-surgery, and having gastric bypass rather than adjustable gastric banding as a procedure.

Published in: *Annals of Surgery*



Charis Eng, MD, PhD

### Expanding Knowledge in the Genomic Medicine Institute

#### New Genes Discovered for Cowden Syndrome

Charis Eng, MD, PhD, Chair of the Genomic Medicine Institute, continues to further knowledge of the genetic basis of Cowden syndrome — an underrecognized condition that increases the risk of breast, thyroid and other cancers. With three genetic variations already believed to account for 50 percent of patients with Cowden syndrome, Dr. Eng and her team identified two more genetic variations to account for another 11 percent. This discovery could speed the development of molecular diagnosis, predictive tests and gene-directed medical management.

#### Lynch Syndrome Screening for Cancers

Lynch syndrome is the most common cause of several adult-onset cancers including colorectal cancer. In women, Lynch syndrome increases the risk of endometrial cancer by 40 percent. Cleveland Clinic researchers in the Genomic Medicine Institute have completed studies that will help guide future evaluation and medical management of colorectal and endometrial cancer in patients with Lynch syndrome.

One study assessed the clinical guidelines for testing for Lynch syndrome in colorectal surgery patients. It recommends that these test results be sent to both the colorectal surgeon and genetic counselor — with the counselor contacting patients to refer them for genetic counseling. This protocol increases the number of patients who come in for genetic counseling and reduces the time between referral and counseling tenfold.

In another study, they demonstrated the feasibility and benefits of universally screening all endometrial cancers using immunohistochemistry for MSH6 and PMS2 mismatch repair proteins,

with screen positives being referred to genetic counseling.

#### Reversing Pulmonary Arterial Hypertension

Pulmonary arterial hypertension (PAH) is high blood pressure in the arteries to the lungs. A team led by Micheala Aldred, PhD, investigated ataluren as a possible therapeutic drug for PAH. Ataluren is an investigational drug already in clinical trials for other genetic diseases. Cultured lung and blood cells from PAH patients were isolated to study ataluren's effects. The study suggested that PAH may be arrested and reversed in patients with particular genetic mutations. This finding promises personally tailored treatment for PAH and a possible cure for some patients.

#### Whole Exome Sequencing in the Clinical Setting

The exome is the coding sequence of all the genes in a human cell. The Genomic Medicine Institute is pioneering the use of exome sequencing in the clinical setting. Exome sequencing may be used to discover the possible genetic causes of difficult-to-diagnose diseases in individuals and families.

#### Genomic Medicine Institute Counseling in Las Vegas

The Genomic Medicine Institute has begun offering real-time genetic counseling to patients at Cleveland Clinic's Lou Ruvo Center for Brain Health in Las Vegas, Nev. They are working with Ryan Walsh, MD, PhD, Director of the center's Parkinson's Disease and Movement Disorders Program, to provide telegenetics videoconference consults to patients diagnosed with spino-cerebellar ataxia. Telegenetics is also being used to link genetic counselors from the main campus with the center's multidisciplinary Huntington's disease clinical team.

## Hero Experience Program

Cleveland Clinic is committed to assisting veterans and reservists and supporting them in their professional and personal development in healthcare careers. Cleveland Clinic's Hero Experience program helps returning veterans apply their skill sets to the healthcare industry. Cleveland Clinic maintains collaborative partnerships with state and local organizations that help returning veterans make the transition from the battlefield to the civilian workforce. Hero Experience is an initiative of Cleveland Clinic's Human Resources Department. Since it was launched in 2012, it has resulted in more than 500 hires.

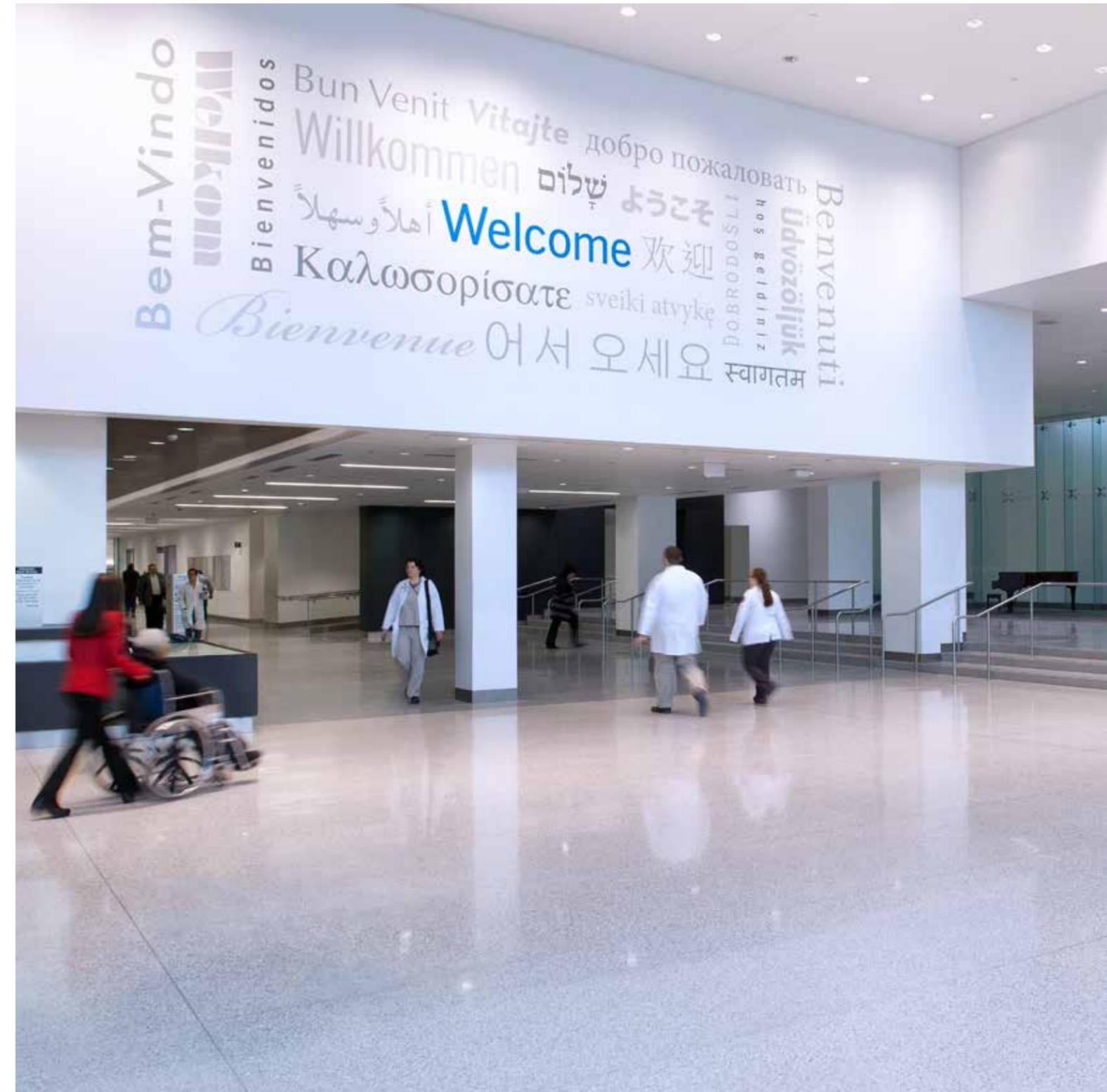


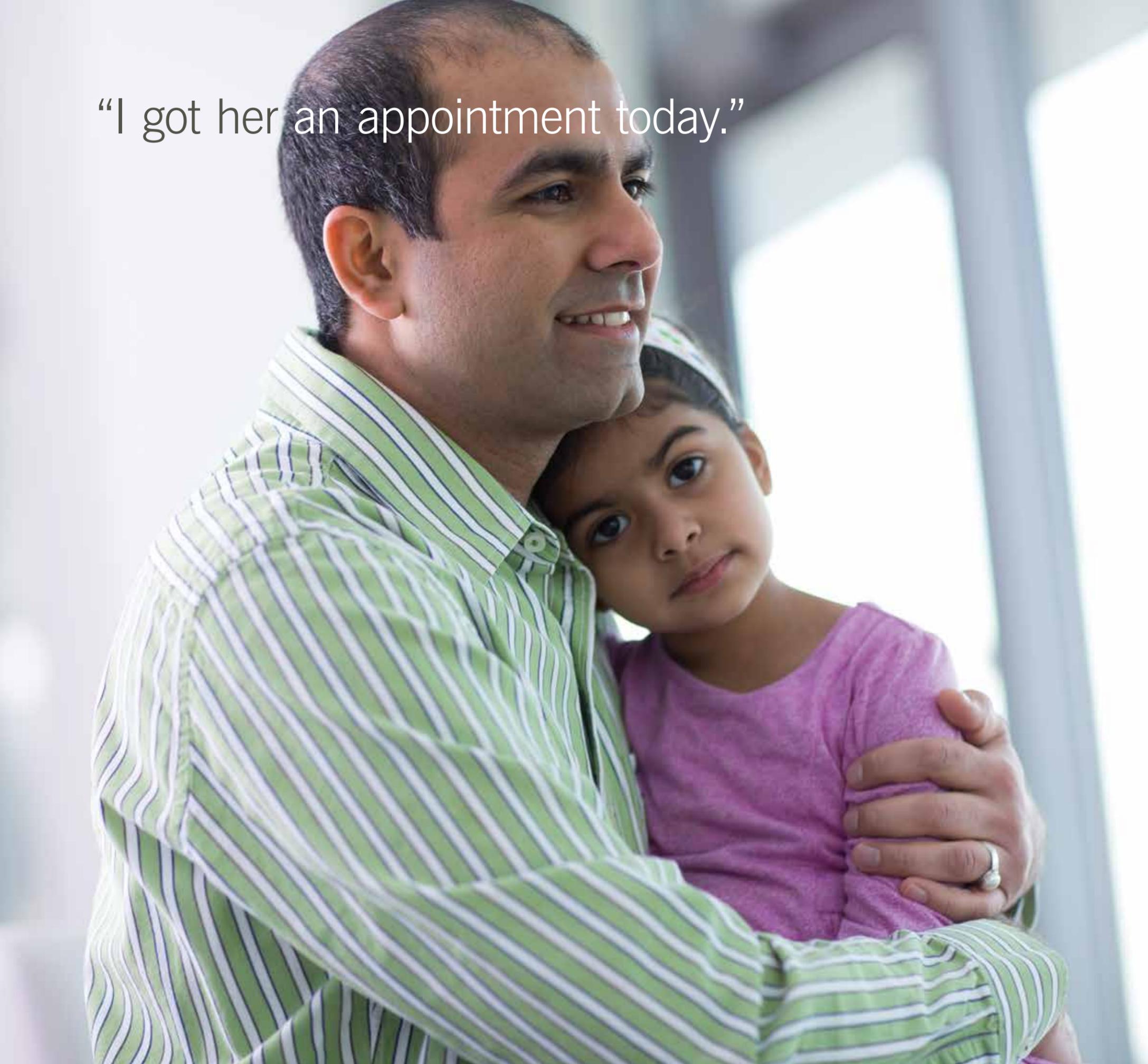
**Hero Experience Profile: Isaac Horton,  
Cleveland Clinic Red Coat Caregiver**

Isaac Horton served 29 years in the military, including six years in combat. He retired as Garrison Sergeant Major, Executive Manager, for the U.S. Army, in charge of more than 1,500 personnel. "My work at Cleveland Clinic parallels my career in the military," says Mr. Horton. "I am called upon daily to use critical thinking skills and be ready to respond in greeting patients, many of them critically ill, their family members and caregivers, of diverse backgrounds. My military travels around the world helped me learn a number of foreign languages. I get a lot of smiles when I can greet a patient in their own language."

Isaac Horton was among the caregivers on hand to greet Admiral Michael Mullen, Retired Chair, Joint Chiefs of Staff, when he visited Cleveland Clinic in December 2013. They had met previously in Iraq and Afghanistan, where Mr. Horton was assigned for combat.

"Cleveland Clinic is doing a great job at helping veterans transfer their military skills to service in the healthcare industry," says Mr. Horton. "Working at Cleveland Clinic is a way for me to give back, every day. It's very rewarding."





“I got her an appointment today.”

THE CLEVELAND CLINIC WAY

## An Integrated System

Cleveland Clinic is an integrated healthcare delivery system with local, national and international reach.

Cleveland Clinic encompasses locations in Ohio, Florida, Nevada, Canada and Abu Dhabi. Linked by health information technology, shared protocols and critical care transport, we offer the right care, at the right place, at the right time. That's the Cleveland Clinic way.

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As an integrated system, Cleveland Clinic is able to offer same-day appointments — more than a million were booked in 2013 alone.

## 2013 Clinical and Research Achievements



Critical Care Transport

### Transit Safe for Acute Aortic Syndrome Patients

Acute aortic syndrome is a potentially deadly condition possibly involving aortic dissection, thoracic aneurysm, or other lesions threatening the structural integrity of the body's largest blood vessel. Patients experiencing this condition need to be quickly diagnosed and placed in the care of an experienced surgical team. Such teams are most likely to be found at large academic medical centers such as Cleveland Clinic. It is often necessary to transport patients with acute aortic syndromes to these centers on an emergency basis. But is it safe to do so?

Chad Raymond, DO, a fellow in Preventive Cardiology and Rehabilitation, studied 263 patients with suspected acute aortic syndrome who were transported by Cleveland Clinic's Critical Care Transport team via ground mobile ICU, helicopter and fixed-wing jet over a two-year period. The patients went directly into the coronary care unit, bypassing the emergency department. The median trip was 87 minutes, during which patients were cared for by critical care teams. Dr. Raymond reported 0 percent mortality en route and 9 percent in-hospital mortality for these gravely ill patients. The study concluded that patients with acute aortic syndrome can be safely transferred to specialized centers for definitive treatment, and a well-trained critical care transfer team can successfully optimize medical management in transit.

Published in: *American Journal of Cardiology*

### Expanding Cleveland Clinic's Global Reach

International Operations continued to extend Cleveland Clinic's global reach in 2013 with the opening of new offices in London and Turkey. Cleveland Clinic Global Solutions London will build and strengthen relationships with friends, donors, patients, alumni and stakeholders who live in the United Kingdom and surrounding region. Cleveland Clinic will share its best practices, consult on future projects, and offer services remotely such as electronic second opinions and virtual medicine, and explore other possible collaborations in the future. Cleveland Clinic Global Solutions Turkey will coordinate visits to Cleveland Clinic for patients seeking additional or alternate treatment, as well as build and maintain relationships in the region for other business opportunities. In 2012, Cleveland Clinic saw a 28 percent increase in patients coming from Turkey.

Among their other achievements, International Operations successfully planned and implemented Abu Dhabi Night on April 15. The event was a chance for Cleveland Clinic's caregivers to learn the latest updates and information on operations in Abu Dhabi, including Cleveland Clinic Abu Dhabi, Sheikh Khalifa Medical City. It also provided information to caregivers hoping for a career in Abu Dhabi.



Cleveland Clinic Florida

Jerry Rabinowitz

### Cleveland Clinic Florida — 25th Anniversary

The establishment of Cleveland Clinic Florida in 1988 began a new era in South Florida healthcare. What began as a group specialty practice in Ft. Lauderdale with nine physicians is today a world-renowned academic medical center with a staff of 230 salaried physicians and more than 2,000 dedicated professionals working at hospital, clinic and wellness facilities in Weston and West Palm Beach.

Cleveland Clinic Florida's 25th anniversary year of 2013 was made all the more notable by the generous gift of Pauline Braathen — \$30 million to fund the construction of a five-story, 143,000-square-foot building on Cleveland Clinic Florida's Weston campus. The building will be named the Egil and Pauline Braathen Facility and will house the expanded Pauline Braathen Neurological Center and Cleveland Clinic Florida's Cancer Center.

For the fourth year in a row, Cleveland Clinic Florida ranked highest among hospitals in Broward County in regional rankings in *U.S. News & World Report's* ranking of Best Hospitals 2013-2014. Overall, Cleveland Clinic Florida ranked fifth among 73 hospitals in the Miami-Fort Lauderdale metro area and 14th of 271 hospitals in Florida.

### MDS-Smoking Link Found

Myelodysplastic syndromes (MDS) are cancers, similar to leukemia, in which the bone marrow fails to generate sufficient normal blood cells. Most patients are 60 years or older at diagnosis, and thus genetic abnormalities that cause MDS are thought to be acquired. A genetic study of



Mikkael Sekeres, MD, MS

MDS patients led by Mikkael Sekeres, MD, MS, of Cleveland Clinic's Taussig Cancer Institute, revealed for the first time links between smoking and genetic abnormalities in MDS — specifically along the histone acetylation pathways. The study also found that the genetic abnormalities associated with MDS showed a positive dose-response relationship with both the age of the patient and how much the patient smoked. Patients who didn't smoke responded better to treatment and lived longer than those who did smoke.

Published in: *Blood*

***"This class of genetic abnormalities is along a pathway that's treatable. That might mean using specific drugs for smokers to make the treatment more effective."***

— Mikkael Sekeres, MD, MS, Taussig Cancer Institute

### Malaria Parasite May Be Evolving

The most common form of human malaria parasite may be evolving to infect individuals once thought to be immune. The parasite, *Plasmodium vivax*, causes serious illness that can recur throughout a patient's lifetime. David Serre, PhD, of the Lerner Research Institute, and colleagues at Case Western Reserve University discovered a mutation in *P. vivax* that could allow it to infect individuals with a specific blood type previously considered immune to *P. vivax* infection. The evidence suggests that the parasite may have recently evolved to enhance its infectious capabilities. Further research could lead to new vaccination strategies or treatments to slow the rapid spread of this form of malaria.

Published in: *PLOS Neglected Tropical Diseases*

## Abu Dhabi Highlights

### Cleveland Clinic Abu Dhabi

Cleveland Clinic Abu Dhabi (CCAD) is nearing completion. Under the leadership of CCAD CEO A. Marc Harrison, MD, more than 450 Cleveland Clinic caregivers — including more than 100 physicians, nurses and allied health professionals — are currently on-site. They have begun moving thousands of pieces of medical equipment and fixtures into the new facility, which will begin seeing patients in the first half of 2015.

Located on Al Maryah Island in Abu Dhabi's new financial district, CCAD will be a multispecialty tertiary care facility with an adjacent outpatient clinic. It will be the largest structure of its kind in the Middle East, with more floor space (2.7 million square feet) than the Empire State Building. Facilities include five ambulatory floors, three diagnostic and treatment levels, 13 floors of critical and acute inpatient units, 360 beds, operational and support departments, a retail corridor, a conference center and a high-fidelity clinical simulation center. More than 30 medical and surgical subspecialties will be offered under the Miller Family Heart & Vascular Institute, Digestive Disease Institute, Respiratory Institute, Cole Eye Institute and Neurological Institute. CCAD is a partnership with Mubadala Development Company, a public joint stock company established and wholly owned by the government of the Emirate of Abu Dhabi.

Dr. Harrison is shaping CCAD to reflect both the culture of the region and the mission, vision and values of Cleveland Clinic. "We're using insights we've gathered from Mubadala Healthcare to meet the patient expectations of Abu Dhabi nationals," says Dr. Harrison. "We know, for instance, that family is a deeply important connection to our patients here, so we've built patient rooms to anticipate the presence of large, extended families. We are bringing Cleveland Clinic's best practices for patient experience to Abu Dhabi in order to provide compassionate, patient-centered care of the highest quality, complementing the United Arab Emirates' evolving healthcare industry."

"We admire the Abu Dhabi government's commitment to increasing the accessibility of world-class healthcare in the emirate, and Cleveland Clinic has developed long-standing relationships in support of that goal," Cleveland Clinic's CEO and President Toby Cosgrove, MD, told a meeting held to recruit caregivers to work at the new facility. "We are excited to expand globally Cleveland Clinic's model of care and bring our services to the people of Abu Dhabi and the Middle East."

### Sheikh Khalifa Medical City

Cleveland Clinic manages Sheikh Khalifa Medical City (SKMC) in Abu Dhabi. Ben Frank serves as Chief Executive Officer of SKMC, the largest health system in the emirate. Here are some of SKMC's 2013 clinical highlights:

- Bashir Sankari, MD, performed the first cadaveric kidney transplantation in UAE at SKMC.



Cleveland Clinic Abu Dhabi nears completion

- Paul Rychwalski, MD, began providing pediatric ophthalmological care to Abu Dhabi's youngest patients.
- The pediatric cardiac surgery program performed its 1,500th operation.
- SKMC was accredited as a Cycle IV Chest Pain Center by the Society of Cardiovascular Patient Care — the only hospital outside the United States so accredited.

### SEHA Honors SKMC

The Abu Dhabi Health Services Company-SEHA named SKMC the SEHA's Business Entity of the Year for 2013. Nominees for the honor are judged on 21 key performance indicators and compared with all 12 of SEHA's organizations across the board. Criteria include patient satisfaction, waiting time targets met, time for new appointments, budget variances, accreditations and achievements, and nationalization rate. Other SKMC personnel honored by SEHA include Ahmad Yahya, Acting Chief Information Officer (Technology Leadership Award); Tarey Ray, MS, RN, Chief Nursing Officer (Nursing Health and Allied Health Leadership Award); Samer Ellahham, MD, Chief Quality Officer (Medical and Quality Leadership Award); and Mariam Al Zaabi, Human Resources Director (Rising Star Award).

A close-up photograph of two young girls. The girl on the right has long brown hair, wears glasses, and a pink shirt with a large sequined flower. She is looking towards the girl on the left. The girl on the left has brown hair in pigtails with a green hair tie and is wearing a grey and light green striped shirt. The background is softly blurred.

“Will I get sick like  
mommy?”

THE CLEVELAND CLINIC WAY

## Personalized Healthcare

Cleveland Clinic incorporates family history, genetic profile and personal preference into your care.

Cleveland Clinic is tailoring healthcare to individuals and families. Our Genomic Medicine Institute offers genetic assessment and counseling. Our doctors work to align medications with individual genetic profiles. We are making patients active partners in their own care. That's the Cleveland Clinic way.

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**Children at risk of inheriting familial disease syndromes can reduce their risk through genetic counseling at Cleveland Clinic's Genomic Medicine Institute.**

## 2013 Clinical and Research Achievements



Kathryn Teng, MD

### Center for Personalized Healthcare Update

Cleveland Clinic's Center for Personalized Healthcare operates as Cleveland Clinic's hub for the identification, analysis, development and integration of select new services and technologies that allow for personalized preventive care. Under the direction of Kathryn Teng, MD, it provides physicians and nurses with the tools and resources they need to create personalized care plans for their patients. The center also provides information and tools to patients that empower them to proactively participate in the management of their health.

### Personalized Medication Program Launched

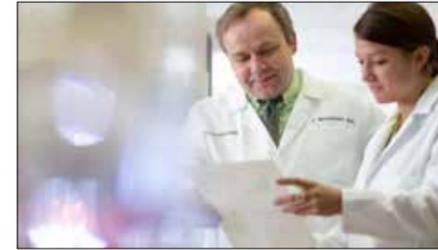
Not all patients respond the same way to medications. New techniques are making it possible to tailor the prescription and administration of certain drugs to the genetic profiles of specific patients to ensure that patients get the right drugs in the doses that will do them the most good. The Center for Personalized Healthcare has launched the Personalized Medication Program across the system to integrate and standardize the use of genetics when prescribing drugs. The program creates a platform to incorporate evidence-based, genetics-informed prescribing over time in order to reduce adverse drug events and to avoid duplication of testing. It currently includes best-practice alerts in the electronic medical record recommending the use of genetic information in prescribing certain drugs.

### MyFamily Update

Family health history is an important piece of information to help predict patients' risk for certain diseases. MyFamily is a tool that was introduced in 2012 and provides patients with an electronic portal in which to collect and record their family health history, as well as provide physicians with clinical decision support that is integrated into the electronic medical record. MyFamily has been expanded to include 12 health conditions and is actively being used at eight Cleveland Clinic primary care locations, as well as the Center for Personalized Genetic Healthcare, Taussig Cancer Institute's Breast Survivorship Clinic, and Cleveland Clinic's Breast Center.

### Personalized Healthcare Education and Awareness

The keystone of the Center for Personalized Healthcare's education program in 2013 was the 2013 Cleveland Clinic Personalized Healthcare Summit. This event attracted more than 120 clinicians, thought leaders, researchers and industry professionals from 14 states and Canada. The center celebrated Personal Healthcare Month in Ohio by hosting visiting professor Dr. Howard McLeod, who spoke about integrating pharmacogenetics into clinical practice. The center also copresented a continuing medical education event with the Genomic Medicine Institute to educate physicians and advanced-practice nurses about personal genomic testing.



Jaroslaw Maciejewski, MD, PhD (left)

### Twins Lead Researchers to MDS Finding

Myelodysplastic syndromes (MDS) are serious bone marrow failure disorders that only rarely run in families. A small subset of patients with MDS can be effectively treated by a drug called lenalidomide (a derivative of thalidomide). Until now, there has been only one genetic marker (deletion 5q) indicating the likelihood of responsiveness to lenalidomide. Mikkael Sekeres, MD, MS, and Jaroslaw Maciejewski, MD, PhD, of Cleveland Clinic's Taussig Cancer Institute, reported on identical twins with MDS and a family history of leukemia. These twins both responded to lenalidomide treatment, despite lacking deletion 5q.

Drs. Sekeres and Maciejewski and their teams analyzed blood from the twins and discovered that both had a mutation of an enzyme called DDX41, a DEAD-box helicase. This discovery sent Dr. Sekeres and his team back to their database. They looked at 94 other MDS patients and discovered a strong correlation between DDX41 and sensitivity to lenalidomide and were able to recapitulate leukemia in a DDX41 knockout animal model. In a presentation to the American Society of Hematology, they reported that by looking for the DDX41 mutation, doctors may be able to more accurately predict which patients will respond to lenalidomide.

### New Test Tells Prostate Cancer Virulence on First Biopsy

Men diagnosed with prostate cancer need to know how aggressive their tumor is so they can work with their doctors on planning how, or if, it should be treated. Eric Klein, MD, Chair of Cleveland Clinic's Glickman Urological & Kidney

Institute, and Cristina Magi-Galluzzi, MD, PhD, Director of Genitourinary Pathology in the R. Tomsich Pathology & Laboratory Medicine Institute, working with private industry, performed a series of developmental studies to demonstrate that gene expression measured in tumors from radical prostatectomy specimens can predict the development of metastasis and likelihood of death from prostate cancer. They went on to show that this information can be derived from very tiny biopsy samples. The discovery was developed in collaboration with Genomic Health Inc. The company developed it into a commercially viable test that was launched in 2013. The test allows doctors to assess prostate tumor aggressiveness on initial biopsy. Wide use of this test could significantly reduce overtreatment of nonlethal prostate cancer.

### Collaboration Finds Autism Marker

Autism spectrum disorders can be difficult to diagnose, creating a demand for measurable biological or biochemical markers of the disease. A collaboration between Charis Eng, MD, PhD, Chair of the Genomic Medicine Institute, and Thomas Frazier II, PhD, Director of Cleveland Clinic Children's Center for Autism, has found high levels of a specific amino acid — aspartic acid — in the urine of individuals identified with autism spectrum disorders. They also identified elevated or reduced levels of other specific amino acids in the subjects' blood plasma. The results of this study suggest that urine analyses and blood work could prove to be simple, cost-effective diagnostic tests for autism.

Published in: *European Journal of Human Genetics*

## Philanthropy in Action

Everyone who works at Cleveland Clinic is a caregiver. Everyone who makes a philanthropic gift to Cleveland Clinic is a caregiver too. That is because all gifts ultimately benefit patients. In 2013, generous gifts were made to advance a wide range of innovative programs and projects.

### Transformational Gifts

Among the top five gifts in 2013 were transformational gifts, which launch significant initiatives and take research, education and patient care to new levels. These included:

- A \$30 million gift by Pauline Braathen to Cleveland Clinic Florida, the largest in Cleveland Clinic Florida's 25-year history, to construct a 143,000-square-foot, five-story building on the Weston campus. The Egil and Pauline Braathen Facility will house the expanded Pauline Braathen Neurological Center and Cleveland Clinic Florida's Cancer Center and offer a patient resource and education center, an infusion suite, a neuro-interventional suite, and advanced technology for treatment including radiosurgery for brain tumors and cancer affecting the neurological system. Mrs. Braathen says she made her gift "in the certain belief that it will improve many lives for years to come."
- A \$20 million gift by Eric and Sheila Samson toward a planned new medical campus for students of Cleveland Clinic's Lerner College of Medicine and Case Western Reserve University School of Medicine. Cleveland Clinic and Case Western Reserve University will partner in the ownership and operation of the new medical building, to be located on Cleveland Clinic's main campus. In 2011, the Samsons made a generous gift establishing the Samson Global Leadership Academy at Cleveland Clinic, a two-week immersion program for healthcare executives in which nearly 60 executives from around the world have participated.
- Other top gifts were made by Charles Butt to establish the Mary Elizabeth Holdsworth Heart Valve Education Fund; the Mikati Foundation for research into liver disease and transplantation; and Ken and Patricia Cleveland toward expansion of the Brunswick Family Health Center emergency department.

Together, 30,013 Cleveland Clinic benefactors, including individuals, corporations and foundations, made more than 47,000 gifts totaling around \$173 million. Major gifts advanced Cleveland Clinic Innovations, Cleveland Clinic Children's Center for Autism, the Scott Hamilton CARES Initiative and overall stroke treatment.



Architect's rendering of the Egil and Pauline Braathen Facility

### Named Chairs

Significant gifts also created named chairs that help Cleveland Clinic's most accomplished physicians and researchers expand the scope of their research and teach and train fellows, interns, residents and medical students. Through the years, philanthropy has created a total of 105 named chairs, the most recent of which will further research into prostate cancer, kidney transplantation, urological oncology, and alcohol and drug abuse treatment.

### Special Events

Each year, well-attended special events benefit Cleveland Clinic's mission in Ohio, Florida and Nevada. In 2013, these included the Cleveland Clinic Florida Ball; An Evening with Scott Hamilton & Friends, supporting programs of the Scott Hamilton CARES Initiative at the Taussig Cancer Institute; Cleveland Clinic Children's HeartThrob Ball; and the Power of Love Gala presented by Keep Memory Alive to support Cleveland Clinic's Lou Ruvo Center for Brain Health in Las Vegas.

"There is a direct link from our organization's success to our benefactors," says Armando Chardiet, Chair of Cleveland Clinic's Philanthropy Institute. "Whether it is a research development, a positive patient outcome or a talented class of graduating medical students, philanthropy makes it possible. Every gift makes a difference."

## Financial and Statistical Highlights

### Cleveland Clinic

#### PATIENT CARE

	2012	2013
Total Outpatient Visits	4,725,513	5,153,358
Emergency Visits	78,343	100,679
Total Admissions (excluding newborns)	54,988	55,036
Acute	54,166	54,697
Non-Acute	822	339
Surgical Cases	94,225	97,970
Inpatient	26,015	26,399
Outpatient	68,210	71,571

#### EDUCATION

	2012	2013
Residents and Fellows in Training	1,785	1,793
Continuing Medical Education		
Programs	1,519	1,568
Participants	229,678	268,795
Accredited Residency Training Programs	67	70
Allied Health Student Rotations	1,969	2,189
Programs for Allied Health Specialists	65	64

#### RESEARCH

	2012	2013
Total Grant and Contract Revenue	\$169M	\$163M
Total Federal Revenue	\$109M	\$106M
Total Laboratory Principal Investigators	178	172

### Cleveland Clinic Health System

#### PATIENT CARE

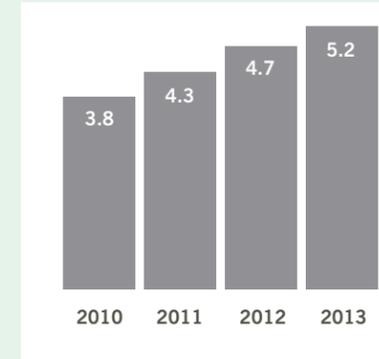
	2012	2013
Total Outpatient Visits	5,087,608	5,548,258
Emergency Visits	458,333	476,144
Total Admissions (excluding newborns)	157,394	157,097
Acute	144,495	144,421
Non-Acute	12,899	12,676
Surgical Cases	199,030	202,186
Inpatient	56,377	57,394
Outpatient	142,653	144,792

#### FINANCIAL HIGHLIGHTS (\$ IN THOUSANDS)

	2012	2013
Total Operating Revenues	6,187,137	6,450,159
Operating Income	157,069	293,995
Total Assets	10,205,403	10,951,799

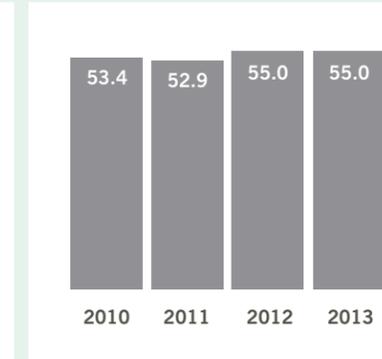
NOTE: Some figures in the 2012 column have been updated following revision of the 2012 annual report after its release.

TOTAL OUTPATIENT VISITS  
(CLEVELAND CLINIC)



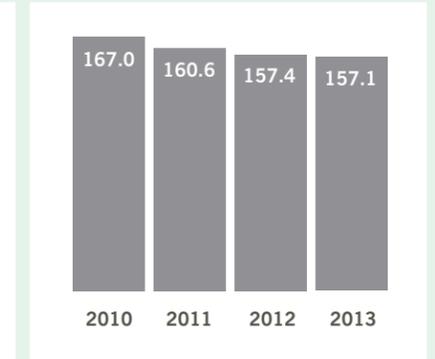
IN MILLIONS

TOTAL PATIENT ADMISSIONS —  
EXCLUDING NEWBORNS  
(CLEVELAND CLINIC)



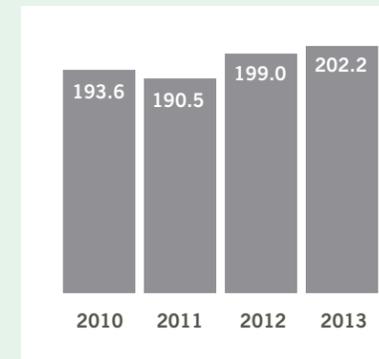
IN THOUSANDS

TOTAL PATIENT ADMISSIONS —  
EXCLUDING NEWBORNS  
(CCHS)



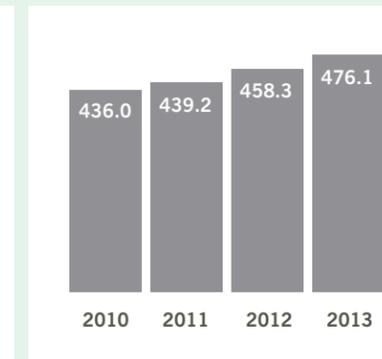
IN THOUSANDS

SURGICAL CASES —  
INPATIENT AND OUTPATIENT  
(CCHS)



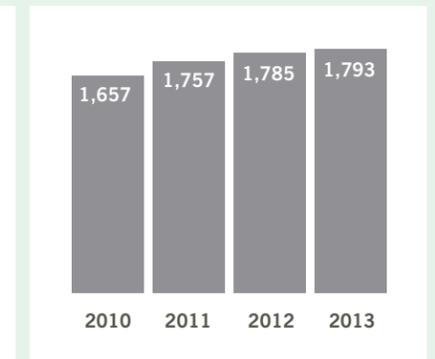
IN THOUSANDS

EMERGENCY  
DEPARTMENT VISITS  
(CCHS)

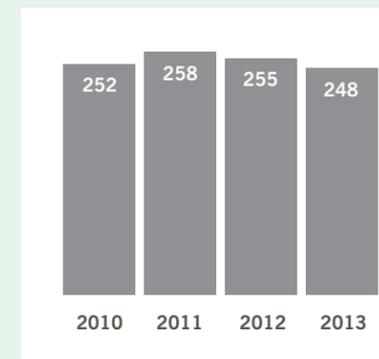


IN THOUSANDS

EDUCATION — RESIDENTS  
AND FELLOWS IN TRAINING  
(CCHS)

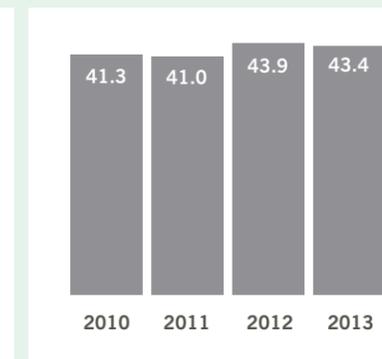


RESEARCH — TOTAL  
RESEARCH FUNDING  
(CCHS)



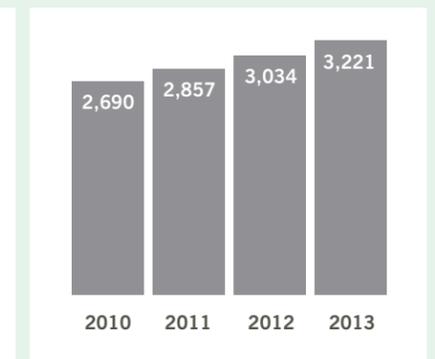
\$ IN MILLIONS

WORKFORCE —  
TOTAL EMPLOYEES  
(CCHS)



IN THOUSANDS

PROFESSIONAL STAFF  
(CCHS)



## Arts & Medicine Institute Turns 5

This past year marked the fifth anniversary of the creation of what is now Cleveland Clinic's Global Arts & Medicine Institute (AMI). Under the leadership of Iva Fattorini, MD, MSc, AMI oversees Cleveland Clinic's activities in art and music therapy, performance art and the art collection at all Cleveland Clinic locations around the world.

"People often reset their values when they are at the hospital," says Dr. Fattorini. "That's a moment when we can bring something new into their lives, bring some beauty."

Through the AMI's efforts, Cleveland Clinic is now the only major medical center in America to offer live music in public places most days of the year. In 2013, the institute presented its 1,000th live performance.

Among its other 2013 achievements, AMI opened the first-ever group exhibition of contemporary art from the United Arab Emirates in a healthcare setting. Curated by the Abu Dhabi Music and Arts Foundation and AMI, the exhibit, called "Three Generations," was displayed at Cleveland Clinic's main campus. AMI's art therapy and music therapy programs touched more than 3,500 patients in individual bedside sessions and several hundred families and employees in group sessions throughout the hospital.

Art and music therapy programs have expanded and are now offered at Euclid, Hillcrest, Lakewood and Fairview hospitals as well as Cleveland Clinic Children's Hospital for Rehabilitation. They have touched nearly all units of the main campus.

The success of AMI has attracted increasing support, including corporate sponsors, foundation grants and individual donations to keep its programs going.



Artwork shown: "Diaspora," by El Anatsui from Anyako, Ghana

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**100 Integrated Health Systems to Know**

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**2013 Best of the Best**

*Professional Women's Magazine*

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(8th year)

ERC

**Top Workplaces**

*The Plain Dealer*

**Top 150 National Workplaces**

Workplace Dynamics

**Commission 50**

Greater Cleveland Partnership

**Top 50 STEM Workplaces**

American Indian Science and Engineering Society, *Winds of Change Magazine*

**Best of the Best**

*Hispanic Network Magazine*

**Success Story Award**

(Physician Communication)  
Press Ganey

**Guardian of Excellence Award (HCAHPS Scores)**

**Best Practice Award**  
Ohio Patient Safety Institute

**Global Insight Community of the Year Award for Exceptional Patient Engagement**

Vision Critical

**Get with the Guidelines®**

American Heart Association and American Stroke Association

**– Stroke Honor Roll**

Cleveland Clinic  
Cleveland Clinic Florida  
Euclid Hospital  
Hillcrest Hospital

**– Gold Plus — Stroke**

Cleveland Clinic  
Cleveland Clinic Florida  
Hillcrest Hospital

**– Gold Plus — Heart Failure**

Cleveland Clinic Florida

**– Gold — Heart Failure**

Cleveland Clinic

**– Silver Plus — Stroke**

Euclid Hospital  
Marymount Hospital  
South Pointe Hospital

**– Silver — Resuscitation**

South Pointe Hospital

**100 Most Influential People in Healthcare, 50 Most Influential Physician Executives in Healthcare**

*Modern Healthcare*  
Toby Cosgrove, MD, CEO and President

**100 Hospitals with Great Heart Programs**

*Becker's Hospital Review*

**Primary Care Medical Home Certification for Hospitals**

The Joint Commission

**COMMUNITY HOSPITALS**

**Guardian of Excellence Award** (Emergency Department)

Press Ganey  
Twinsburg Family Health and Surgery Center Emergency Department  
Sagamore Hills Family Health Center Emergency Department

**Commitment to Excellence Award** (Most Improved HCAHPS Scores)

Press Ganey  
Lutheran Hospital

**Pathway to Excellence®**

American Nurses Credentialing Center (ANCC)  
Euclid Hospital  
Lakewood Hospital  
Marymount Hospital  
South Pointe Hospital

**Magnet Recognition Program®**

ANCC  
Main Campus  
Cleveland Clinic Children's Hospital for Rehabilitation  
Cleveland Clinic family health centers  
Fairview Hospital

**Distinguished Hospital Award for Clinical Excellence**

HealthGrades  
Hillcrest Hospital  
Marymount Hospital  
South Pointe Hospital  
Cleveland Clinic Florida

**Primary Stroke Center**

The Joint Commission  
Medina Hospital

**Top Performer on Key Quality Measures**

Marymount Hospital

**America's 50 Best Hospitals, Pulmonary Care Excellence Award, Women's Health Excellence Award**

HealthGrades  
Marymount Hospital

**First Place, Doctors' Dilemma Competition**

Ohio Chapter of the American College of Internal Medicine  
Internal Medicine Residency Program, Fairview Hospital

**Accreditation on Cancer**

American College of Surgeons Commission on Cancer  
Fairview Hospital  
Lakewood Hospital  
South Pointe Hospital

**Accreditation**

CARF International  
Cleveland Clinic Children's Hospital for Rehabilitation  
Euclid Hospital, Center for Rehabilitation

**Breast Health Accreditation**

The National Accreditation Program for Breast Centers  
Fairview Hospital

**Baby Friendly**

UNICEF/World Health Organization  
Fairview Hospital  
Hillcrest Hospital  
Lakewood Hospital

**ENVIRONMENTAL AWARDS**

**ENERGY STAR® Partner of the Year, Sustained Excellence**

Environmental Protection Agency

**Melvin Creeley Environmental Leadership Award**

Ohio Hospital Association

**Environmental Leadership Circle**

Practice Greenhealth  
Cleveland Clinic

**System for Change Award**

Practice Greenhealth  
Cleveland Clinic health system

**Partner for Change with Distinction**

Practice Greenhealth  
Euclid Hospital  
Fairview Hospital  
Marymount Hospital

**Partner for Change**

Practice Greenhealth  
Nine Cleveland Clinic family health centers  
Cleveland Clinic Florida  
Hillcrest Hospital  
Lakewood Hospital  
Lutheran Hospital  
Medina Hospital  
South Pointe Hospital

**Making Medicine Mercury-Free Award**

Practice Greenhealth  
Lakewood Hospital  
Lutheran Hospital  
Medina Hospital  
Stephanie Tubbs Jones Community Health Center  
Twinsburg Family Health and Surgery Center

#### Partner Recognition Award

Practice Greenhealth

Stephanie Tubbs Jones

Community Health Center

Twinsburg Family Health and  
Surgery Center

#### Stryker Sustainability Silver Award

Stryker Sustainability Solutions

Marymount Hospital

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#### INTERNET

#### eHealthcare Leadership Awards

[clevelandclinic.org](http://clevelandclinic.org)

Platinum Award – Best Doctor  
Directory

Platinum Award – Best Overall  
Internet Site

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This Annual Report was produced in-house.

#### Cleveland Clinic Multichannel Content Marketing

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#### Principal Photography

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Platinum Award – Best Health/  
Healthcare Content

Platinum Award – Best  
Marketing Campaign

Gold Award – Best Overall  
Internet Site

Gold Award – Best Social  
Networking

[ccfcme.org](http://ccfcme.org)

Platinum Award – Best  
Health/Healthcare Content

Gold Award – Best Overall  
Internet Site

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#### VIDEO

*Empathy: The Human  
Connection to Patient Care*

#### Hermes Awards

Platinum: Video/International  
Communication

Platinum: Video/Nonprofit

#### Communicator Awards

Award of Distinction: Film/  
Video – Motivational

Award of Distinction: Film/  
Video – Social Issue

#### Telly Awards

People's Choice/Bronze: Non-  
Broadcast Production

Silver: Film/Video –  
Motivational

#### Cannes Corporate Media & TV Awards

Gold: Sponsoring, Nonprofit,  
Corporate Social Responsibility

*New Hearts, New Lives: The  
Lyons Family Journey*

#### Hermes Awards

Gold: Video/Medical

#### Telly Awards

Bronze: Film/Video Charitable/  
Not-for-Profit

*New Year, New Heart: A  
Transplant Story*

#### Communicator Awards

Award of Excellence: Online  
Video/Documentary

#### Telly Awards

Bronze: Online Video/  
Documentary

*One Family, Two Miracles*

#### Communicator Awards

Award of Excellence: Film/Video  
Motivational

*One in a Million*

#### Hermes Awards

Gold: Video/Medical

#### Communicator Awards

Award of Distinction: Video  
Charitable/Nonprofit

*Transforming Healthcare in  
the 21st Century*

#### Hermes Awards

Platinum: Video/Corporate  
Image

#### Telly Awards

Bronze: Film/Video Corporate  
Image

To view online version of this annual report, visit [clevelandclinic.org/annualreport](http://clevelandclinic.org/annualreport)



**Cleveland Clinic**

Every life deserves world class care.