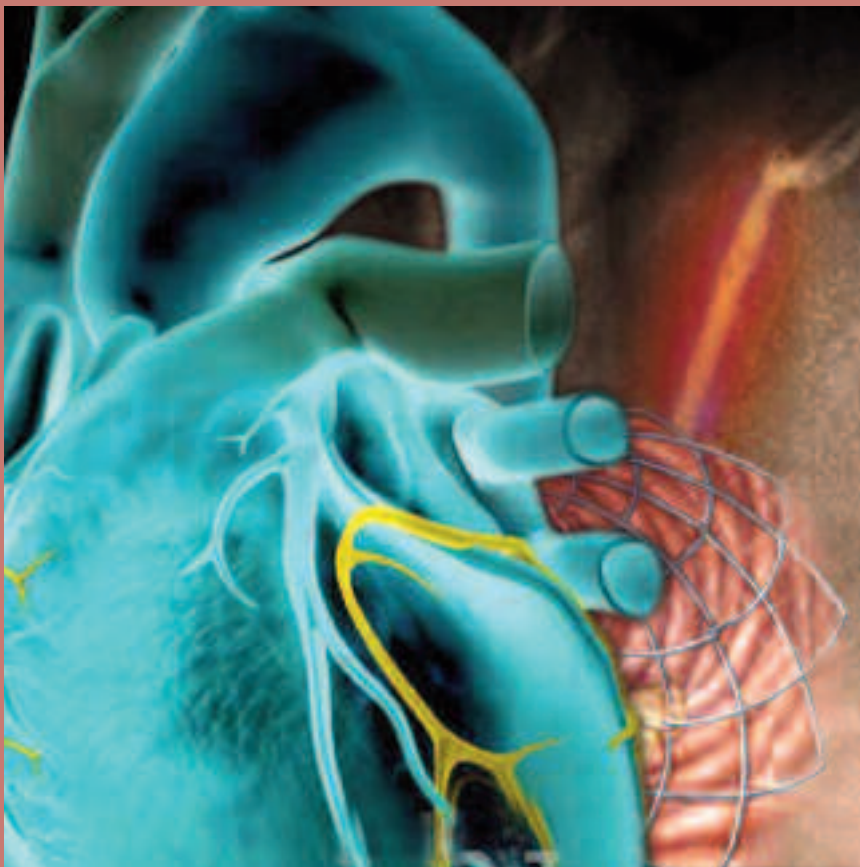


CARDIAC CATH LAB

2010 CLINICAL OUTCOMES REPORT



A MESSAGE FROM DR. SHARMA



Samir K. Sharma, MD,
FSCAI, FACC

Professor Medicine, Cardiology

Director, Cardiac Cath Lab
& Intervention

Dear Colleague:

We from the cardiac catheterization laboratory at Mount Sinai Heart take a great pride in presenting our second annual outcomes report. We offer a comprehensive overview of the work being done at the nation's largest and finest cardiac catheterization laboratory in diagnosing and treating a variety of cardiac diseases. Public reporting of quality and patient safety data is increasingly mandated for transparency by various organizations and stakeholders and we present our data in comparison to various regional and national standards. Technical achievement in percutaneous interventions has resulted in a relentless drive for procedural excellence and near-perfect results. Outcomes data in the following pages will convince you that we at Mount Sinai have *perfected the art of PCI*.

On the following pages, details of the cardiac procedures performed in our cath lab over the last five years demonstrate the remarkable growth our group has achieved at a time when many cardiac centers in the country are facing declines or staggering in volume. This remarkable growth, despite increasing complexity of cases, is accompanied by declining rates of complications – made possible by dedicated teamwork and caring for each patient as an individual. We are also committed to developing and adopting the universal use of innovative, evidence-based standardized medical protocols and this has contributed to our extraordinary success. For these reasons, it is not unusual for patients in the region, many who have been deemed “inoperable for advanced care,” to come to us and be treated successfully.

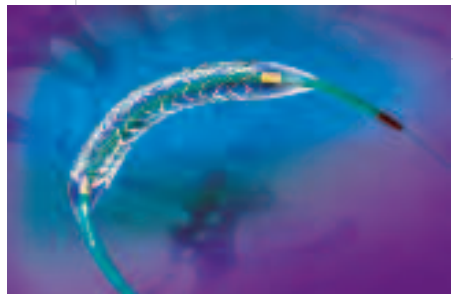
In this report we also provide details of innovations we have developed that have contributed to our national and international recognition. These innovations, combined with cutting-edge research, ensure that our program remains a leader. Patients who can benefit from ongoing trials at our center are routinely offered the opportunity to participate with the goal of achieving the best possible outcome, some of which we will share with you.

We in the Mount Sinai cath lab are practicing daily the famous saying of Albert Einstein, “Everything should be made as simple as possible, but not simpler” by innovation and technical advancement, making PCI a safe, simple and ambulatory procedure.

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Mount Sinai Hospital Cardiac
Cath Lab: Clinical Outcomes
2010



WELCOME



Kenneth L. Davis, MD
President and Chief Executive Officer
The Mount Sinai Medical Center



Dennis S. Charney, MD
Anne and Joel Ehrenkrantz,
Dean Mount Sinai School of Medicine



Wayne E. Keathley
President and Chief Operating Officer
The Mount Sinai Hospital

It is our distinct honor to share with you the second edition of the *Cardiac Cath Lab Clinical Outcomes Report*. This report demonstrates the truly outstanding caliber of patient care and clinical research taking place daily at The Mount Sinai Medical Center. It has been enormously gratifying to participate in the growth of Mount Sinai from a well-respected institution primarily serving the New York metropolitan area into one of the nation's leading academic medical centers that draws patients from around the world.

The catheterization laboratory at Mount Sinai is one of the many centers of excellence that have distinguished Mount Sinai in recent years. It stands at the forefront of clinical quality and research innovation so that our patients benefit from the most advanced treatments. Cardiovascular interventions that seemed unimaginable even five years ago are now possible at Mount Sinai.

The cath lab is renowned for its world-class team of physicians and surgeons. Their unparalleled skill and expertise allow Mount Sinai to treat virtually every facet of cardiovascular disease at any hour of the day or night. A set of carefully tested and practiced protocols guide the delivery of care from the moment a patient enters the Medical Center until they are ready to return home.

An unwavering commitment to excellence and a dedication to providing superior outcomes for our patients serve as the guiding principles in everything we do at Mount Sinai. Our cath lab staff embody these values while tackling the most complex cases of cardiovascular disease. Patients turned away by other institutions that lack the capacity for delivering the most advanced therapies come to Mount Sinai. We are honored by their choice.

We hope you find this edition of the *Cardiac Cath Lab Clinical Outcomes Report* informative and we offer our most sincere welcome to Mount Sinai.

A MESSAGE FROM VALENTIN FUSTER, MD

In April 2006 Mount Sinai Heart was established at Mount Sinai Medical Center as a multidisciplinary model for the prevention, treatment and eradication of heart disease in all its forms. This approach brought together a number of cardiac specialty services, all working toward the same goals. Mount Sinai Heart thus became part of one of the nation's oldest, largest and most respected medical institutions, a tertiary-care teaching facility acclaimed for excellence in a broad spectrum of clinical care. In scarcely five years since our beginning, Mount Sinai Heart has gained its own reputation as one of the world's leading centers for cardiovascular medicine and advanced diagnosis, treatment and therapeutic technologies. Today Mount Sinai Medical Center ranks among the nation's best hospitals, listed in *U.S. News & World Report's* 2009-2010 "Honor Roll."

As will become evident upon reading this second edition of the *Cardiac Cath Lab Clinical Outcomes Report*, one of the outstanding contributors to Mount Sinai Heart's rise to recognition is the cardiac catheterization laboratory under the outstanding leadership of Dr. Samin Sharma. Through his example and his passion to be the best, he has attracted a team of catheterization specialists of almost legendary talents and skills. Their ability to do the near impossible in the most challenging medical situations has made the cath lab a place where patients can be assured the most timely treatment with the most appropriate techniques 24/7. Continuous improvement through research and clinical trials and that special personal ingredient – a natural gift of leadership – are what make the difference.

I am glad to have this opportunity to note another great year of achievements and growth for the entire team at Mount Sinai Heart's cardiac cath lab.



Valentin Fuster, MD, PhD
Director, Zena and Michael A.
Wiener Cardiovascular Institute
Director, Marie-Josée and
Henry R. Kravis
Cardiovascular Health Center
Richard Gorlin, MD, Heart
Research Foundation
Professor of Cardiology

WHAT WE DO

The Cardiac Catheterization Laboratory: An Overview



Left to Right:
Prakash Krishnan, MD,
Annapoorna Kini, MD,
Pedro Moreno, MD,
Samin Sharma, MD,
Michael Kim, MD

Henry Ford once said, “Coming together is a beginning, *keeping together is progress, working together is success.*” This concept of teamwork in the cath lab is the guiding principle and the foundation of what we do daily, and is the main reason for our success.

Mount Sinai Heart, which encompasses clinicians, scientists, nurses and associated caregivers under the leadership of visionary director Valentin Fuster, MD, PhD,

has emerged as a premier center delivering an extraordinary range of clinical and research care to patients suffering from a variety of cardiovascular ailments with a goal of bringing the best cardiovascular care to our patients.

The cardiac catheterization laboratory at Mount Sinai Heart is the busiest interventional catheterization laboratories in the United States. Our cardiac cath lab, which consists of five adult cath rooms (one equipped for endovascular procedures), one pediatric cath room and one biopsy room, has been established as a tertiary center for complex coronary, valvular and vascular interventions. All cath rooms are equipped with intravascular ultrasound (IVUS) and three rooms have fractional flow reserve (FFR) capability. In this competitive environment, only the best can flourish. That is exactly what our cath lab has done, delivering the best and the safest invasive/interventional care to cardiac patients, through innovation and procedural excellence. Some highlights of the Cardiac cath lab:

- **Procedural Volume:** The cath lab volume at Mount Sinai Heart cath lab continues to rise each year, as illustrated in the subsequent chart. In 2009, we experienced an unprecedented increase in volume for nearly every procedure, both in coronary

and vascular interventions with a new record of 5,800 adult interventions (the highest in the country). The majority of PCI are done using stents – 6 percent in conjunction with rotational atherectomy and 1 percent with the aid of a thrombectomy/distal protection device – the remaining 12 percent are performed through PCTA alone (half of them using cutting balloon atherectomy). Some of the growth is attributed in part to our various outreach activities – allowing community physicians, the integral part of the Mount Sinai referral network, to offer tertiary care to their patients in the local catchment area. Due to our established reputation for handling complex coronary and valvular cases with great success and safety, about one third of our interventional patients are referred by physicians (cardiologists & interventionalists) outside of our network.

- **Interventional Outcomes:** The system of established standard protocols, rigorous attention to minute details and strong sense of teamwork has helped to achieve the best interventional outcomes in the country. We have continued to improve our outcomes each year, with unprecedented extremely low procedural complications in 2009. This remarkable growth has been achieved despite high case complexity and incidence of co-morbid medical conditions. Reports of risk-adjusted PCI mortality over the last 10 years by the NYS Department of Health have consistently placed the Mount Sinai Heart cath lab among the lowest for in-hospital and 30 day mortality for all cases as well as emergency cases. The recent New York State DOH report of 30-day risk-adjusted mortality for 2006 has shown our incidence of 0.66 percent for all cases, 0.50 percent for elective cases and 1.94 percent for emergency PCI cases as among the lowest in

The system of established standard protocols, rigorous attention to minute details and strong sense of teamwork has helped to achieve the best interventional outcomes in the country.





The numbers of both medical and non-medical cath lab staff have grown tremendously to accomplish the ultimate goal of delivering the safest and highest quality care.

the state and about 30 percent lower than the statewide average. A big part of this lower 30-day risk-adjusted mortality is due to the experience and high volume of the senior attending full-time interventionalists. In the 2006 report, Dr. Annapoorna Kini was awarded the double-star notation, denoting significantly lower 30-day risk-adjusted mortality amongst approximately 450 interventionalists practicing in NY State.

- **Clinical Research:** In addition to clinical success, the cath lab has participated in numerous investigator-initiated and multi-center trials in the field of coronary interventions. The results of many of these endeavors have resulted in FDA approval of new drugs and devices to improve the outcome and safety of percutaneous interventional procedures. Also, key scientific publications on various PCI outcomes from our vast interventional database repository of approximately 30,000 patients since 2000 continue to advance the field of interventional cardiology in a safe and progressive manner. Five research coordinators and five database coordinators are constantly engaged in recruiting patients for research trials and obtaining detailed and comprehensive follow-up of all interventional patients (in-hospital, at 30 days and one year).
- **Cath Lab Staff:** To effectively manage increasing volume, extreme pressure is placed on both physical infrastructure and the cath lab staff. The numbers of both medical and non-medical cath lab staff have grown tremendously to accomplish the ultimate goal of delivering the safest and highest quality care. Presently there are



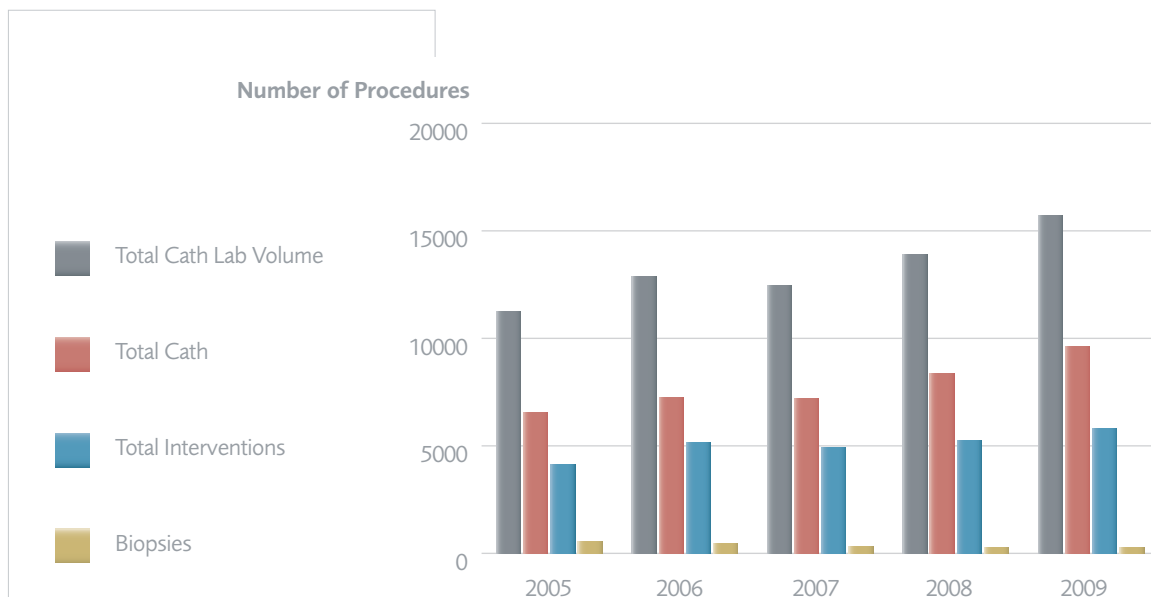
five full-time senior attendings, five full-time affiliate attendings, eleven voluntary interventional attendings, four voluntary cath attendings, two CHF/Transplant attendings, one pediatric cath attending, eight interventional fellows and 12 cath lab nurse practitioners. The total number of cath lab staff including nurses, technicians and support staff has grown to over 132, along with a nurse manager, operational manager and nursing director. Each member of the cath lab staff has a strong work ethic and takes pride in their contribution to the goal of the department – delivery of efficient and safe care to patients in need. As a result the cath lab consistently reports a very high level of patient satisfaction.

- **Interventional Cardiology Fellowship:** Mount Sinai Heart cath lab takes pride in educating future clinical cardiology and interventional cardiology specialists by establishing a rigorous academic and hands-on training program. Our interventional fellowship program is the largest in the country, with 8 fellows (7 ACGME and one non-ACGME), and our graduate trainees have become noted leaders in community and academic medical centers; some graduates are serving as directors of cardiac cath labs across the nation.

Left to Right:
Deepak Khanna, MD,
Fernando Ruiz, MD,
Sweta Chandela, MD,
Jason Kovacic, MD,
Annapoorna Kini, MD,
Huy Nguyen, MD,
Randolph Hutter, MD,
Atul Limaye, MD,
Roshan Patel, MD

RESULTS

Growth and Trends in Cath Lab Volume and Procedures

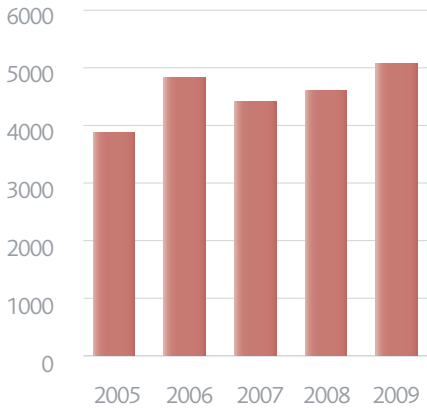


With over 5,800 interventions last year, our cath lab is the leader in intervention in the U.S.

The volume of diagnostic cath and interventional procedures at the Mount Sinai cardiac catheterization laboratory has experienced substantial growth over the last five years in every aspect of cardiac procedures. Total percutaneous interventions encompass coronary interventions (PCI), endovascular interventions (for diseased limb, cerebral or renal arteries), valvuloplasties (for stenosed aortic or mitral valves), alcohol septal ablation (for hypertrophic obstructive cardiomyopathy [HOCM]) and interventions for other structural heart diseases (such as closing of ASD, PFO or paravalvular leaks). This last category, performed by our pediatric cardiologist, is not counted in our interventional numbers and is steadily increasing, with 78 such procedures in 2009. In 2009 we carried out record 5,800 interventions of which 5,078 were PCI, 602 were endovascular interventions, 100 were balloon aortic valvuloplasties, 11 were balloon mitral valvuloplasties and 9 alcohol septal ablations. Carotid stenting is performed in the special neuro-interventional radiology suite in the MSH by neuro-interventionalists or vascular surgeons.

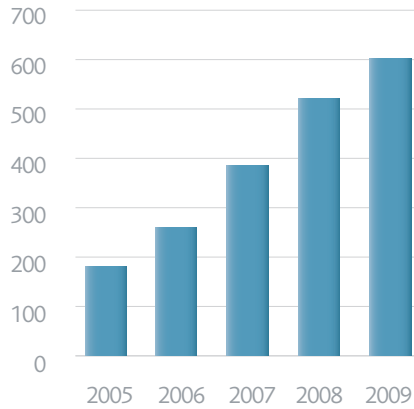
PCI

Major complication (N):
12 14 14 26 27



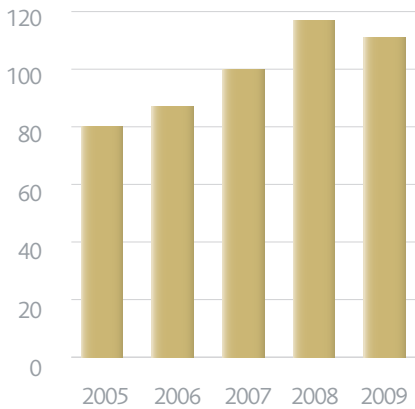
Endovascular Interventions

Major complication (N):
1 0 1 2 0



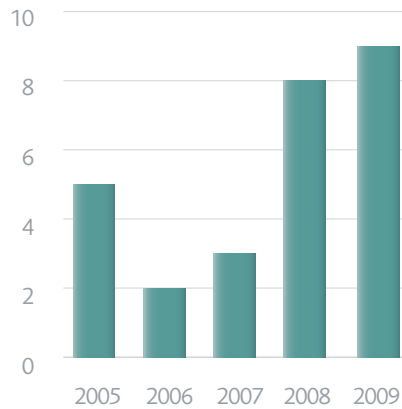
Valvuloplasties

Major complication (N):
3 2 4 5 3

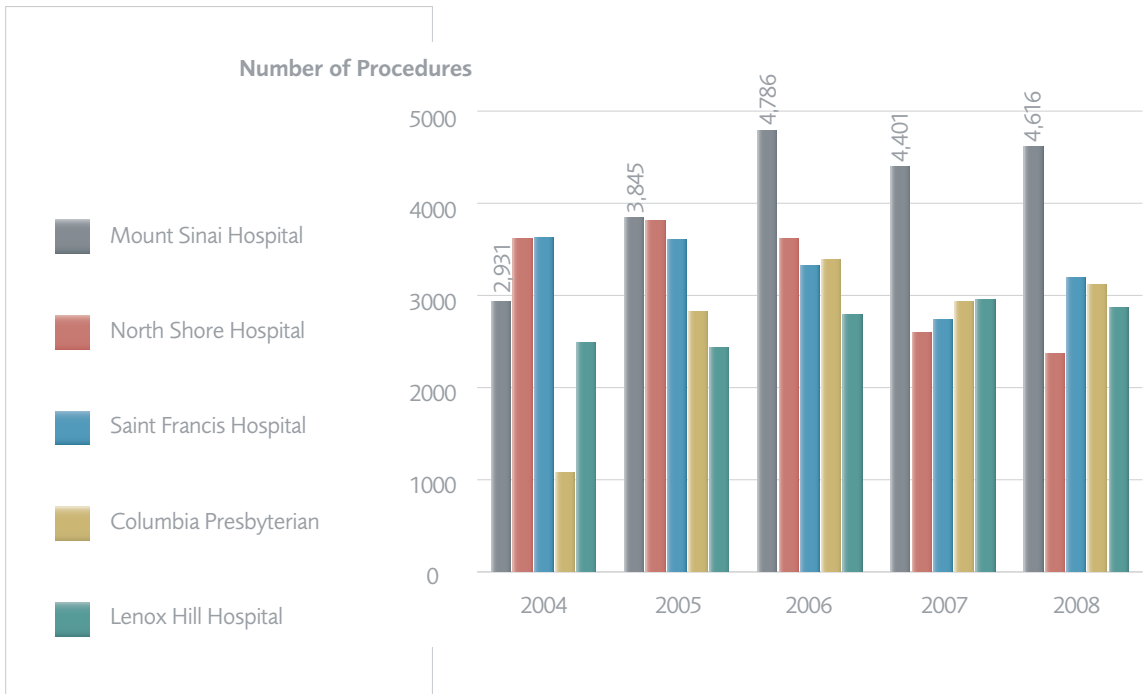


Alcohol Septal Ablations

Major complication (N):
0 0 0 0 0

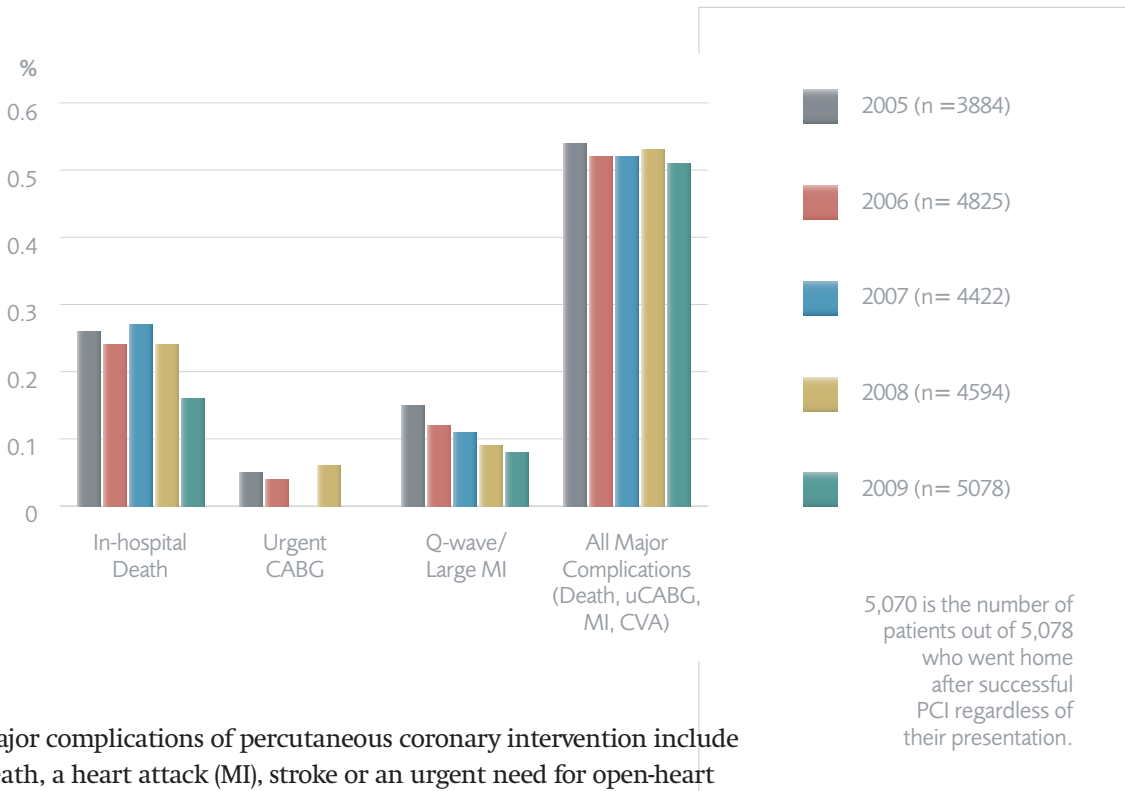


NYS-DOH reported PCI volumes



Mount Sinai Hospital's cardiac catheterization laboratory is one of the busiest in the country and the most active center in the state. Growth has been tremendous over the past five years, as the above chart shows. Our cath lab has risen to the top position among New York State hospitals in 2005 and since then has had a commanding lead of over 1,400 interventions over any other center in 2006-2009, with growth occurring in both coronary and non-coronary interventions. Data is taken from New York State's own Department of Health statistics.

Temporal Complication Trends



Major complications of percutaneous coronary intervention include death, a heart attack (MI), stroke or an urgent need for open-heart surgery (CABG) as a result of the procedure. The sum of those numbers for the past five years represents less than 0.55 percent and in-hospital mortality of less than 0.25 percent. These low complication rates, credited to uniform protocols across all staff, are all the more remarkable for the fact that our cath lab accepts the most difficult coronary and valvular cases, many of them deemed too risky or “not-doable” elsewhere. The comparative data of patients’ clinical characteristics, as shown in the table on page 14 confirms significantly higher adverse features of PCI patients treated at MSH compared to New York State. Also, a comparative complication rate of PCI at MSH cath lab with New York State, ACC-NCDR and Cleveland Clinic is shown in the attached graphs and summarizes our complication rates as one-third to half of the reported national and regional standards.

Baseline Demographics and Risk Factors of PCI

Comparison of Mount Sinai Hospital 2009 vs.
New York State 2006

	MSH (N = 5,078)	NYS (N = 58,258)
Age >80 yrs (%)	12.5*	11.6
Previous MI (%)	54.2	38.4
Peripheral vascular disease (%)	14.1*	6.5
CHF (%)	10.1*	8.2
COPD (%)	9.2	6.8
DM on medication (%)	43.4*	32.2
LVEF <30% (%)	3.8*	4.2
S Cr >1.5 mg/dl (%)	11.2*	9.8
Renal failure, dialysis (%)	3.3	2.0
Previous CABG (%)	16.4*	16.3
Prior CVA (%)	11.0	7.6
2/3 vessel CAD (%)	31/20	30/12
Rotational atherectomy (%)	5.7*	1.9
DES use (%)	87.3	87.5

Excellent outcomes are achieved despite a high volume of challenging cases with high baseline risk factors.

* P <0.05% For Mount Sinai Hospital vs. New York State.

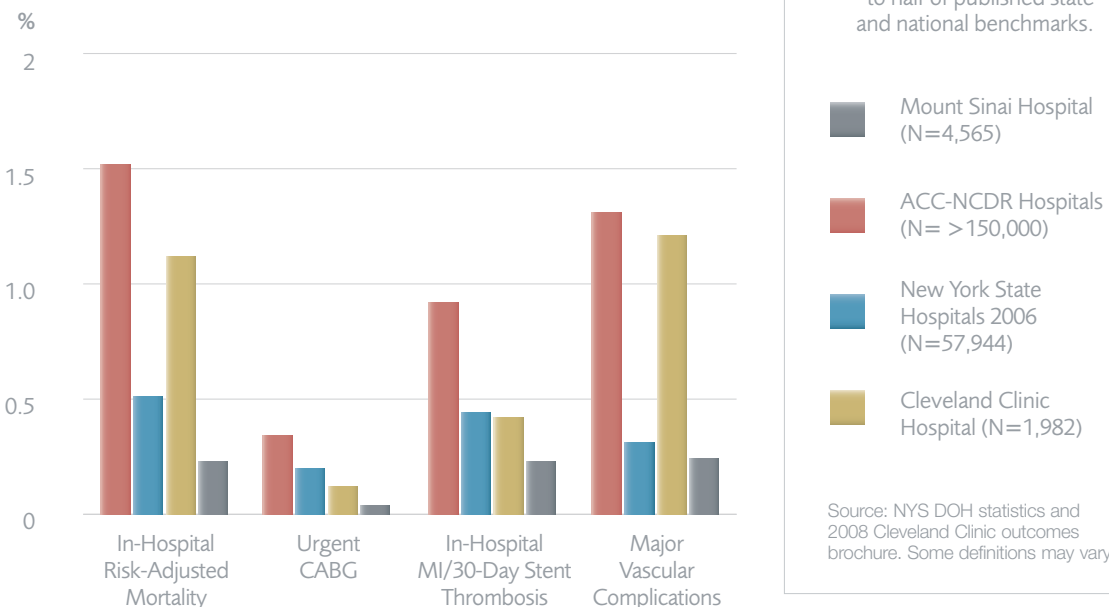
Major Complications Following PCI

Comparison of Mount Sinai Hospital 2009 vs. New York State 2006

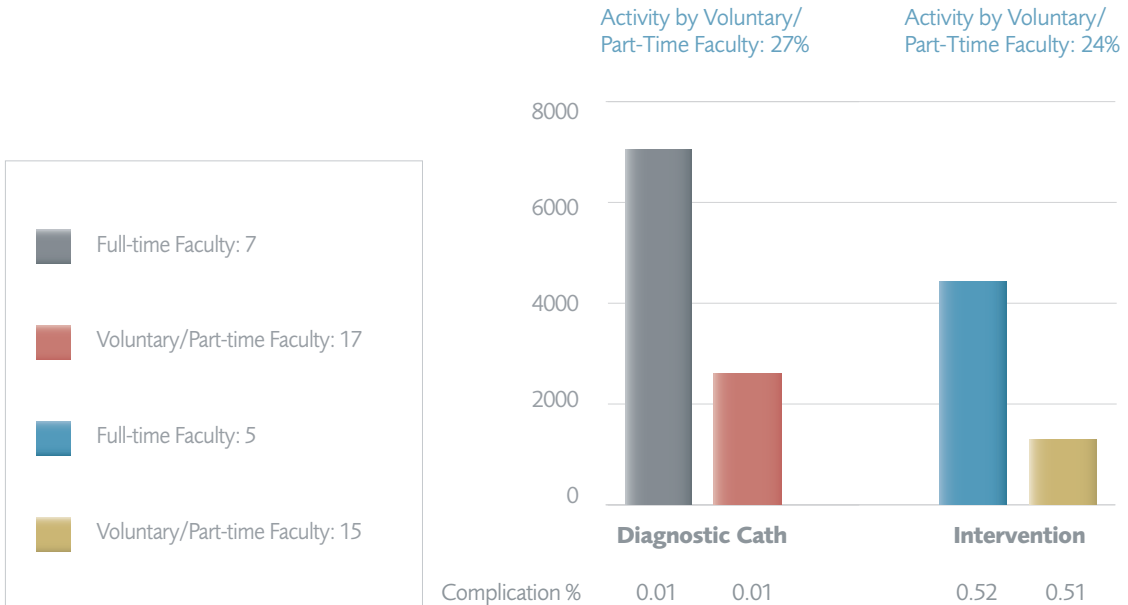
	MSH (N = 5,078)	NYS (N = 58,258)
In-hospital mortality (%)	0.16*	0.49
Trans-mural MI (%)	0.08*	0.12
Emergency cardiac surgery (%)	0.00*	0.24
Acute occlusion target vessel/SBr (%)	0.18*	0.41
Stent thrombosis (%)	0.04*	0.41
Stroke (%)	0.04*	0.12
A/V injury at cath entry site (%)	0.12*	0.35
Renal failure requiring dialysis (%)	0.00*	0.12

* Complications are substantially lower than state average.

In-Hospital Mortality and Major Complications of PCI 2008



Cath Volume by Full-Time vs. Voluntary/Affiliate Faculty 2009

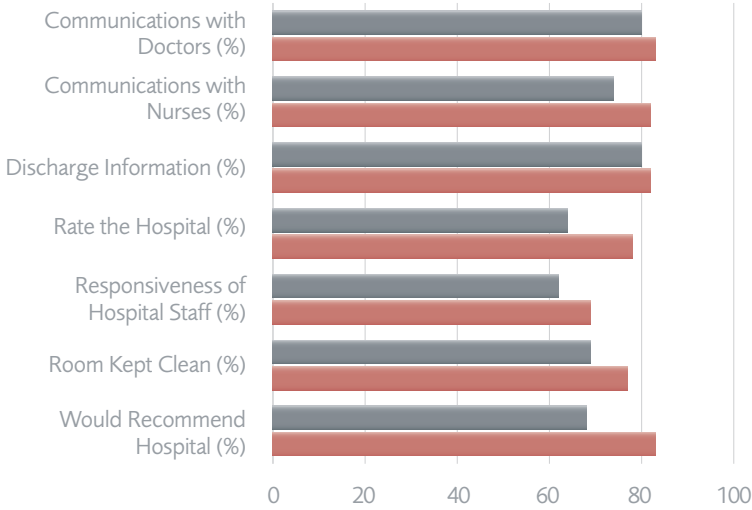


High volumes translate into consistently better outcomes and fewer complications.

Mount Sinai Heart cath lab has been able to successfully meet the high demand for invasive and interventional services by utilizing a combination of full-time senior attendings, full-time affiliate attendings, voluntary and part-time invasive cardiologists and interventionalists. All these specialists work under the same protocols to ensure consistency and quality of care. For 2009, full-time affiliate, voluntary and part-time faculty accounts for approximately 27 percent of diagnostic cath and 24 percent of interventional volume. Overall, procedural complications have been similar between the five full-time senior attendings and full-time affiliates and voluntary/part-time attendings (0.52 percent vs. 0.51 percent respectively). This again is the result of teamwork, standardized protocols and assistance by the expert full-time senior interventionalists in tough, complex cases, or during any unexpected procedural complications. Complex cases are routinely discussed daily, with technical input from the senior interventionalists; this results in safe, successful outcomes even by a recently graduated junior interventionalist.

Other Quality Indicators of the Interventional Unit

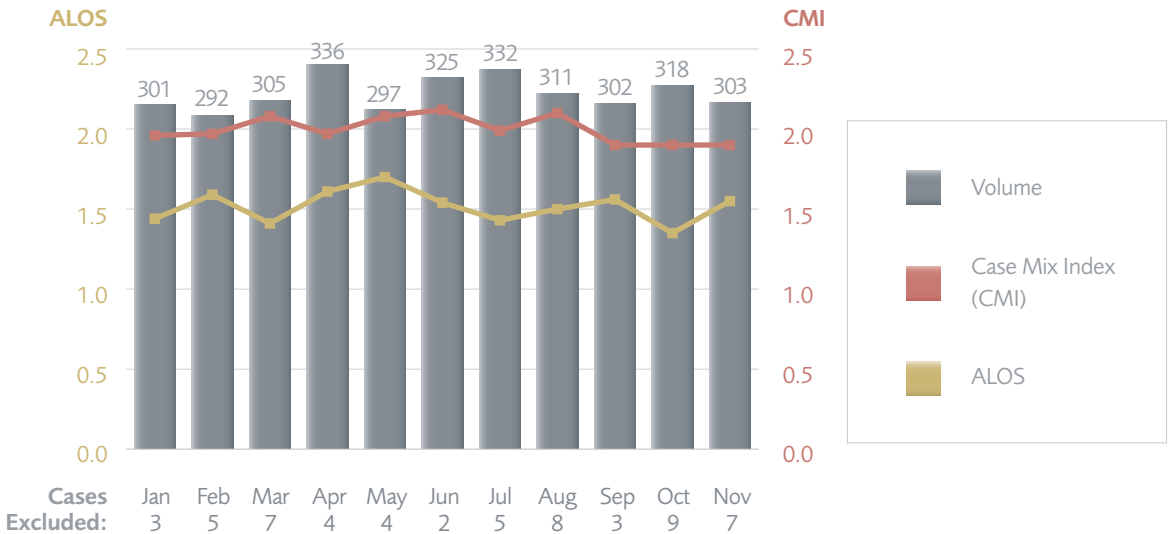
Patient Satisfaction: 2009 HCAHPS Survey



Across all categories, Mount Sinai Heart HCAHPS scores are higher than the national average.

National Average
 MSH Interventional Unit

Internal Volume, ALOS, and CMI 2009 YTD



Risk-adjusted average LOS: expected LOS is consistently less than 0.8.

Samin K. Sharma, MD Director, Cardiac Cath Lab & Intervention on Complex Coronary Interventions



Live footage of interventions, including ULM procedures, can be viewed at www.ccllivecases.org.

Mount Sinai Hospital's cath lab ranks as the top-volume PCI center in New York State, based on Department of Health statistics. The cath lab has seen total interventions rise by 12 percent in the past year, coupled with further declines in already low rates of death and major complications. These are statistics to be proud of indeed! We can attribute our success to the constant efforts on the

part of every member of our staff in advancing clinical practice through well-designed innovations. Below are brief descriptions of three such recent innovation advances that are contributing both to improved understanding of CAD and to patient outcomes after intervention.

Unprotected Left Main Disease

Historically, CABG had been the treatment of choice for unprotected left main (ULM) disease, supported by the ACC/AHA guidelines. Even recommendations updated in 2007 called PCI "consistently not helpful and possibly harmful" in treating ULM cases. In the era of bare metal stents, patients with ULM disease treated by PCI definitely did not do as well over the long term as patients who underwent CABG. Since the introduction of drug eluting stents (DES), however, the use of PCI has been expanded for selected patients with ULM lesions. There was a lack of large, randomized studies to provide sufficient clinical data upon which to make changes in the practice guidelines and make the use of PCI broadly acceptable for ULM revascularization. The SYNTAX Trial was designed to examine that premise; comparing CABG with Taxus DES. In sum, the 1,800 patients who participated in the trial had complex multi-vessel disease including a subset of 705 patients with ULM disease.

When the SYNTAX trial results were analyzed they showed conclusively that among the subset of 705 patients with ULM disease, CABG or DES had equivalent outcomes in terms of death, MI or stroke after up to two years of follow-up, but higher repeat revascularization rates in the DES group. However, PCI trended toward better outcomes among ULM patients with isolated lesions in the ostium and mid-shaft or with associated one-vessel disease, and a significantly lower stroke rate compared to CABG. It was reassuring to see that correctly-performed ULM PCI demonstrated outcomes equivalent to CABG. Also, ULM PCI is indicated in patients with co-morbid medical conditions, which can make CABG surgery risky. Mount Sinai cath lab has been identified as the center of excellence for ULM interventions, performing as many as 180 ULM PCI annually (compared to fewer than 100 in 2003). These numbers are rising, with every expectation that they will continue on this course as our techniques and devices improve – with major complications (death, MI or stroke) of <1 percent and chances for repeat revascularization at 1-2 years being 3-5 percent. Technical details of three of our recent ULM procedures can be seen in the archives of our monthly Web series of live coronary interventions at www.ccclivecases.org.

Volume of Unprotected Left Main Coronary Artery PCI at MSH

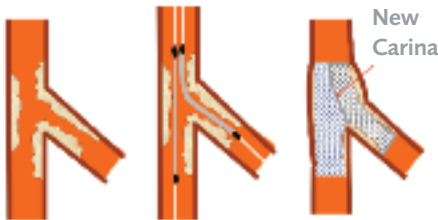




Bifurcation Lesion Interventions

A bifurcation lesion (BL) refers to a blockage that begins before the intersection of the main vessel (MV) and side branch (SB) and continues beyond. Bifurcation lesion interventions represent roughly 15 percent of medical procedures at most PCI centers. Based on lesion location alone (pre-branch, post-branch, parent vessel only), bifurcation lesions are complex and technically challenging for PCI. Successful treatment through PCI requires familiarity with a wider selection of dedicated bifurcation devices and techniques, particularly in regard to how to navigate the varying angulations between the MV and SB, all of which add up to higher learning curves for the interventionalists. Every BL must be approached in the context of its own anatomy and operator experience. Not surprisingly, PCI of BLs are also associated with higher procedural costs, higher hospital length of stay, higher complications largely related to side branch closure (caused by plaque shift or dissection), and higher rates of subsequent restenosis. The conventional BL intervention technique is to stent the MV and balloon the SB, usually with a cutting balloon that also removes the

obstruction; but sometimes the balloon alone does not do the job and we need to insert a stent in the SB as well. Double stenting in such locations is tricky because it must be done without blocking the intersection. To do this correctly we have popularized the simultaneous kissing stent (SKS) technique. Two appropriately-sized DES are advanced simultaneously toward the bifurcation along their separate channels. When their leading edges meet proximally the two stents are simultaneously



The simultaneous kissing stent (SKS) technique involves guiding two appropriately-sized stents to the bifurcation lesion, and expanding them together to "kiss" and form an attachment.

inflated and deflated until their struts "kiss" and engage to form a firm attachment at the carina. Clinical outcomes in the SKS-PRECISE Trial completed in 2008 at Mount Sinai Hospital which involved 100 randomized patients (half SKS and half conventional stent strategy) showed better acute success and better long-term patency, especially in the SB, compared with the standard technique without any early or late stent thrombosis. We continue to develop and advance this and other strategies for BL interventions.

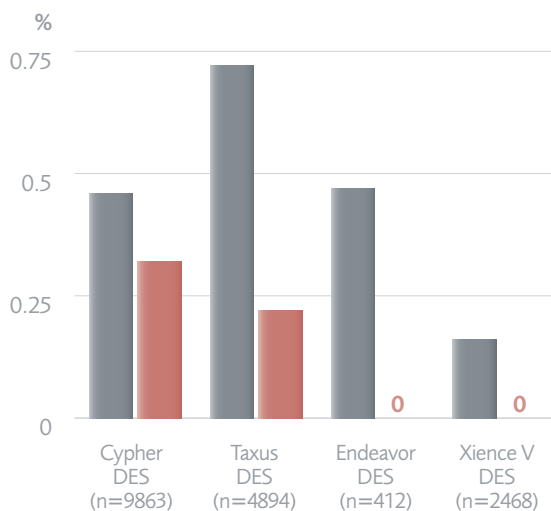
Late Stent (DES) Thrombosis (after 1 year)

Bare metal stent (BMS) models of the 1990s, while good in preventing immediate collapse of cleared arteries, were associated with an unacceptable level of restenosis (about 25 percent) due to scar tissue (neointimal proliferation) formation inside the stent.

A more advanced design – the drug-eluting stent (DES) – came along beginning in 2003 and clinical restenosis decreased to approximately <5 percent. But DES use requires that patients take an antiplatelet drug such as clopidogrel (Plavix) for about one year, while the inside lining of the stent is gradually covered with a smooth, thin layer of endothelial cells in a manner that reduces turbulence and reduces the tendency for blood clotting. Data started to appear in 2006 indicating that after discontinuation of Plavix, typically after 6-12 months, a small number of DES patients started developing late stent thrombosis (more than one year) at rates higher (0.6-1.0 percent) than observed in BMS patients (0-0.1 percent). Still, even with these rare adverse events, the benefits of DES were considered by most interventionalists to far outweigh the risks and the guidelines for continuance of Plavix was stretched generally to three years.

Currently, newer generations of drug eluting stent technology has addressed these issues, and several models are in the works. Two of them were approved by FDA (Xience and Endeavor). At Mount Sinai we have recently completed a study showing that after deployment of the Xience™ V stent (by Abbot Vascular, Inc.), which received FDA approval in July 2008, we can now safely discontinue clopidogrel therapy after one year. The Xience V (or Promus by BSC Inc.) DES is a thin strut stent with a thin polymer and uses everolimus as its drug-eluting substance, which inhibits in-stent neointimal growth but still results in faster healing endothelization and fewer problems overall, especially early or late stent thrombosis and restenosis.

Early and Late Stent DES Thrombosis





Annapoorna S. Kini, MD Associate Director, Cardiac Cath Lab on Percutaneous Coronary Intervention of Chronic Total Occlusion

A chronic total occlusion (CTO) is a complex blockage of a coronary artery that has lasted for more than three months. CTOs are found in 15-20 percent of all patients undergoing coronary angiography. This subset of lesions has, up until now, proven to be the least amenable to recanalization through percutaneous coronary intervention (PCI), especially when the blockage is calcified or fibrotic and the obstruction is at an angulated location making access more difficult. Consequently, the traditional guideline for treating patients with CTO remains coronary artery bypass surgery. But because PCI is far less invasive and recovery tends to be faster, developing a well-designed and supported technique for clearing CTOs has become the

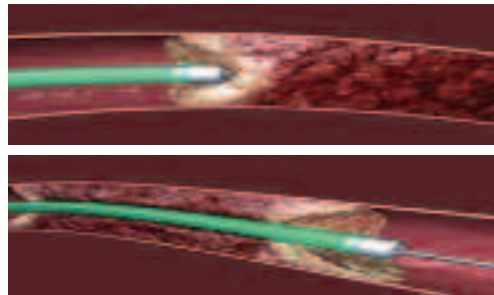
last frontier in percutaneous coronary intervention, and one in which Mount Sinai cath lab, a tertiary referral center with special expertise in complex coronary interventions, has been very much engaged in performing the task successfully.

Before opening the blockage, we have to make sure that the heart muscle serving it is still alive and capable of recovery once the blockage is removed. A stress test or an MRI to check viability of myocardium (a gold standard) may be necessary. The remarkable thing about chronic blockages that develop slowly (60-80 percent and finally 100 percent) as opposed to acute blockages is that during the gradual progression of a chronic blockage small-diameter collaterals can develop to maintain sufficient myocardial function. Often they do a good enough job that the patient is not even aware of the blockage until it is complete. After the blockage is removed the collaterals then regress and even wither away.

Developing a well-designed and supported technique for clearing CTOs has become the last frontier in PCI.

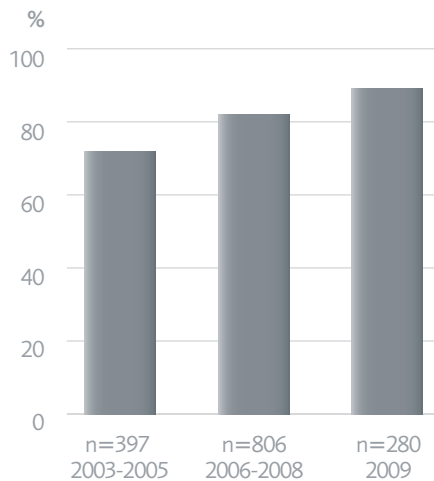
Once we have that information our focus is how to use PCI to remove the blockage most effectively and avoid coronary artery bypass surgery for our patients. In the past we had a success rate of between 60-70 percent but now with better devices, better technique, and better pharmacological strategies, we have attained a success rate close to 90 percent at Mount Sinai. The challenges are several, including difficulty in crossing CTOs with wires and delivery of balloons and stents to that blocked area. Rotational atherectomy, which grinds the plaque and makes delivery of the balloons and stents feasible, is often used. Major complications, including heart attack, death, or perforation of the arterial wall and pericardial tamponade during attempts to penetrate the resistant calcified blockage during procedures are rare (< 0.1 percent). After a significant learning curve, an experienced operator will have a high success rate with low complications. The devices used in this procedure include an array of advanced tapered-tip, hybrid and hydrophilic wires, in different states of flexibility and stiffness. The newer wires are coated with a lubricant that allows them to literally glide through the channels. The innovative techniques we use include contralateral injection (using both groin access to administer dye and outline the blocked artery clearly to facilitate the wire channel) controlled drilling and penetrations.

Despite all the advances in technology available to us we still rely to a great extent on our tactile sense of what is happening in the artery. Many times the wire will find the channel. However, coordination of visual and tactile sensation is the key to the success of this procedure. And as we master each new technique we become ready to meet the new technical developments coming along, always reaching for the next level of difficulty – prepared to master it and provide greater patient safety and quality of life.



Top: CTO Negotiating wire through chronic blockage
 Bottom: CTO Wire, successfully past the chronic blockage

Procedural Success of CTO at Mount Sinai Hospital



Rates of procedural success are greatly improved with advancements in technique and operator skill, with major complications of <1%.



Participation in clinical trials including the PROSPECT trial has contributed to our knowledge of vulnerable plaques, which often elude detection under traditional screening.

Pedro Moreno, MD Director Interventional Research, Cardiac Cath Lab on Advances in Vulnerable Plaque Treatment

Despite continuous improvement in the medical and interventional treatment of coronary artery disease, we continue to struggle with the fact that contemporary PCI, as good as it is, may not prevent an MI or even death in the seemingly stable patient. This is because life-threatening heart attacks arise most often from lesions — the

so-called vulnerable plaques that escape conventional imaging technology.

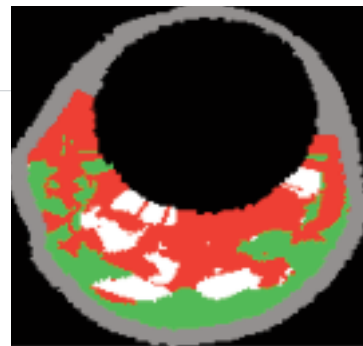
Recently Mount Sinai's cath lab participated in the first large-scale systematic effort to change this condition, the PROSPECT Clinical Trial. This prospective study to evaluate the role of vulnerable plaque in the progression of coronary artery disease tracked 700 patients with acute coronary syndromes (ACS) in a three-year multi-center trial. After treating the precipitating lesion, and with patient consent, investigators went on to investigate the presence and composition of additional non-culprit, non-stenotic lesions (2,600 in all) in the three major arteries. Many of these lesions were not detectable in stress tests or coronary angiograms. However, using newly introduced imaging technology called virtual histology — an advanced version of intravascular ultrasound — we were able to systematically analyze plaque composition with regard to size and thickness on the basis of the distinct spectral parameters of each tissue substrate.

From this data we went on to correlate various plaque characteristics, patient risk factors, and plasma markers with subsequent plaque progression and adverse cardiac events that subsequently occurred among participants. The results — based on literally hundreds of thousands of frames viewed by VH-IVUS and angiography — gave us a statistical picture of the common features of these non-occlusive lesions, which turn out to be more dangerous than occlusive hard plaques.

The PROSPECT Trial has also contributed to our knowledge of the cellular events leading up to the rupture of vulnerable plaque (VP). VPs begin as inflamed, lipid-rich lesions. Unlike the calcified plaques that project into the lumens to cause blockages, VPs grow eccentrically within the vessel walls, much like abscesses. As they grow, VPs develop a thin, fibrous cap covering an increasingly necrotic core of dead macrophages and other debris, hence their designation thin-cap fibroatheromas (TCFAs). Eventually this pathologic process – a form of programmed apoptosis associated with zinc-dependent metalloproteins – digests the cap causing it to rupture. Simultaneously, a potent thrombogenic protein called tissue factor spills out to trigger thrombosis and MI. Contrary to what we expected, the incidence of TCFA was rather low. Half of the patients in PROSPECT had no TCFA at all. The majority of patients comprising the other half had only one or two TCFAs. Multiple TCFAs were only seen in the minority of patients (<7 percent). We also determined that the risk of a TCFA going on to trigger a new cardiovascular event in three years rises substantially according to plaque composition and plaque area. We risk-stratified them as follows: isolated TCFA has an event rate of 4.4 percent. TCFA associated with a lumen area less than 4 mm² yields an event rate of 9 percent. TCFA plus a plaque burden greater than 70 percent raises the relative risk to 15.3 percent. Finally, when the TCFA has both a high plaque burden and a lumen area less than 4.0 mm² the predictive event rate rises to a statistically significant 17.2 percent. As a result, we cardiologists should look for TCFA when a patient is undergoing coronary stenting, so we can improve our risk-stratification and identify patient at higher risk for repeat coronary events.

Only now are we able to study human VP in vivo. Thanks to these recent advances, we can anticipate the availability soon of devices and techniques to treat patients proactively. By any measure, we are entering a new era in cardiology.

Example of a thin-cap fibroatheroma (TCFA). Notice a large lumen with a positively remodeled plaque. Large necrotic core (red) in contact with the lumen.





Michael C. Kim, MD Director, Coronary Care Unit on Door-2-Balloon Time in STEMI

This past year MSH achieved an almost unprecedented D2B record of less than 90 minutes in over 95% of our STEMI patients.

The most serious heart attack is signaled by characteristic ST elevations on the surface electrocardiogram, hence the name ST segment elevation myocardial infarction, or STEMI. Rapid intervention in STEMI is critical because the condition, which is triggered by a total blockage of a coronary artery, can result in a significant portion of the heart muscle dying due

to lack of blood supply if not cleared quickly. It's the cardiac condition most people fear most when they say "heart attack" and with good reason; 50 percent of patients never even make it to the hospital alive.

Because patient mortality rates have remained high in this medical emergency even as others improve, and because angioplasties are the ideal method of treatment, the American College of Cardiology (ACC) declared a national "Door to Balloon" initiative in 2006, calling on every hospital to examine performance with the goal of treating STEMIs (by balloon catheterization for example) within 90 minutes of a patient's arrival at the ER "door." Mount Sinai, which already had an outstanding record of performance in treating STEMIs, took up the challenge. This past year we achieved an almost unprecedented D2B record of less than 90 minutes in over 95 percent of our STEMI patients, with a caseload of 150-200 patients annually. In one notable instance our D2B interval was only 20 minutes! Offering these kinds of responses when only 30 percent of hospitals nationwide are consistently doing so is significant.

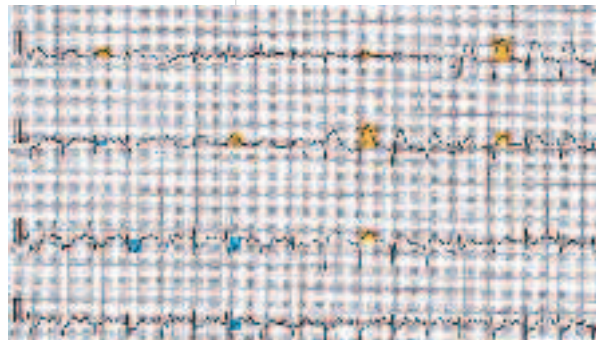
How do we do this? The simple answer is that we have examined every detail of our program and developed better strategies for getting these critically ill patients to the cath labs without any unnecessary delay. As we are known to the city's ambulance services as offering outstanding care and rapid response, a patient suspected of a STEMI is likely to be brought here even if it means bypassing a closer hospital without a comparable program. We also have a bed

in the cardiac care unit set aside for STEMI, so no matter what else may be going on there we can give immediate attention to a critical care patient 24/7. And we have held scores of meeting with colleagues in the ER.

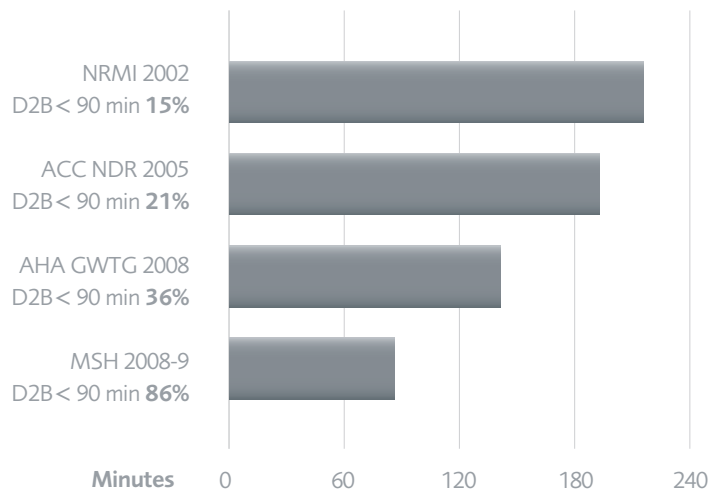
The Mount Sinai ER is trained and staffed to take an ECG as soon as patients with MI symptoms arrive unless the transporting ambulance has already done so. If STEMI is confirmed, a direct call is placed to the attending physician on duty so that the cath team can begin mobilization, a process that takes no more than 30 minutes, often a lot less. The stable patient is sent upstairs where additional tests and history are taken as needed. (During late night-early morning hours the interval from ER to cath intervention the cath lab relies on a central page system that reaches attendings, fellows, nurses and PCI technicians on call. To further shorten D2B all on-call physicians live within 10-15 minutes of the hospital; fellows live in hospital-provided apartments within 5 minutes walking distance.)

In summary, much of what we do in elective PCI can be said to make patients feel better, which is unquestionably gratifying. But what we do with STEMI is more dramatic – we operate on the edge of life and death and, as our NY State averages show, we beat the odds in an amazing 95 percent of the time.

12-lead electrocardiogram showing ST-segment elevation (orange) in I, aVL and V1-V5 with reciprocal changes (blue) in the inferior leads, indicative of an anterior wall myocardial infarction.



Door to Balloon and STEMI





Mount Sinai Heart is a leader in endovascular interventions for severe PAD, which can help eliminate the need for amputation in many cases.

Prakash Krishnan, MD Director Endovascular Intervention, Cath Lab on Peripheral Atherectomy in Treating Peripheral Artery Disease

Peripheral arterial disease (PAD) occurs when plaque builds up in the arteries that carry blood to your head, organs, and limbs. When plaque builds up in arteries, the condition

is called atherosclerosis. Over time, plaque can harden and narrow the arteries. This limits the flow of oxygen-rich blood to your organs and other parts of your body. PAD usually affects the legs, but also can affect the arteries that carry blood from your heart to your head, arms, kidneys, and stomach. The symptoms of PAD depend on which organ or muscle group the affected artery supplies.

Once PAD is diagnosed, there are many modalities of treatment. These include medications, exercise, angioplasty, stent, bypass surgery and atherectomy. The remainder of the article will focus on a specific type of atherectomy, endovascular peripheral atherectomy.

Atherectomy is a procedure for opening up an artery by removing the plaque produced by the build-up of cholesterol and other fatty substances in the inner lining of the artery from atherosclerosis.

Types

Directional - SilverHawk Plaque Excision System™ The system consists of a catheter with a mounted blade, a collection reservoir and a handheld battery-powered drive unit. The device is made up of a 135 cm shaft with a cutting assembly, which has a cutting blade at the proximal end of a nosecone designed to collect the plaque shavings.

Rotational/Aspiration - Jetstream G2™ Jetstream G2 is designed with an expandable cutting tip for use in debulking via rotational atherectomy. The catheter includes distal ports located at the tip,

which are designed to provide independent infusion and aspiration functions for the active removal of fluid, excised tissue and thrombus from the treatment site.

Orbital - Diamondback 360™ The Diamondback 360° System uses the principle of centrifugal force. As crown rotation increases, centrifugal force presses the eccentrically mounted, diamond-coated crown against the stenotic lesion, removing a thin layer of plaque. The increasing crown orbit creates a larger lumen.

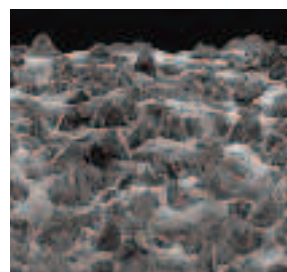
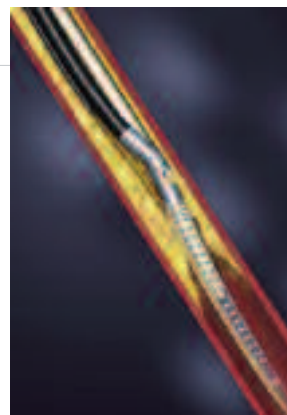
Laser - CLiRpath® Photoablation Atherectomy System

When the CLiRpath catheter reaches the blockage site it transmits short bursts of ultraviolet energy through the flexible fibers of the catheter. The ultraviolet energy penetrates the top of the lesion, gently ablating a small portion of the blockage. The laser catheter moves slowly through the blockage, vaporizing the blockage. The laser light breaks down the blockages into byproducts easily absorbed by the blood stream.

The endovascular section of the cardiac catheterization laboratory at Mount Sinai Medical Center specializes in the endovascular management of acute and chronic arterial and venous disease. Procedures performed include but are not limited to directional, rotational, laser atherectomy, angioplasty and stenting of the renal, carotid, mesenteric, subclavian, iliac and other extremity arteries; IVC filter placement, thrombolysis and rheolytic thrombectomy in the management of acute limb ischemia, acute pulmonary embolism, and deep venous thrombosis.

The services provided by the section expanded in the past year to include the comprehensive management of chronic venous insufficiency. Therapeutic procedures in the treatment of varicose and spider veins include endovenous laser ablation, phlebectomy and sclerotherapy.

The section performs over 1,000 diagnostic angiograms and over 600 percutaneous endovascular arterial interventions with major complication rate of less than .01 percent. The program continues to grow annually in both procedural volume and services provided.



Top to bottom: SilverHawk Plaque Excision System™, Jet Stream G2, diamond-coated crown of Diamondback 360°



Sean P. Pinney, MD Director, Advanced Heart Failure and Transplant Program on Innovations in Heart Transplantation

Our success in treating acute MI has greatly improved patient survival, but has increased the incidence of chronic heart failure. Conventional therapies, such as ACE-inhibitors and beta-blockers, alleviate the fatigue and shortness of breath that accompany heart failure. Implantable defibrillators and biventricular pacemakers reduce the risk of sudden death. Together, these therapies extend and improve the lives of heart failure patients. Unfortunately, heart failure is a progressive condition that may at some point require therapy beyond conventional treatments.

Mount Sinai has been an innovative leader in the search for alternative advanced therapies that will offer hope to a greater number of patients with heart failure.

Fortunately, Mount Sinai is an innovative center for providing advanced heart failure care. We have performed nearly 500 heart transplants since the program's inception in 1989. Although transplantation remains the gold standard for end-stage HF patients, its major limitation is the fixed number of organ donors. Over the past 15 years, that number has remained at 2,200 but there are approximately 250,000 patients living with advanced heart failure. From a transplant recipient's viewpoint, cardiac transplantation is a miracle. From an epidemiological viewpoint, transplantation is trivial, meeting only 1 percent of the demand.

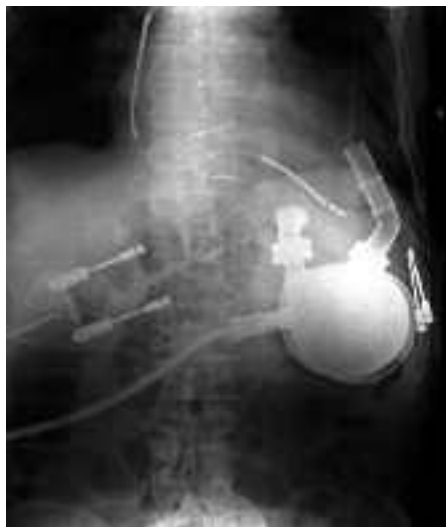
Mount Sinai has been an innovative leader in the search for alternative advanced heart failure therapies. Such treatments include extended criteria transplantation, ventricular assist devices, gene therapy and stem cell therapy. In order to expand the donor and recipient pools, Mount Sinai offers an alternative transplant program. Occasionally, well-selected patients who have

been declined transplantation elsewhere (usually for advanced age), will be listed for transplantation at Mount Sinai. Our team has helped show that accepting extended criteria donors for these recipients can produce very successful outcomes.

Other alternative therapies include ventricular assist devices (VAD). A VAD is quite simply a blood pump that is surgically implanted to assist the failing heart in circulating blood throughout the body. VADs have undergone significant improvements since first introduced, evolving from their original bulky, pulsatile pump model to the newer, quieter, more dependable continuous-flow pumps. Our surgeons and physicians have participated in trials of these newer second- and third-generation devices and are currently enrolling patients into a clinical trial with the newest such pump, the DuraHeart™ from Terumo, Inc.

Working with Dr. Roger Hajjar, Mount Sinai physicians are now able to offer experimental gene therapy. In the cath lab, cardiologists inject into the coronary arteries an engineered virus carrying a gene for SERCA-2A, a key protein inside the heart cell. The promise of gene therapy is to allow failing heart cells to reconstruct themselves by providing them with a new, corrected blueprint. So far, two patients have received this therapy, which has the promise to allow hearts to recover without needing surgery.

Mount Sinai has been in the forefront of cardiogenic research for over a decade, focusing on regenerative therapies as mesenchymal stem cells, which have the potential to transform into heart cells. Starting this fall, researchers at Mount Sinai began participating in an NHLBI-funded multicenter trial studying the safety and efficacy of mesenchymal stem cell injection in VAD recipients who are awaiting heart transplantation. This study will try to determine the degree to which such stem cells can regenerate heart muscle and improve the heart's performance.



Mount Sinai Heart is currently enrolling participants in a clinical trial for the newest ventricular assist device, Terumo Heart's DuraHeart™.



Barry A. Love, MD Director, Pediatric Cardiac Cath Lab on Transcatheter Repair of Paravalvular Regurgitation

Though most paravalvular regurgitation requires no therapy, severe cases may lead to dyspnea, edema and pulmonary hypertension.

Post-operative paravalvular regurgitation is a relatively common complication of prosthetic valve replacement. Most paravalvular regurgitation is insignificant, asymptomatic, and requires no therapy. In some instances, however, the regurgitation worsens in the months following implantation, gradually increasing the regurgitant volume. It may also occur

after an episode of healed infective endocarditis, as the result of inflammatory damage at the interface between the annulus and the sewing ring. Especially in patients with impaired cardiac function, paravalvular regurgitation may lead to progressive dyspnea, orthopnea, edema, and pulmonary hypertension. In 10 percent of patients, the forces exerted on the red blood cells by the regurgitant jet leads to transfusion-dependent hemolytic anemia.

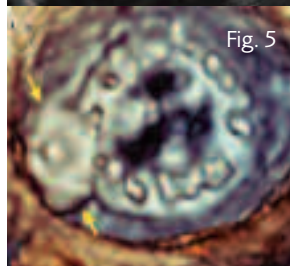
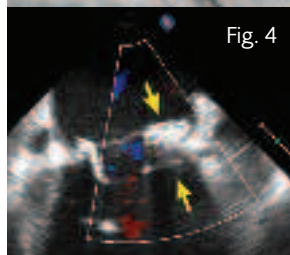
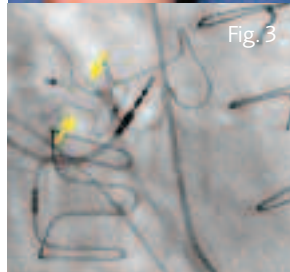
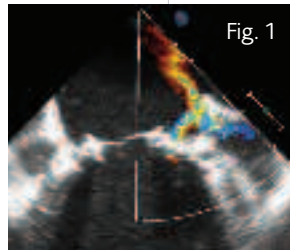
The paravalvular regurgitant channel is usually oblique and irregularly shaped, but is always located between the sewing ring of the prosthetic valve and the native annulus. The most common sites of clinically significant paravalvular regurgitation are around the mitral and aortic valve positions. Some patients may have multiple sites of regurgitation. The gold standard for repair of symptomatic paravalvular regurgitation has traditionally been reoperation via open heart surgery, but this invasive approach can carry a high risk — especially among older patients who are often additionally burdened with such co-morbidities as prior coronary artery bypass grafts, left ventricular dysfunction and renal dysfunction.

More recently, techniques have been developed to place occlusive devices across the regurgitant channel(s) via cardiac catheterization, thus avoiding major surgery. The goal of this newer catheter-based option is to achieve stable device positioning with complete closure of the defect, without interfering with the function of the valve leaflets; and to do so with minimal physical stress and a quicker recovery for the patient. Recent advances including real-time 3D

transesophageal echocardiography have dramatically improved our ability to precisely locate the defects, while the advent of steerable sheaths has improved our ability to more easily reach the entire circumference of the valves. Newer varieties of transcatheter occluders have also enabled us to better tailor the repair to each patient's specific anatomical nuances.

Transcatheter repair of paravalvular regurgitation is performed by only a handful of experienced cardiologists in relatively few cardiac centers. The expertise in transcatheter occluder techniques developed in our congenital cardiac catheterization laboratory to treat structural heart defects, chiefly in the young, translates well to treating adult patients with paravalvular regurgitation. Likewise, all of the equipment and devices to repair paravalvular regurgitation are "borrowed," from other applications in the sense that they have been adapted to uses beyond their original purpose. One example is the Amplatzer Muscular VSD Occluder, designed to close congenital ventricular septal defects, but often used as an appropriate occluder for many paravalvular channels. Development of devices specific to paravalvular regurgitation is on the horizon, which will further improve our ability to treat this lesion in the safest and most effective manner.

Patients most appropriate for this treatment are those with symptomatic paravalvular regurgitation adjacent to either a bioprosthetic or mechanical valve. Patients with transfusion-dependent hemolysis should also be considered. Patients must not have active infection, and the valve prosthesis must be stable in the annulus.



Case study of 48-year-old man presenting with 2-pillow orthopnea and progressive exercise intolerance. Left ventricular dysfunction with an EF of 35 percent. Moderate paravalvular mitral regurgitation is found with a defect near the left atrial appendage. Cardiac catheterization was performed and transseptal access was gained to the left atrium. The paravalvular defect was crossed with the help of a steerable sheath and 3D echocardiography. A 10mm Implanter Muscular VSD occluder was delivered across the defect.

Figure 1: Transesophageal echocardiogram (TEE) with color Doppler showing moderate paravalvular regurgitation adjacent to the bioprosthetic mitral valve.

Figure 2: Photograph of an Amplatzer Muscular VSD occluder.

Figure 3: Fluoroscopy showing the Muscular VSD occluder across the paravalvular channel.

Figure 4: TEE with color Doppler showing no residual paravalvular regurgitation after placement of the occluder.

Figure 5: 3D TEE image of the occluder in position as viewed from the left atrium.



Teamwork and a focus on treating each case as an individual ensures superior outcomes and more satisfied patients.

Beth Oliver, RN Senior Director, Nursing on Maintaining Quality in Patient Care & Follow-Up

Nurses are key to maintaining the highest level of quality care in the cath lab. Even as our patient load has grown dramatically, we maintain a remarkably low complication rate through teamwork and continuous quality improvement. Our evidence-based practice is constantly upgraded through robust monthly meetings in which the interventional team reviews procedures, assesses performances, and makes changes where appropriate.

Another contributor to quality is our Patient Guide, a binder that leads individual patients through the steps of cardiac procedures and beyond. Currently, we offer the guide in English, Spanish, Russian and Hindi to meet the needs of our patient population.

The booklet describes in user-friendly terms atherosclerosis, coronary artery disease, cardiac catheterization, and some of the more common interventional procedures. The guide also offers post-PCI instructions on diet and exercise, as well as simple ways to select and prepare heart-healthy foods (lower cholesterol, lower salt). Another section discusses care of the catheterization access site, safe activities during healing, and the importance of smoking cessation and/or avoidance of tobacco products. A final section takes up the importance of adherence to blood-thinning medications and especially aspirin and clopidogrel (Plavix®).

Also included are photocopies of the patient's angiograms showing the area of cardiovascular system treated and repaired. For anyone who wants to understand the gravity of their situation when they came into the cath lab and what has been done to make them better, these pictures are worth a thousand words.

Lastly, we make follow-up calls to every patient a day after discharge. We ask how they are doing since returning home. We listen carefully to address concerns and assure them that they can call back any time with questions.

Antonietta Tolentino CCRN, MSN, NP-C Adult Nurse Practitioner, Cardiac Cath Lab on NP Collaboration in Minimizing Complications

The cath lab's nurse practitioners work directly with the physicians and staff in planning and implementing patient care from the time of intake to discharge and sometimes beyond. Our role here has been developing and expanding since 1998, when Mount Sinai's cath lab broke new ground by adding two NPs to its staff, who then worked in two cath lab rooms. Today, we have 14 NPs covering seven lab rooms, indicators of increasing caseload in Mount Sinai's cath lab and the importance placed here on patient-centered care.



Mount Sinai cath lab has 12 NPs working hand-in-hand with physicians and staff, committed to minimizing complications.

As registered nurses with additional postgraduate education and training in cardiovascular interventional nursing practice, we take on core functions including conducting meticulous assessments of each patient's medical history and physical condition prior to catheterization. Many patients come in without thorough work-ups and without much sense of what health problems might be contributing to their current situation. It is our job to open up what amounts to a Pandora's box of existing conditions and provide our findings to the interventional cardiologist. Under his or her direct supervision we also participate in diagnostic catheterization procedures including angiography. Subsequently, we give each patient and family a thorough explanation of the procedure. We take time to discuss with them what the reasonable expectations are as to outcome and recovery time, and we describe in detail their future plan of care and answer questions to set the basis for informed consent.

Following established protocols, the NPs are also responsible for management of post-procedural recovery. Our close and prompt attention is the forefront in detecting any complications during recovery. Further, we give discharge instructions to the patient and family, emphasizing medication compliance, therapeutic lifestyle changes that include smoking cessation, dietary changes, and exercise, as well as follow-up appointments at Mount Sinai and with the referring physician.

RESEARCH AND CLINICAL TRIALS

Top Ten Major Publications: Mount Sinai Cardiac Cath Lab

1. Creatine Kinase-MB elevation after coronary intervention correlates with diffuse atherosclerosis and low-to-medium level elevation has a benign clinical course: Implication for early discharge after coronary intervention. Kini A, Marmur J, Kini S, Dangas G, Wallenstein S, Cocke T, Brown E, Ambrose J, Sharma S. *J Am Coll Cardiol.* 34:663, 1999.

Clinical Implications: This observational study was the first report in the literature to document that minor post-procedure enzyme elevation are common after otherwise successful PCI and are not associated with any higher mortality at 12-15 months follow-up. We also established by careful follow-up, that patients with elevated CK-MB but declining value can safely be discharged home without any untoward events.

2. Plaque neovascularization is increased in ruptured atherosclerotic lesions of the human aorta: Implications for plaque vulnerability. Moreno P, Purushothaman K, Fuster V, Echeverri D, Trusczyńska H, Sharma S, O'Connor William. *Circulation* 110: 2032, 2004.

Clinical Implications: We are the pioneers in making the observation that one of the mechanisms of plaque rupture is mediated by new vessel formation in the adventitia and is exaggerated in diabetic patients and in lesions with high lipid contents.

3. A simplified approach to bifurcation lesions in medium-to-large size vessels: Simultaneous kissing stents (SKS) technique. *Am J Cardiol* 94: 913, 2004. Also SKS-DES in large bifurcation lesions. Sharma S, Ahsan C, Lee J, Kim M, Fisher E, Steinhamer A, Kini A. *Cathet Cardiovasc Interv* 65:10, 2005.

Clinical Implications: There are various techniques for PCI of large bifurcation coronary lesions but none of them is perfect. We invented a simplified bifurcation technique of placing two stents side-by-side with excellent short-term outcomes and lower restenosis (<5 percent) at 15 months of follow-up.

4. Results of repeat balloon valvuloplasty for treatment of aortic stenosis in patients aged 59 to 104 years. Agarwal A, Kini A, Attanti S, Lee P, Ashtiani R, Steinheimer A, Moreno P, Sharma S. *Am J Cardiol* 95:43, 2005.

Clinical Implications: While aortic valve replacement (AVR) is a standard treatment for symptomatic aortic stenosis (AS), many elderly patients are high risk for AVR and functionally limited by AS. In these patients, opening the aortic valve by percutaneous balloon procedure (BAV) and repeating up to three times if needed, can provide effective symptomatic improvement for 3-5 years with low complication rates.

5. A risk score to predict in-hospital mortality for percutaneous coronary interventions. Wu C, Hannan E, Walford G, Ambrose J, Holmes D, King S, Clark T, Katz S, Sharma S, Jones R. *J Am Coll Cardiol* 47:654, 2006.

Clinical Implications: By interrogating a large NY State PCI database, independent factors influencing in-hospital mortality were identified with creation of a simple risk-score from 0-40 predicting in-hospital mortality from 0.05 to 99 percent after PCI. A simple handout for calculating PCI risk-score has been generated for use in daily clinical practice.

6. Bolus-only vs. Bolus + infusion of Glycoprotein IIb/IIIa inhibitors during percutaneous coronary intervention. Kini A, Chen V, Krishnan, P, Kim M, Suleman J, Mares A, Moreno P, Sharma S. *Am Heart J* 156:513, 2008.

Clinical Implications: While GP IIb/IIIa inhibitors are routinely used to improve PCI outcomes, their use is associated with higher vascular and bleeding complications. We reported that infusion of GP IIb/IIIa inhibitors after PCI could safely be eliminated (give bolus only), with decreasing vascular and bleeding complications yet maintaining anti-ischemic benefit up to 12 months follow-up.

7. Changing outcomes and treatment strategies for wire induced coronary perforations in the era of bivalirudin use. Kini A, Rafael O, Sarkar K, Rajdev S, Jakkula M, Mares A, Kaplish D, Krishnan P, Kim M, Sharma S. *Cathet Cardiovasc Intervent* 74:700, 2009.

Clinical Implications: his publication challenges the common practice of deferring bivalirudin use in cases of potential coronary perforation (largely due to lack of an antidote). Our systematic analysis showed that guidewire induced coronary perforation if occurs with bivalirudin use had benign course compared to occurring with heparin. This can simply be explained on the basis of short bivalirudin half life.

8. Incomplete revascularization in the era of drug-eluting stents. Hannan E, Chuntao W, walford G, Holmes D, Jones R, Sharma S, King S. *J Am Coll cardiol Interv* 2:17, 2009.

Clinical Implications: This report showed that patients undergoing coronary stenting who receive incomplete revascularization experience more adverse outcomes even in the era of DES. Therefore, every effort should be made to perform complete revascularization using DES to improve overall survival.

9. Serum creatinine ratio: A novel predictor of mortality after percutaneous coronary intervention in patients with normal and abnormal renal function. Sarkar K, Kini A, Rafael O, Jakkula M, Kaplish D, Lee P, Suleman J, Krishnan P, Kim M, Sharma S. *Cathet Cardiovasc Intervent* 74: 234, 2009.

Clinical Implications: We identified that rise in serum creatinine from baseline (serum creatinine ratio) both in patients with normal as well as elevated serum creatinine, has an adverse prognosis at 1 year, corresponding to graded rise in serum creatinine post PCI. Therefore, every effort should be made to prevent the rise in serum creatinine post PCI.

10. Relation of High-Density Lipoprotein Cholesterol to Mortality After Percutaneous Coronary Interventions in Patients With Low-Density Lipoprotein <70 mg/dL. Kini A, Muntner P, Moreno P, Mann D, Krishnan P, Kim M, Rafael O, Farkouh M, Sharma S. *Am J Cardiol*, 103:350, 2009.

Clinical Implications: We showed that low serum HDL cholesterol levels in CAD patients with target LDL level of <70 mg/dL undergoing PCI is a predictor of mortality at 5 years follow-up. Our analysis showed that for every 14 mg/dL rise in HDL cholesterol reduced mortality by 32 percent at a mean follow-up of 5 years and now has emerged as a strong prognostic factor.

Mount Sinai Heart Cardiac cath lab is committed to advancing the field of interventional cardiology by performing procedures safely and appropriately by participating in well-designed clinical research trials and the publication of major clinical research findings.

Top Ten Key Clinical Trials:

Study Title	Study Details	Sponsor	PI	Target Enrollment & Study Sites	Current Status/ Enrollments
FREEDOM Trial	Randomized trial comparing CABG vs. PCI in diabetic with multi-vessel disease. To evaluate whether PCI with DES is more or less effective than the existing standard of care CABG. Multicenter, two-arm, open label prospective randomized superiority trial with equal allocation of 3 yrs duration	National Heart, Lung and Blood Institute (NHLBI)	S. Sharma	2,058 (Global)	Ongoing/60 subjects enrolled. 28PCI/ 32CABG
IMPELLA PROTECT II Trial	PROTECT II: A prospective, multi-center randomized controlled trial of the IMPELLA® RECOVER® LP 2.5 System versus intra-aortic balloon pump (IABP) in patients undergoing non-emergent high risk PCI	ABIOMED	S. Sharma	650 (USA)	Ongoing/ 18 subjects enrolled
SPIRIT Trial	Prospective, two-arm, open-label, multicenter registry using Xience Prime EECSS and Xience Prime LL EECSS in de novo native coronary artery long lesions (length = 32 mm) with reference vessel diameters (2.25 mm to = 4.25 mm).	Abbott Vascular	S. Sharma	500 (Global)/ 10 Mount Sinai	Ongoing/ 5 subjects enrolled
ABCD-PCI Trial	Early ambulation and discharge VS. overnight hospital stay for patients undergoing successful vascular closure after PCI	St. Jude Medical MSSM	M. Kim	600/6 sites (USA)	Ongoing/ 222 subjects enrolled
VWF STUDY	To determine if BAV and AVR is effective at reversing the acquired Type 2- vWF syndrome seen in severe AS. Deficient vWF and Factor-VIII complex is responsible for bleeding	MSSM	J. Bander	100 Single Center MSSM	Ongoing/ 15 subjects enrolled

Study Title	Study Details	Sponsor	PI	Target Enrollment & Study Sites	Current Status/ Enrollments
CRISP-AMI-Trial	A multicenter randomized trial of mechanical LV unloading using IABP to reduce infarct size pre-PCI for acute MI	DataScope Inc	M. Kim	300 (USA)	Ongoing
SKS-PRECISE Trial	A randomized pilot trial for treatment of true bifurcation lesions with simultaneous kissing stents. SKS technique vs. conventional technique	Johnson & Johnson	S. Sharma	100 Single Center MSSM	Completed/ 100 subjects enrolled
COLOR Registry	Chronometric observations of lipidcore containing plaques of interest in native coronary arteries registry using the LipiScan coronary imaging system.	InfraReDx inc.	A. Kini	1,000 USA	Ongoing/13 subjects enrolled
RESOLUTE Trial	Endeavor resolute zotarolimus-eluting coronary stent system in the treatment of de novo lesions in native coronary arteries with a reference vessel diameter of 2.25 mm to 4.25 mm.	Medtronic Inc.	M. Kim	1,574 (USA)	Ongoing/12 subjects enrolled
PARIS Registry	Patterns of non-adherence to anti-platelet regimens in stented patients, an observational single-arm study. To examine the modes of non-adherence to dual anti-platelet therapy (DAPT) in patients with CAD following PCI-stenting.	Columbia University	A. Kini	5,011 (Global)	Ongoing/200 subjects enrolled

PATIENT SUCCESS STORIES



Patient: Eunice Geagan, 93-year-old female

Diagnosis: Acute heart failure, aortic valve disease, unstable angina

Treatment: Catheterization of left and right coronary arteries and insertion of drug eluting stents

"My doctor knew Dr. Sharma personally but, more importantly, she knew his reputation for working miracles with congestive heart failure patients like me."

"I've never thought of myself as having serious medical problems — certainly not heart failure," says Mrs. Geagan, "In September 15th, when my daughter was driving me to the hairdresser, I suddenly found myself unable to breathe."

Mrs. Geagan's daughter turned the car around and headed straight for Huntington Hospital's ER. "They put me on a breathing tube and got me stabilized," the former patient continues. "When my regular doctor arrived, he quickly determined I needed to see Dr. Sharma in the city. She knew Dr. Sharma personally but, more importantly, she knew his reputation for working miracles with congestive heart failure patients like me."

Mount Sinai sent an ambulance and Mrs. Geagan saw Dr. Sharma that same afternoon. "He was simply charming. He explained in simple terms what he was going to do to relieve my breathing problem. He scheduled surgery for the next morning and wished me a good night's sleep."

Less than 24 hours later Mrs. Geagan was out of surgery and resting. "Dr. Sharma came in to see me, explained how well things had gone, explained which medications I would need, and pronounced me ready to go home. My recovery has been very rapid. My regular doctor is monitoring me for any recurrence of symptoms, but I've essentially returned to my normal life, playing cards with my friends again and going out for social events. And you can bet I'm enjoying my wonderful family more than ever knowing just how close I came to losing it all.

"My advice is get the ice out at five every evening, sit down with people you love, talk things over, and be glad to have lived another good day."

Patient: Kevin Lang, 48-year-old male

Diagnosis: Advanced coronary artery disease

Treatment: Two-staged interventions of the left and right coronary arteries involving LV assist device support, rotablation and stent insertions

Kevin Lang and his family were relaxing this past summer when he began to feel ill. “I was short of breath, with shooting neck pain and tightness in my chest. I tried to shrug it off — but my wife took one look at me and called the ambulance. She knows I’ve been dealing with diabetes since I was nine, not to mention kidney problems and a heart attack and bypass four years earlier.”

Kevin was diagnosed with a heart attack, and taken to a nearby facility where he was stabilized on a balloon pump. “They couldn’t help a high-risk guy like me,” Kevin recalls. “The best hope they offered was Mount Sinai where I was transferred to the care of Dr. Sharma. Two days later he hooked me up to a temporary pacemaker while he cleared three obstructions and inserted stents. I woke up only hours later, already feeling better. I went home after two days with instructions to return in a month for part two.”

This time Dr. Sharma focused on the right coronary artery, portions of which showed considerable calcification. “I was wide awake,” says Kevin, “and the procedure was a breeze, even though I knew he was using a roto-roter to clear the obstructions. I was home the next day and back on light duty at my electrical contracting business a day or so later.”

Kevin’s rapid recovery “surprised everyone. But I’ve made an effort to take much better care of myself since my first attack. I’ve been dealt a difficult hand with my diabetes but with Dr. Sharma’s extraordinary care I’ve been given a second chance in life. I intend to make the most of it.”

“With Dr. Sharma’s extraordinary care I’ve been given a second chance in life. I intend to make the most of it.”



Patient: Chaudry Qudrat, 52-year-old male

Diagnosis: Complex blockage of left main artery and LAD

Treatment: Percutaneous coronary interventions and insertions of two drug-eluting stents

“In early June I had a heart attack,” says Chaudry Qudrat. “My wife called 911 and I was transported immediately to the local hospital. An angiogram showed two blocked arteries on the left side. The hospital doctors and my cardiologist told me I needed open-heart surgery right away. But I’m a storekeeper and I couldn’t afford to be out for six months recovering from major surgery.”



“All I can say is God bless Dr. Sharma for coming to my rescue.”

A visiting friend, who had been a patient of Dr. Sharma, advised Qudrat to have his records sent across the river fast as he could. “He said Dr. Sharma was a very competent but conservative surgeon. My wife and I decided that was a very good suggestion.”

Within hours Dr. Sharma had reviewed Qudrat’s charts and was on the phone. He said Qudrat was technically a high-risk case based on multiple medical issues and on his current reports. But Dr. Sharma added reassuringly, in the right hands the current blockages could be corrected without open-heart surgery.

That was all Patient Qudrat needed to hear and he was transferred the same day to Mount Sinai. Dr. Sharma met his patient the next morning to explain the procedure and, after performing the usual imaging, opened the blockages in Qudrat’s left main artery and left anterior descending artery and inserted stents. Almost instantly Qudrat’s blood flow went from severely obstructed to virtually normal.

“When I awoke, Dr. Sharma told me to take the week off to recover but I felt strong enough to go back to work the next day. I’m taking medications to reduce my risks and cutting down on smoking, too. All I can say is God bless Dr. Sharma for coming to my rescue.”

Patient: Mario Mendoza, 46-year-old male

Diagnosis: Multiple coronary arterial blockage with prior recommendation for quadruple bypass surgery

Treatment: Staged PCIs of right and left coronary arterius

Early last year Mario Mendoza’s medical troubles, which included high blood pressure, diabetes, and heart disease, seemed to be gaining ground. “I was getting short of breath and feeling chest pain. I went to see my cardiologist, who recommended quadruple bypass surgery. Open-heart surgery was definitely not what I wanted to hear, so I asked around for the name of another doctor who might have a less drastic approach. My friend’s doctor spoke glowingly of Dr. Annapoorna Kini.”

Mendoza called Dr. Kini and was astonished when she made time to see him the next day. “That really impressed me!” Mendoza brought in his medical records, and Dr. Kini reviewed them, explaining, “You won’t need an open-heart procedure — I can fix you up with a series of angioplasties.”

Mendoza and Dr. Kini made a date for the following Monday. “She seemed so confident that I was ready to put my trust entirely in her hands,” Mendoza explains. “She put me out for a couple of hours, and unblocked two arteries on the right side. A month later she had me back and did the other two arteries on the left. I immediately began feeling better and was able to return to work.

“Dr. Kini is definitely no ordinary doctor. She is very thorough, and follows up to make sure that her patients are doing well. She wants to have me come in from time to time to see how well the medications are working and to monitor my blood flow. She’d like me to stop smoking, and I will keep trying because it would be a shame to come this far back to health and then blow it.”



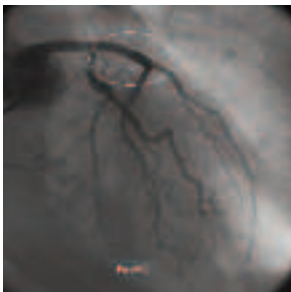
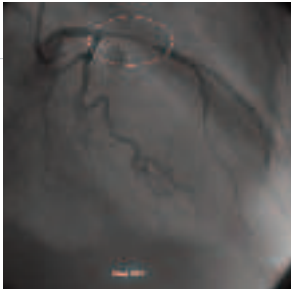
“Dr. Kini is definitely no ordinary doctor. She is very thorough, knows her stuff, and follows up to make sure that her patients are doing well.”

Patient: Peggy Hirsch, 75-year-old female

Diagnosis and Treatment 1: Acute heart attack; reversed with opening occluded LAD and stenting

Diagnosis and Treatment 2: Advanced peripheral artery disease; corrected with series of revascularization surgeries and aggressive pharmacological therapies

"I owe Dr. Moreno a lot. I came close to the edge and if it hadn't been for the personal attention he gave my case, I don't think things would have turned out so well."



"My troubles started with a tick bite in 2004," Peggy Hirsch recalls. "That turned into Lyme disease which triggered a host of other problems." The first sign that more than Lyme arthritis was making Mrs. Hirsch sick came in June 2005 when she experienced shortness of breath and pain in her shoulders followed by chest pain. On July 14th, 2005 she was rushed from her Manhattan apartment to Mount Sinai's ER with an acute heart attack.

"Tests showed my heart muscle working at 35 percent with a severe blockage of my main coronary artery," Hirsch recalls.

"They sent me to Dr. Moreno. He cleared the blockage, inserted a stent, and presto, my blood was flowing, and pretty soon I could breathe on my own again."

Peggy made a successful recovery from her MI, but within a year she was showing signs of progressive circulatory problems in her hands and legs. She saw Dr. Moreno again. "After taking blood tests, he called to tell me that I had an advanced form of giant cell arteritis (GCA), a disorder possibly triggered by the Lyme disease. As GCA can quickly lead to blindness, he urged me to come in immediately."

So back Peggy went to Mount Sinai for a two-staged revascularization intervention, including angioplasties on both legs and a carotid-brachial bypass, the latter to replace a section of diseased right brachial artery.

"I owe Dr. Moreno a lot. I came close to the edge and if it hadn't been for the personal attention he gave my case, I don't think things would have turned out so well. Today I'm enjoying a full life, able to spend joyful times with my grandchildren."

Patient: Louis Diaz, 83-year-old male

Diagnosis: Acute heart attack, causing cardiogenic shock

Treatment: High risk PCI of left main and LAD with IABP for hemodynamic support

“In late August I began having trouble breathing — at first I didn’t pay it any mind,” Louis Diaz recounts. “I thought it was just my emphysema getting to me. But when my chest also tightened, my wife called 911. A good thing, too,” Diaz continues. “I told them to take me to the VA hospital downtown where I usually go, but the medic said I was having a heart attack and nearby Mount Sinai was the only place for me.”

Diaz arrived at the Mount Sinai ER in cardiogenic shock. In the cath lab he was placed on a balloon pump to augment dangerously low pressure. An angiogram revealed severe diffuse arterial disease with roughly 80 percent blockages in the left main and left anterior descending arteries. Dr. Michael Kim, on duty that night, inserted catheters to clear the blockages and places two drug-eluting stents to hold the lumens open.

“Everyone at Mount Sinai was so kind to me, and so good about explaining things,” Diaz reports. “They kept me there for four days until they could be sure I was OK and then sent me home with lots of medications and instructions on how to stay out of trouble. I’ve since lost weight and I now do some exercise. I sincerely thank Dr. Kim for being a terrific doctor.”

Louis Diaz has decided to make Mount Sinai his home hospital in the future. “I want to be closer to the people who were so good to me. I know I am very lucky to be alive and I’m going to do whatever it takes to stay around for a few more years.”



“Everyone at Mount Sinai was so kind to me, and so good about explaining things. Dr. Kim is terrific.”

Patient: Owen Cowitt, MD, 66-year-old male physician

Diagnosis: Chronic total occlusion of left femoral, popliteal and tibial arteries with aneurysm of the iliac artery and gangrenous toes of left foot

Treatment: Complex peripheral recanalization via rotational atherectomy and drug-eluting stents



"I left the hospital the following day on my feet and didn't miss a day of work."

"I was diagnosed with adult-onset diabetes in my late thirties," Dr. Cowitt begins. "I had difficulty managing the condition, and my health continued to deteriorate. In 2004 I received a transplant to replace my failing kidneys.

"Though the surgery was a success, the diabetes-related problems continued, particularly circulatory issues with my left foot which developed chronic ulcers and gangrene. A doctor myself, I recognized it as PAD and I visited a specialist at NYU. But they recommended only amputation, which was devastating."

A colleague of Dr. Cowitt suggested Dr. Prakash Krishnan, a specialist in endovascular intervention at Mount Sinai. "Dr. Krishnan immediately made himself available," says Cowitt. "He radiated confidence, which I found very reassuring."

Dr. Cowitt chose December 31st to have the procedure. "My own practice generally closes for the holidays, so on New Year's Eve day I went in for the surgery. Dr. Krishnan began the procedure by opening up a portal in my right femoral artery. He carried out a complex intervention recanalizing my left superficial femoral artery, working down to the anterior tibial artery, clearing the occluded passages with a rotablator. When he was done I had a pedal pulse again and, best of all, an intact foot.

"Dr. Krishnan later told me that he had found areas in which the occlusion was 90 to 100 percent closed but that he was able to bring them down to 0 to 10 percent! I left the hospital the following day on my feet and didn't miss a day of work. I've done very well since. I've been back for some additional treatment for my left toes, but I'm really doing well, and that to me is a miracle."

FULL-TIME SENIOR FACULTY

Samin K. Sharma, MD, FSCAI, FACC

Zena & Micheal A. Weiner Professor of Medicine Cardiology
Director Cardiac Cath Lab & Intervention

Education and Training

MBBS: SMS Medical College Jaipur, India

Residency, Internal Medicine: New York University Downtown Hospital

Fellowship, Cardiology: City Hospital Center at Elmhurst

Fellowship, Interventional Cardiology: Mount Sinai Hospital

Samin K. Sharma, MD is well known for complex coronary interventions, performing over 1,600 interventions a year (the highest volume in the country) while achieving an extremely low rate of complications. According to the reports of the New York State Department of Health, he has the highest success rate of angioplasty (lowest mortality of <0.2 percent) in the entire group of interventional cardiologists in New York State from 1994 to 2004, a remarkable feat considering the complexity of cases referred. Dr. Sharma has authored over 125 articles, over 300 abstracts, twelve book chapters and has been the editor of *Cardiology Clinics* (December 2006 issue and February 2010 issue). Most of the publications describe the innovating procedural techniques to improve the interventions' success and reduce complication rates. Every year a large number of interventionalists learn from Dr. Sharma's masterful teaching to become safe operators. He has been dubbed the "master of rotablator," a tool especially designed to tackle complex calcified blockages. He has been regularly featured on national and local TV channels and in various newspapers and magazines such as *Newsday*, *Newsweek*, *New York Times*, *New York Post*, *Forbes*, *Wall Street Journal*, *Barron's*, *Daily News*, *Washington Post*, *New York Resident*, *New York Sun*, *New York Magazine*, *Earthtimes*, *India Abroad*, and *India Today*. He has been continuously featured in the *America's Top Physicians* (by Castle Connolly) and *New York's Best Doctors & New York's Super Doctors* listings and in national *Who's Who*. Dr. Sharma also has passion for teaching, sharing his expertise with fellows every day – who have awarded him the Simon Dack Best Teacher in Cardiology in 2000 and the Fellow's Advocate award in 2009. Dr. Sharma has also served on New York State's Cardiac Advisory Board since 2004. For his unprecedented success and outcome of angioplasty for last ten years, New York State Governor George Pataki awarded him the "Governor's Excellence Award" on May 23, 2006. Dr. Sharma is also the recipient of the "Physician of the Year" award given by MSH nurses and "Jacobi Medallion Physician" award given by MSH physicians, in 2007. Dr. Sharma has had the privilege of performing invasive procedures on various heads of states and countries.

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Clinical Interests

Coronary Artery Disease,
Interventional Cardiology,
Valvuloplasty



Annapoorna S. Kini, MD, MRCP, FACC

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Director Interventional Cardiology Fellowship
Associate Director Cardiac Cath Lab & Intervention

Education and Training

MBBS: Kasturba Medical College Mangalore, India
Residency, Medicine/Cardiology: University of Wales Cardiology, United Kingdom
Fellowship, Cardiology: Mount Sinai Hospital
Fellowship, Interventional Cardiology: Mount Sinai Hospital

Dr. Annapoorna Kini performs over 1,000 coronary interventions annually (the highest number by a female interventionalist in the U.S.) with an extremely low complication rate of <0.3 percent. In August of 2009, a New York state report named her as the safest operator among 350 other physicians. She is highly regarded for performing complex coronary interventions especially in chronic total occlusions for patients with advanced heart disease, with utmost safety and excellent long-term results. She has become the national expert on heart assist devices, including Tandem Heart and Impella, which are crucial for many high-risk cases. Dr. Kini also specializes in the non-coronary interventions of mitral and aortic balloon valvuloplasty, and alcohol septal ablation for obstructive hypertrophic cardiomyopathy. Besides being a superb interventionalist, Dr. Kini is an excellent teacher, educating both cardiology and interventional fellows on various aspects of cardiac catheterization and coronary interventional techniques.

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Clinical Interests

General Cardiology,
Interventional Cardiology,
Hypertrophic Cardiomyopathy,
Chronic Total Occlusions



Pedro R. Moreno, MD, FACC

Associate Professor Medicine, Cardiology
Director Interventional Research, Cardiac Cath Lab

Education and Training

MBBS: Universidad Javeriana, Bogota
Residency, Internal Medicine: Brigham and Women's Hospital
Fellowship, Cardiology: Massachusetts General Hospital
Fellowship, Interventional Cardiology: Massachusetts General Hospital

Dr. Pedro R. Moreno performs over 1,000 cardiac coronary invasive procedures annually (including diagnostic catheterizations, angioplasties and coronary stents) with >99 percent success rate and <1 percent major complications. Dr. Moreno is triple board certified in internal medicine, cardiology, and interventional cardiology. As a world-renowned expert in atherosclerosis, Dr. Moreno has been a pioneer in the understanding of inflammation and acute coronary syndromes. Dr. Moreno was the first to describe the role of macrophages in living patients with unstable angina and acute myocardial infarction, and is a pioneer in atherosclerotic neovascularization and intra-plaque hemorrhage. Its impact in the scientific community was evident by immediate recognition, which opened new routes of investigation around the world.

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Clinical Interests

General Cardiology,
Interventional Cardiology,
Hypertrophic Cardiomyopathy,
Chronic Total Occlusions

Michael C. Kim, MD, FACC

Assistant Professor Medicine, Cardiology
Director Coronary Care Unit

Education and Training

MD: Georgetown University School of Medicine
Residency, Internal Medicine: Mount Sinai Hospital
Fellowship, Cardiology: Mount Sinai Hospital
Fellowship, Interventional Cardiology: Mount Sinai Hospital

Dr. Michael C. Kim currently performs over 1,000 diagnostic catheterization procedures and over 650 percutaneous coronary interventions annually. He has quickly developed an outstanding clinical reputation within the Tri-State area and boasts a superb safety record. Dr. Kim serves as both Director of the Coronary Care Unit and Director of Medical Education in the Cardiac Catheterization Laboratory at Mount Sinai Heart. As Director of the Coronary Care Unit, Dr. Kim is recognized as an expert in the management of critical care cardiology especially in the area of acute coronary syndromes and ischemic heart failure.

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Clinical Interests

Coronary Artery Disease,
Interventional Cardiology,
Cardiac Catheterization

Prakash Krishnan, MD

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Director Endovascular Intervention, Cath Lab

Education and Training

MBBS: Rajah Muthaih Medical College, India
Residency, Internal Medicine: St. Vincent's Medical Center of Richmond
Fellowship, Cardiology: Ochsner Clinic Foundation
Fellowship, Interventional Cardiology: Mount Sinai Medical Center
Fellowship, Endovascular Intervention: North Central Heart Institute

Dr. Prakash Krishnan performs over 1,500 procedures annually (including diagnostic, complex coronary and endovascular interventions). He has quickly developed an outstanding national and international reputation with a superb safety record. He is an expert in catheter-based vascular therapy, specializing in the endovascular management of acute and chronic arterial and venous disease. Procedures performed include but are not limited to directional, rotational and laser atherectomy, angioplasty and stent of extremity arteries, IVC filter placement, thrombolysis, and rheolytic thrombectomy in the management of acute limb ischemia, acute pulmonary embolism, and deep venous thrombosis. He also performs therapeutic procedures in the treatment of varicose and spider veins including endovenous laser ablation, phlebectomy, and sclerotherapy. Dr. Krishnan is an excellent teacher and educator. He is an invited lecturer and moderator in numerous national and international meetings. Dr. Krishnan demonstrates endovascular techniques to interventionalists from across the country.

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Clinical Interests

Coronary Artery Disease,
Interventional Cardiology,
Peripheral Artery Disease,
Endovascular Intervention



Barry A. Love, MD, FRCPC

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Education and Training

MD: University of Western Ontario
Residency, Pediatrics: Children's Hospital of Montreal
Fellowship, Pediatric Cardiology: Children's Hospital Boston

Dr. Barry Love is director of the congenital cardiac catheterization laboratory at Mount Sinai Heart. Dr. Love holds a joint appointment in both the Department of Pediatrics and the Department of Medicine and is one of only a few physicians who perform interventional procedures on patients with congenital heart disease from infancy through adulthood. He has been a pioneer in extending many of the techniques used in the treatment of congenital heart disease, to acquired heart lesions in adults such as paravalvular leaks and post-infarction ventricular septal defects. He has been recognized by Castle Connolly as one of *America's Top Doctors* for 2009, and is listed as one of the *New York Times Magazine's Super Doctors* for both 2008 and 2009. Dr. Love has a research interest in new device technology and is a principal investigator for several device trials in congenital heart disease.

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Clinical Interests

Pediatric Catheterization
& Interventions,
Pediatric and Adult
Congenital Heart Diseases



Sean P. Pinney, MD

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Education and Training

MD: Georgetown University School of Medicine
Residency, Internal Medicine: Beth Israel Deaconess Hospital, Boston
Fellowship, Cardiology: Columbia-Presbyterian Medical Center

Dr. Sean Pinney is a well-known cardiologist specializing in the management of patients with advanced heart failure. Together with Dr. Entelechy Anyanwu, Dr. Pinney established Mount Sinai's ventricular assist device program, which offers a broad array of temporary and implantable devices for patients with cardiac failure. Under his leadership the heart transplant program at Mount Sinai has increased its clinical volume and improved patient outcomes. He has been recognized by his peers and Castle Connolly as being one of New York's best doctors. Dr. Pinney is an active clinical researcher who has led both NIH- and industry-sponsored trials in the areas of cardiac transplantation and mechanical circulatory support. He serves on the American College of Cardiology Heart Failure and Transplant committee, the United Network for Organ Sharing (UNOS) thoracic committee and the medical advisory board for the New York Organ Donor Network.

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Clinical Interests

Cardiac Catheterization,
Cardiac Transplantation,
Heart Failure

FULL-TIME AFFILIATES

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Education and Training

MBBS: Sindh Medical College, Pakistan

Residency, Internal Medicine: Salem Hospital

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Fellowship, Interventional Cardiology: Mount Sinai Hospital

Clinical Interests

Clinical Cardiology, Cardiac Catheterization, Coronary Intervention, Primary PCI

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Education and Training

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Fellowship, Cardiology: Tulane University School of Medicine

Fellowship, Interventional Cardiology: Ochsner Clinic Foundation

Clinical Interests

Interventional Cardiology, Cardiac Catheterization, Endovascular Intervention

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Education and Training

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Clinical Interests

Clinical Cardiology, Coronary Interventions, Peripheral Interventions

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MD: Georgetown University School of Medicine, Washington, DC

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Clinical Interests

Acute Myocardial Infarction, Fellows Education, Coronary Intervention

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Clinical Interests

Pulmonary Hypertension, Advanced Heart Failure & Mechanical Support

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VOLUNTARY/PART-TIME FACULTY



Master Teacher

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Clinical Interests

Clinical Cardiology, Fellows' Education, Cardiac Catheterization

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Education and Training

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Residency, Internal Medicine: University of Pittsburgh

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Fellowship, Interventional Cardiology: Mount Sinai Hospital

Clinical Interests

Clinical Cardiology, Fellows' Education, Cardiac Catheterization

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Clinical Interests

Clinical Cardiology, Non-Invasive Cardiology, Coronary Interventions

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Clinical Interests

Clinical Cardiology, Biostatistics, Interventional Cardiology

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Education and Training

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Clinical Interests

Clinical Cardiology, Non-Invasive Cardiology, Interventional Cardiology

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Education and Training

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Fellowship, Interventional Cardiology: Mount Sinai Hospital

Clinical Interests

Clinical Cardiology, Endovascular Interventions, Coronary Interventions

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Clinical Interests

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Srinivas Kesanakurthy, MD

Assistant Clinical Professor Medicine, Cardiology

Education and Training

MBBS: Rangaraya Medical College, Kakinada

Residency: Lenox Hill Hospital

Fellowship, Cardiology: Lenox Hill Hospital

Fellowship, Interventional Cardiology: Lenox Hill Hospital

Clinical Interests

Clinical Cardiology, Cardiac Catheterization, Coronary Interventions

Phone: 718-518-8093 E-mail: kesana@yahoo.com



Robert A. Zaloom, MD

Assistant Clinical Professor Medicine, Cardiology

Education and Training

MD: Ross University

Residency, Internal Medicine: Lutheran Medical Center

Fellowship, Cardiology: SUNY Downstate Medical Center

Clinical Interests

Clinical Cardiology, Echocardiography, Cardiac Catheterization

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George Fernaine, MD

Assistant Clinical Professor Medicine, Cardiology

Education and Training

MD: SUNY, Health Science Center

Residency, Internal Medicine: St. Vincent's Hospital

Fellowship, Cardiology: St. Vincent's Hospital

Fellowship, Interventional Cardiology: Lenox Hill Hospital

Clinical Interests

Clinical Cardiology, Cardiac Catheterization, Coronary Interventions

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Farah E. Atallah-Lajam, MD

Associate Clinical Professor Medicine, Cardiology

Education and Training

MD: Universidad Autonoma De Santo Domingo, Santo Domingo

Residency, Internal Medicine: Elmhurst Hospital

Fellowship, Cardiology: Brooklyn Hospital

Fellowship, Cardiac Catheterization, Nuclear Cardiology: Lenox Hill Hospital

Clinical Interests

Clinical Cardiology, Cardiac Catheterization, Coronary Interventions

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William J. Schwartz, MD

Assistant Clinical Professor Medicine, Cardiology

Education and Training

MD: Albert Einstein College of Medicine

Residency, Internal Medicine: Bronx Municipal Hospital Center

Fellowship, Cardiology: Bronx Municipal Hospital Center

Fellowship, Cardiac Catheterization: New York University Medical Center

Clinical Interests

Clinical Cardiology, Non-Invasive Cardiology, Cardiac Catheterization

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Choudhury Hasan, MD

Assistant Clinical Professor Medicine, Cardiology

Education and Training

MBBS: Dhaka Medical College, Dhaka

Residency, Internal Medicine: The Brooklyn Hospital Center

Fellowship, Cardiology: The Brooklyn Hospital Center

Fellowship, Interventional Cardiology: Deborah Heart and Lung Center

Clinical Interests

Cardiac Catheterization, Coronary Interventions, Echocardiography

Phone: 718-657-8003 E-mail: cmmhasan03@gmail.com



Claude Simon, MD

Assistant Professor Medicine, Cardiology

Education and Training

MD: University of Massachusetts, Massachusetts

Residency, Internal Medicine: Yale-New Haven, Greenwich Hospital

Fellowship, Cardiology: Yale-New Haven, Bridgeport Hospital

Clinical Interests

Interventional Cardiology

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Lynne Glasser, MD

Assistant Professor Medicine, Cardiology

Director Interventional Inpatient Service

Education and Training

MD: SUNY Health Science Center

Residency, Internal Medicine: New York University Medical Center

Fellowship, Cardiology: Manhattan Veterans Administration Medical Center

Since joining Mount Sinai Medical Center in November 2008, Dr. Glasser is playing an important role in the treatment and management of interventional patients, before and after the procedure.

Clinical Interests

Clinical Cardiology, Preventive Cardiology

Phone: 212-241-4521 E-mail: lynne.glasser@mountsinai.org





Beth Oliver, RN

Senior Director of Nursing

Education and Training

BS, Nursing: UMass Boston

Nurse Practitioner Certification: Columbia University

Beth Oliver, MS, BSN is responsible for the supervision and management of a complex staff of NPs, RNs, PCAs and BAs. Beth has been nursing leader in cardiac services for the past 20 years and has been involved in several publications, abstracts and presentations. She is the past recipient of the Ellen Fuller award of excellence in Nursing Leadership 2003 and a member of Sigma Theta Tau, the national Nursing Honor Society, AONE (American Organization of Nurse Executives) and the board of directors at the American Heart Association.

Phone: 212-241-5544 E-mail: beth.oliver@mountsinai.org



Rosario Marasigan, RN

Clinical Nurse Manager

Education and Training

BS, Nursing: Philippine Women's University

Rosario Marasigan is the clinical nurse manager since 2006. In this role she efficiently & effectively manages a unit with complex staff of 130 health professionals. Rosario has been an excellent clinical & charge nurse for 16 years prior to being the manager. Being a nursing instructor in the past makes her a great teacher at the bedside & a role model to our new nurses in the cath lab. She is a certified critical care nurse and an active member of AACN since 1990.

Phone: 212-241-1835 E-mail: rosario.marasigan@mountsinai.org



Cynthia Wilde, RN

Network Program Manager

Education and Training

BS, Nursing: Malloy College

MA, Nursing: New York University

Cynthia Wilde has been the network program manager since November 2008. She is responsible for the cardiac catheterization Labs at North General Hospital and Lutheran Medical Center. Cynthia was effective in the development and success of the Lutheran Medical Center STEMI program.

Phone: 212-241-0459 E-mail: cynthia.wilde@mountsinai.org



Gregory Gojkovich

Operations Manager

Education and Training

AA degree, Moorpark College, California.

Greg Gojkovich joined the Mount Sinai cath lab in January 1987. In 1992, he accepted a cath lab operational manager position at Beth Israel Medical Center, New York, NY. He returned to Mount Sinai Heart in 2001, where he is currently the Operations Manager.

Phone: 212-241-1548 E-mail: gregory.gojkovich@mssm.edu

Nurse Practitioner Team

Mount Sinai's dedicated staff of nurse practitioners work closely with the physicians and staff in planning and implementing care from the time of intake to discharge, ensuring a quality experience at all points in the patient's visit. Adherence to established protocols is largely responsible for Mount Sinai cath lab's low rate of complications.



Antonietta Tolentino



Gloria Manzanilla



Rheoneil Lascano



Surekha Patel



Haydee Garcia



Yasmine Lee



Melissa Mattimore



Caroline Austin-Mattison



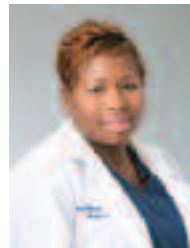
Leticia Jakasal



Dharti Patel



Suzzette Chan



Tanya Sullivan

Interventional Fellows

Mount Sinai Heart's interventional fellowship program is the largest in the country, educating the next generation of clinical cardiology and interventional cardiology specialists. This well-regarded program, which combines academic and hands-on experience, has graduated physicians who are serving as noted leaders in community and academic medical centers.



Sweta Chandela, MD



Randolph Hutter, MD



Deepak Khanna, MD



Jason Kovacic, MD



Atul Limaye, MD



Huy Nguyen, MD



Roshan Patel, MD



Fernando Ruiz, MD

Interventional Database Team

(Left to Right) Delenia Gulle, Vinita Vishnoi, Birju Narechania, Roja Thapi, Rucha Karajgikae, Angelica Mares (not pictured)



Interventional Research Team

(Left to Right) Narayan Esiolin, John-Paul Velasco, E.J. Fernandez, Asif Adam, Mary Kathryn Holton, Eyal Levy, Michael Fusilero



A Dedicated Team

The total number of cath lab staff including nurses, technicians and support staff has grown to over 132 dedicated employees. Each member of the cath lab staff has a strong work ethic and takes pride in their contribution to the goal of the department – delivery of efficient and safe care to patients in need.





LIVE SYMPOSIUM OF COMPLEX CORONARY & VASCULAR CASES JUNE 16-19, 2010

The primary focus of this course is to present a "multi-device" approach for revascularization of patients with complex coronary and cardiovascular disease. Physiological assessment by FFR and newer imaging technique of near infrared

spectroscopy (LipiScan) in addition to IVUS guidance during interventions will be highlighted. Various novel interventional devices and techniques such as distal protection device, septal ablation, valvuloplasty, thrombectomy and complex peripheral vascular intervention will be emphasized. Technical issues regarding treatment of emerging problems such as unprotected left main disease, DES restenosis, bifurcation lesions, total occlusions, thrombotic lesions, carotid and peripheral lesions and adjunct pharmacotherapy will be emphasized by the faculty using live case presentations as a platform for discussion. Appropriateness of a revascularization choice and evidence based practice guidelines will be discussed during performance of simple and complex live cases. Within the live case format, current topics will be presented to provide the interventional cardiologist and vascular interventionalist with "state of the art" information for managing patients as the dynamic field of interventional cardiology and vascular intervention continues to evolve. By live cases performed and discussed we expect to emphasize the long-term role of interventional cardiology in management of particular lesion subsets.

For more information on the symposium, including faculty, special events, key dates and registration, visit www.cccsymposium.org.

Nurse/Technician Symposium

Wednesday, June 16

Coronary Symposium

Thursday, June 17

Friday, June 18

Vascular Symposium

Friday, June 18

Interventional Board Review

Saturday, June 19 at Marriott Hotel

Course Directors

Samin K. Sharma, MD
Annapoorna, MD

Vascular Symposium Director

Prakash Krishnan, MD

Coronary Symposium Co-Directors

Mark Reisman, MD
Sameer Mehta, MD
Michael Kim, MD
Pedro Moreno, MD

Co-Directors

J. Michael Bacharach, MD
Peter Faries, MD
Jeffrey Olin, DO
Jose Wiley, MD

Nurse Technician Symposium Directors

Beth Oliver, RN, MS
Antonietta Tolentino, ANP-C



The Society for Cardiovascular
Angiography and Interventions

LIVE COMPLEX CORONARY & VASCULAR CASES

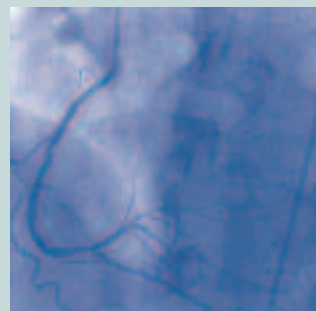
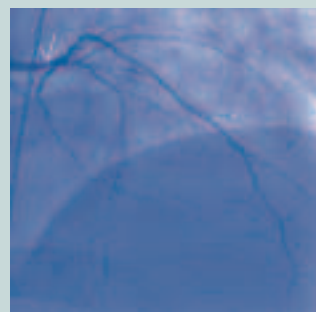
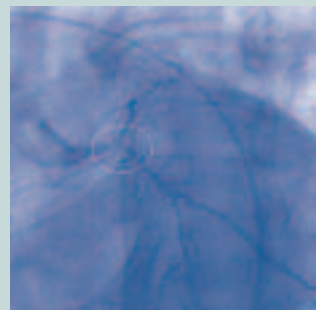
The CCC Live Cases are a series of complimentary groundbreaking live seminars highlighting in-depth procedural techniques for managing complex coronary cases.

These live cases will be streamed real time over the Internet and viewers can participate in our on-line didactic discussion.

View the full schedule and register online at www.ccclivecases.org today.

2010 Web Conference Schedule:

March 9	August 17
April 20	September 21
May 18	October 19
June 15	November 16
July 20	December 21



2009 WEB HITS

Month	Live	Archived	#Countries
July	92	2248	44
August	48	898	31
September	44	756	37
October	59	1185	32
November	54	868	28
December	68	568	22

MOUNT SINAI CATH LAB PARTNERS & AFFILIATES 2009



Mount Sinai of Queens, Astoria



North General Hospital, Manhattan



Lutheran Medical Center, Brooklyn



St. John's Hospital, Yonkers

A great deal of Mount Sinai cath lab's success comes from strong relationships with our regional colleagues. We would like to thank these partners for their continued contributions.

Broadway Cardiopulmonary, PC

Cardiology Unlimited, Eliscer Guzman, MD

Levit Medical Center, SL Quality Care Diagnostic and Treatment Center, Inc.

Long Island Heart Associates, Steven Shayani, MD, & Associates

Family Health Cardiac Center, Niranjan Mittal, MD

Park Avenue Family Practice, L.L.C, James Sayegh, MD

Riverside Medical Group, Sudhakar Mettu, MD & Associates

Manhattan Medical Group, Shuja Qadir, MD

Spektor Medical of Coney Island PC, Gary Spektor, MD

Mount Sinai of Staten Island, Seshadri Das, MD

Westchester Health Associates, George Berk, MD & Associates

Park Avenue Cardiology at Midland Avenue PC, Steven Franscone, MD

Manuel Velasquez, MD, PC

Hea-Shin Kang, MD, PC

Henock Saint-Jacques, MD, PC

Saeed Siddiqui, MD, PC

Richmond Internal Medicine, PC, Javier Chacon, MD

Brook Island Medical Associates, PC, C.S. Govindaraj, MD

Bath Beach Medical, PC, C.S. Govindaraj, MD

We Care Health & Medical Services, PC, Carlos Diggs, MD

Heights Medical Care, PC, Larry Neuman, MD

DOC Medical Office of Yonkers & Bronx, Rajeev Sindhvani, MD

Hamid and Aslam Medical Group, Inc.

Satyavathi Sharma, MD, PC

Ramesh Naik, MD, PC

MOUNT SINAI HEART DIRECTORY

Area	Telephone
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Cardiac Nursing	212-241-3483
Cardiac Rehab Program	212-241-8597
Cardiology Administration	212-241-4030
Cardiology Appointments	212-241-5586
Cardiology Privileges	212-241-4029
Cardiothoracic Surgery	212-659-6800
Cardiovascular MRI and CT Imaging	212-241-3917
Catheterization Laboratories	212-241-5881
Catheterization Laboratory Events	212-241-0592
Catheterization Laboratory Office	212-241-4021
Catheterization Laboratory Research	212-241-0229
Catheterization Laboratory Scheduling	212-241-5136
Coronary Care Unit	212-241-7272
Echocardiography	212-241-1719
Electrophysiology/Pacemakers	212-241-7272
Genetic Disorders	212-241-3303
Heart Failure/Transplantation	212-241-7300
Lipid Management	212-241-7651
MS Heart Information Technology	212-241-4026
Nuclear Cardiology and Stress Testing	212-241-1718
Pediatric Cardiology	212-241-8662
Pulmonary Hypertension	212-241-7300
To Transfer a Patient	212-241-6467
Vascular Laboratory	212-241-6773
Vascular Surgery	212-241-5315

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MISSION:

The Cardiac Catheterization Lab at Mount Sinai Heart is dedicated to delivering the highest quality of diagnostic and interventional cardiac care to patients through teamwork, procedural excellence and innovations.