CURRICULUM VITAE

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Education:

1986	B.S.	The Johns Hopkins University, Biomedical Engineering, Baltimore, MD
1990	M.D.	Harvard Medical School and Harvard-M.I.T., Division of Health, Sciences and Technology, Boston, MA

Postdoctoral Training:

Internship and Residencies:

1990-1991	Intern	Medicine	Massachusetts General Hospital, Boston, MA
1991-1993	Resident	Medicine	Massachusetts General Hospital, Boston, MA

Clinical and Research Fellowships:

1993-1996	Clinical & Research Fellow	Cardiology	Massachusetts General Hospital, Boston, MA
1993-1997	Clinical & Research Fellow	Medicine	Harvard Medical School, Boston, MA
8/94-12/94	Heart Failure Fellow	Cardiology	Brigham & Women's Hospital, Boston, MA

Licensure and Certification:

1991	Diplomate, National Board of Medical Examiners
1992	Massachusetts License Registration
1993	Diplomate, American Board of Internal Medicine, Internal Medicine
1997	Diplomate, American Board of Internal Medicine, Cardiovascular Disease

Academic Appointments:

1997-1998	Instructor in Medicine, Harvard Medical School, Boston, MA
7/98-12/02	Assistant Professor of Medicine, Harvard Medical School, Boston, MA
1/03-	Associate Professor of Medicine, Harvard Medical School, Boston, MA

Hospital or Affiliated Institution Appointments:

1997-1998	Clinical Assistant in Medicine, Massachusetts General Hospital, Boston, MA
1998- 2002	Assistant in Medicine, Massachusetts General Hospital, Boston, MA
2002-	Director, Cardiovascular Laboratory of Integrative Physiology and Imaging, Massachusetts General Hospital, Boston, MA
2002-	Assistant Physician, Massachusetts General Hospital, Boston, MA

Other Professional Positions and Major Visiting Appointments:

2000	Visiting Professor, University of South Carolina, Division of Cardiology, Charleston, SC
2000	Visiting Professor, University of Miami, Department of Medicine, Miami, FL
2000	Visiting Professor, University of Cincinnati, Division of Cardiology and Department of Pharmacology, Cinicinnati, OH

Hospital and Health Care Organization Service Responsibilities:

1992-1996	Physician, Massachusetts Institute of Technology, Medical Department, Cambridge, MA
1993-1996	Physician, Harvard University Health Services, Cambridge, MA

Major Administrative Responsibilities:

1997-	Principal Investigator, Cardiovascular Research Center, Massachusetts General Hospital, Boston, MA

2002 Director, Cardiovascular Laboratory of Integrative Physiology and Imaging, Massachusetts General Hospital, Boston, MA

Major Committee Assignments:

Massachusetts General Hospital:

1997- Subcommittee on Research Animal Care, Member

Harvard Medical School:

1993-1995 Harvard-M.I.T Division of Health Sciences Subcommittee on Ethnic and Racial Sensitivities, Member

1998- Harvard-M.I.T Division of Health Sciences & Technology, Board of Advisors, Member

1999- Harvard-M.I.T Division of Health Sciences & Technology, Admission Committee, Member

National:

American Heart Association:

1996- National Research Peer Review Committee, Member

1997 Affiliate Study Group Research Program & Evaluation Committee, Member

1997-1998 Northeast Peer Review Consortium, Member
North East Research Peer Review Consortia, Member

2001- 2004 North East Research Peer Review Committee, Member

National Institutes of Health/National Heart, Lung, and Blood Institute:

1998- Research Training Review Special Emphasis Panel, Member

2001- Committee for Program Project Grant, Member

National Academy of Sciences:

1999- Research Peer Review Committee, Member

Doris Duke Charitable Foundation:

1999- Annual Meeting Organization Committee, Member

Cardiovascular System Dynamics Society:

1999- Cardiovascular System Dynamic Society, Member-at-Large

Cardiovascular Cell and Gene Therapy Conference:

2002-2004 Director, Cardiovascular Cell & Gene Therapy Conference, Cambridge, MA

Professional Societies:

1982-1986 'Le Cercle Francais', Baltimore, MD, President

1993-1996 Tau Beta Pi, Engineering Honor Society, Johns Hopkins University,

	Baltimore, MD, Treasurer
1988-	Biophysical Society, Member
1988-	Massachusetts Medical Society, Member
1988-	American Medical Association, Member
1991-	American College of Physicians, Member
1993-	American College of Cardiology, Member
1993-	American Heart Association, Member
1997-	Heart Failure Society of America, Member
1999-	Cardiovascular System Dynamics Society, Member-at-Large
2000-	American Society of Gene Therapy, Member
2001	Fellow of the American College of Cardiology
2001	Fellow of the American Heart Association

Editorial Boards:

- Circulation Research
- Journal of Molecular and Cellular Cardiology
- Contributing Editor for the Science of Aging Knowledge Environment (SAGE KE; http://sageke.sciencemag.org)

Reviewer:

- American Journal of Physiology
- Basic Research in Cardiology
- British Journal of Pharmacology
- Cardiovascular Research
- Circulation
- Circulation Research
- Developmental Biology
- Gene Therapy
- Journal of Clinical Investigation
- Journal of Clinical Therapeutics
- Journal of Molecular & Cellular Cardiology
- Journal of Cardiac Failure
- Metabolism
- Molecular Therapy
- New England Journal of Medicine
- Proceedings of the National Academy of Sciences
- Science

Awards and Honors:

1984	Premedical Honor Society, Alpha Delta Epsilon, The Johns Hopkins University, Baltimore, MD
1984	Engeering Honor Society, Tau Beta Pi, The Johns Hopkins University, Baltimore, MD
1983-1985	Dean's List, The Johns Hopkins University, Baltimore, MD

1986	General Academic Honors at Graduation, The Johns Hopkins University, Baltimore, MD
1986	Biomedical Engineering Departmental Honor, The Johns Hopkins University, Baltimore, MD
1986	Undergraduate Research Award in Biomedical Engineering, The Johns Hopkins University, Baltimore, MD
1990	Cum Laude (graduation), Harvard Medical School, Boston, MA
1993	Calderwood Manuscript Prize, Massachusetts General Hospital, Boston, MA
1995	DeSanctis Clinician Scholar Award, Massachusetts General Hospital, Boston, MA
1995	Astra Merck Young Cardiovascular Investigator Award, San Francisco, CA
1996	Bristol-Myers Squibb/American College of Cardiology Travel Award, Orlando, FL
1996-1997	Paul Dudley White Fellow of the American Heart Association, Massachusetts Affiliate
1996	New Investigator Award, American Heart Association, Scientific Conference on the Molecular Biology of the Normal, Hypertrophied, and Failing Heart
1996	Winner, Melvin Marcus Award for Integrative Physiology, American Heart Association, Council on Circulation, New Orleans, LA
1997	3rd Place, AstraZeneca New England Cardiovascular Research Competition, **Boston, MA**
1998	Prize for Scientific Excellence, "Bold New Era for Cardiovascular Research", Boston, MA
1999	Doris Duke Clinical Scientist Award
1999	1st Place, AstraZeneca Cardiovascular Young Investigators Forum, Banff, Alberta, Canada
2001	Beeson Scholar Award, American Federation for Aging Research
2003	Henry N Neufield Memorial Award, Israel
2005	American Society of Clinical Investigators, Member

Part II: Research, Teaching, and Clinical Contributions

A. Narrative Report

Congestive heart failure (CHF) represents an enormous clinical problem demanding effective therapeutic approaches. Despite advances in traditional approaches to its treatment, including pharmacologic management, myocardial revascularization, mechanical assist, and transplantation, CHF remains a leading cause of death worldwide. Even though new treatments for congestive heart failure have had a significant impact on mortality and the course of the disease, they do not reverse or cure the underlying pathological state of the heart. Our laboratory focuses on targeting molecular and cellular pathways to improve contractile function and survival in failing cardiac myocytes. We are targeting specific abnormalities that have been identified in failing hearts at the cellular level by gene transfer. These targets involve membrane channels, intracellular transporters involved in calcium homeostasis, intracellular pathways involved in cell survival.

1. Targeting calcium cycling proteins:

Contraction and relaxation in cardiac myocytes are tightly regulated by intrinsic mechanisms that govern the sequential rise and fall of cytosolic Ca^{2+}. During depolarization, Ca^{2+} entry through the L-type Ca^{2+} channels triggers the release of Ca^{2+} from the sarcoplasmic reticulum (SR) through ryanodine receptors resulting in activation of the contractile proteins. In human cardiomyocytes, the removal of Ca^{2+} from the cytoplasm is governed mainly by the SR Ca^{2+} ATPase (SERCA2a) pump and to a lesser extent the Na/Ca exchanger as shown. Cardiomyocytes isolated from failing human hearts are characterized by contractile dysfunction including prolonged relaxation, reduced systolic force and elevated diastolic force. These contractile abnormalities are paralleled by abnormal Ca^{2+} homeostasis such as reduced SR Ca^{2+} release, elevated diastolic Ca^{2+} and reduced rate of Ca^{2+} removal. In addition, failing human myocardium is characterized by a frequency-dependent decrease in systolic force and Ca^{2+} as opposed to normal myocardium where an increase in pacing rate results in potentiation of contractility and an increase in SR Ca^{2+} release. In the failing heart, the decrease in SR Ca^{2+} load has been linked to a decrease in SR Ca^{2+} ATPase function. We have recently shown that overexpression of SERCA2a by adenoviral gene transfer restores contractile function in cardiac myocytes from failing human hearts. In addition, we have shown that overexpression of SERCA2a in a model of pressure-overload hypertrophy in transition to failure improves contractile function and reserve in these animals. We are currently exploring the effect of long-term expression of SERCA2a in failing animals along with the energy cost of SERCA2a expression using NMR methods. We are also using a different strategy to improve SR Ca^{2+} ATPase activity, which involves decreasing the expression of phospholamban by antisense strategies to enhance SR Ca^{2+} ATPase activity. The Na/Ca exchanger is also being targeted to enhance calcium removal in failing hearts.

2. Clinical Trials in Gene Therapy for Heart Failure

Our laboratory has extended these studies in large animal models and is developing novel molecular imaging techniques to better track gene transfer. In addition, our laboratory is using both genomics and proteomics approaches to identify new targets based on the restoration of contractile function following SERCA2a gene transfer. The large body of data generated by our laboratory to establish SERCA2a as a key target for gene transfer in heart failure has culminated in the initiation of a NIH-funded clinical trial, “Gene Therapy with Adeno-associated Virus Carrying SERCA2a in Patients With Advanced Heart Failure Undergoing Ventricular Assist Device Placement”. This trial will demonstrate the bench-to-bedside application of his research.

3.Targeting the Transient Outward Current:

Action potential prolongation is attributed to reductions in transient outward current (Ito) density in human heart failure. This prolongation can improve contractility but can also cause afte depolarization. Using gene transfer of various K channels responsible for Ito, we are investigating the molecular and the ionic basis of action potential prolongation in cardiac hypertrophy and failure and we are examining how intracellular calcium handling changes in response to alterations in action potential duration.

4. Gene Transfer in Aging Myocardium:

Gene therapy in heart failure has the biggest potential in the aging population where the disease is rampant. However adenoviral gene transfer is less effective in aging cardiac cells than in younger cells. We are examining the molecular mechanisms responsible for this decrease in infectivity.

5. Viral Vectors:
We are constructing viral vectors including adenoviruses (E1-E4 deleted), adeno-associated viruses, and lentiviruses with promoters that infer cardiac specificity and long-term expression.

6. Tracking stem cells in the cardiovascular system
Our laboratory is using newly developed molecular probes to track stem cells and to understand the biology of integration and the cellular fate of stem cells in large animal model of myocardial infarction and remodeling. These novel molecular probes generate contrast simultaneously for both magnetic resonance imaging (MRI) and near-infrared (NIR) fluorescent optical imaging. MRI permits stem cells to be identified in the normal and diseased hearts of large animals over time, non-invasively, and without sacrifice of the animal. NIR fluorescent optical imaging provides high sensitivity, and in some cases single cell sensitivity, which can be used for intraoperative physiological studies, and for histological correlation with other markers of cardiomyocyte function.

B. Funding Information (education and research)

Past

1988-1989	Johnson & Johnson Fund -- Pre-Doctoral Student
	Negative Tension Phenomena in Skeletal Muscle
1996	AHA Massachusetts Affiliate -- PI
	Gene Therapy in Heart Failure (Declined)
1996-2001	NIH/K08 -- Mentored Clinician Scientist Development Award -- PI
	Adenoviral Gene Transfer of Ca^{2+} ATPase in Heart Failure
1997-2001	NIH/R29 -- FIRST Award -- PI
	Adenoviral Gene Transfer in Heart Failure
1999-2000	American Federation for Aging Research -- PI
	Restoration of Diastolic Function in Senescent Rats by Gene Transfer
1998-2002	NIH/R01 -- Co-PI
	Role of IGF-1 Receptor Signaling in Cardiocyte Apoptosis
1998-2001	NIH/R01 -- Co-PI
	Signaling Pathways, Apoptosis, and Heart Failure
1999-2001	NIH/R01 -- Co-PI
	NMR of Mitochondrial Transporter in Cardiac Hypertrophy
1999-2001	NIH/R01 -- Co-PI
	Signaling Pathways in Hypertrophy and Failure
1999-2002	Doris Duke Clinical Scientist Award - PI
	Targeting Signaling Pathways in Heart Failure
1999-2003	NIH/NHLBI 2R01HL49574-05 - Co-PI
	Heart Failure: Ca^{2+} Homeostasis and Energy Reserve
2001-2004	American Federation of Aging Research
	Targeting Signaling Pathways in the Aging Heart by Gene Transfer
2001-2002	Astra Zeneca - PI
	Educational Grant
2002-2003	NIH/NHLBI 1R13 HL71011-01
	Conference Grant: Cardiovascular Cell & Gene Therapy Conference

Active

4/01/02-3/31/06 - PI
NIH/NHLBI R01 HL57263-05
Adenoviral Gene Transfer of Ca^{2+} ATPase in Heart Failure

7/15/03-6/30/07 - PI
NIH/NHLBI R01 HL 71763-01
K and Ca Channels in Cardiac Hypertrophy and Failure

09/22/04-08/31/08-PI
NIH/NHLBI R01 HL 078691
Optical & MRI Imaging of Stem Cells in Diseased Hearts

7/01/05-6/30/10-PI
NIH/NHLBI R13 HL082354
Cardiovascular Cell & Gene Therapy Conference

12/01/05-11/30/10
NIH/NHLBI R01 HL080498
PICOT & Cardiac Hypertrophy

9/1/05-8/31/10-Co-PI
Agency: Fondation LEDUCQ: Transatlantic Networks of Excellence Program
Ca^{2+} cycling and novel therapeutic approaches for heart failure

7/15/03-6/30/07 - Co-PI
NIH/NHLBI R01 HL733756-01
Tracking Stem Cells: Viability and Function in the Heart

9/1/03-8/31/07 - Co-PI
NIH/NHLBI R01 HL67297-01
Regulation of Ca^{2+} Signaling in Myofilament by Troponin C

7/1/03-6/30/07 - Co-PI
NIH/NHLBI R01 HL072265
Effect of Mitral Regurgitation on Ischemic Left Ventricular Remodeling

C. Report of Current Research Activities

Principal Investigator, Cardiovascular Research Center, Massachusetts General Hospital (see A):
- Gene Transfer in the Cardiovascular System

- Excitation-Contraction Coupling in Heart Failure
- Inotropic Mechanisms in Heart Failure
- Myofilament Regulation in Heart Failure
- Sarcoplasmic Reticulum Function in Heart Failure

D. Report of Teaching

1. Local Contributions

a. Johns Hopkins University:

1983-1986 Inorganic Chemistry Course, Teaching Assistant
1985 Organic Chemistry Course, Teaching Assistant

b. Harvard Medical School:

1990 *Cardiovascular Pathophysiology*, Harvard-MIT Division of Health Sciences and Technology, Teaching Assistant

1993-1996 *Treatment of Heart Failure: Basic Science and Clinical Aspects*, Lecturer. Fourth-year Harvard medical students, 10-20 students, one month/year, 2-4 lectures on heart failure, 10 hrs/month

1994 *Introduction to Clinical Medicine,* Tutor. Second-year Harvard medical student, 2 students, Spring term (Feb-May). Biweekly meeting: 2-4 hrs/week

1996- *Cardiovascular Pathophysiology (HT090)*, Harvard-MIT Division of Health Sciences and Technology, Core Faculty Lecturer. First-year Harvard medical students (HST program), 10 students/group, weekly meetings and 10 didactic lectures in the spring term (Feb-May), 5 hrs/week

1999- *Treatment of Heart Failure: Basic Science and Clinical Aspects (ME547.3)*, Co-Director. Fourth-year Harvard medical students, 10-14 students, one month/year and 8 didactic lectures on heart failure, 40 hrs/month

c. Harvard School of Public Health:

2000 *Frontiers in Cardiovascular Biology*, Lecturer to Harvard School of Public Health students, 20-30 students, one month/year and 1 didactic lecture on heart failure, 5 hrs/month

d. Graduate Medical Courses:

1999- *Molecular Medicine* (HT 140), Lecturer, MIT Graduate students and Second-year Harvard medical students, 20-30 students, one month/year and 2 didactic lectures on heart failure, 10 hrs/month

2000- *HST S11: The Art and Science of Medicine*, Lecturer: "Molecular Biology in Medicine," MIT, Undergraduate students, 2 hrs every semester

e. Local Invited Teaching Presentations (Lecturer) [e.g. grand rounds, seminars]:

1995 Colloquium, College of Pharmacy, Northeastern University, Boston, MA
1996 Cardiovascular Research Seminar, Brigham & Women's Hospital, Boston, MA
1997 Whitaker Research Seminar, Boston University, Boston, MA
1997 New England Cardiovascular Research Forum, Astra, Cambridge, MA
1998 Society of Fellows, Massachusetts General Hospital, Boston, MA

1998 Invited Speaker, Bold New Era for Cardiovascular Research, Boston, MA
1998 Medical Grand Rounds, Massachusetts General Hospital, Boston, MA
1998 Cardiovascular Research Seminar, Boston University, Boston, MA
1998 Heart Failure Symposium, Boston University Hospital, Boston, MA
1999 Cardiology Grand Rounds, Boston University School of Medicine, Boston, MA
1999 Cardiology Grand Rounds, Massachusetts General Hospital, Boston, MA
1999 Cardiovascular Seminar, Boston University School of Medicine, Boston, MA
1999 Cardiovascular Research Institute Seminar, New England Medical Center, Boston, MA
2000 Cardiovascular Research Seminar, Harvard School of Public Health, Boston, MA
2001 Heart Failure Research Seminar, Brigham & Women's Hospital, Boston, MA
2001 Gastrointestinal Unit Research Seminar, Massachusetts General Hospital, Boston, MA
2002 Clinical Pathological Conference, Case Records of the Massachusetts General Hospital, Boston, MA
2002 Medical Grand Rounds, Massachusetts General Hospital, Boston, MA

d. Continuing Medical Education Courses:

National:

1999 "New Treatment Modalities in Heart Failure", Buffalo, NY
2000 "Angiotension Receptor Blockade in Heart Failure", Miami, FL
2002 Pri-Med Symposia Beta Blockers in Heart Failure series, Washington, DC

Regional:

1998 "Angiotensin Receptor Blockers in Cardiovascular Disease", Portland, ME
1999 "Emerging Therapies in Heart Failure", Maine Medical Center, Portland, ME
2001 "Angiotensin Receptor Blockers in Cardiovascular Disease", Portland, ME
2002 Beta Blockers in Heart Failure, Providence, RI

Local:

1999 "Angiotensin and its Receptor's Impact on Cardiovascular Disease", Boston, MA
2001 "Angiotensin II and Cardiovascular Diseases", West Springfield, MA
2001 "National Initiative in Continuing Medical Education", Charlestown, MA
2002 Pri-Med Symposium on Beta Blockers in Heart Failure, Boston, MA

e. Advisory and Supervisory Responsibilities in Clinical or Laboratory Setting:

Clinical

- Two-three months/year Attending in the Heart Failure & Cardiac Transplantation Service. Supervision of one-two cardiology fellows. 40 hrs/week.
- One half day clinic every two weeks for general cardiology and evaluation of patients with severe heart failure. 4 hrs/2 weeks.
- One weekend per month covering Cardiac Transplantation and Heart Failure.
- Three weeks general cardiology consult per year. Supervision of two cardiology fellows. 20 hrs/week.
- Weekly cardiac transplantation meeting. 1 hr/week.
- Monthly Boston cardiac transplantation meeting. 3 hrs/month.
- Weekly heart failure meeting. 1 hr/week

Laboratory

1. 800 square feet at the Cardiovascular Research Center dedicated for gene transfer research in heart failure
2. Supervision of six postdoctoral fellows and one technician. 20 hrs/week
3. Supervision of of one-two undergraduate students from MIT. 5 hrs/week
4. Weekly laboratory meeting. 1 hr/week
5. Weekly cardiovascular gene therapy meeting. 1 hr/week
6. National/International meetings. 1/month

f. Teaching Leadership Roles in Department/Affiliated Institution:

1999- *Treatment of Heart Failure: Basic Science and Clinical Aspects (ME547.3)*, Co-Director. Fourth-year Harvard medical students, 10-14 students, one month/year and 8 didactic lectures on heart failure, 40 hrs/month

1999 Thesis advisor, director of the thesis committee for Gabriel Choukroun, Universite de Paris, France

g. Trainees (impact on career):

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Name	Type	Dates	Degree	Institution	Project	Current Position
Balderas, Isabel	Pre-Doc	2002	BS	Harvard Medical School	Tissue specific promoter following gene transfer	American Federation of Aging Research-The John A. Hartford/AFAR Medical Student Geriatric Scholars Program
Beeri, Ronen	Post-Doc	2000-3	MD	Hebrew University, Jerusalem		US-Israel Binational Science Foundation, 2002
Bernecker, Oliver	Post-Doc	9/02-	MD	University of Innsbruck	Cardiac specific promoter for gene transfer	Max Kade Foundation for Research-Austria
Boecker, Wolfgang	Post doc	1998-00	MD	University of Berlin, Germany	Targeting the Heart with Tissue specific Promoters	Med. Internship, Johns Hopkins
Boelcke, Birgit	Post-doc	2002	PhD	University of Cologne, Cologne, Germany	Targeting sorcin in heart failure	Assistant in Medicine, Universitat Koln, Koln, Germany
Choukroun, Gabriel	Post-Doc	1996-99	MD, PhD	Universite de Paris Hopital Necker	SAPKinase and cardiac hypertrophy	Chief, Renal Unit Universite d'Amiens, France
Communal, Catherine	Post Doc	2000-2002	Ph.D	University of Fourier, Grenoble, France	P38 and Heart Failure CASPASE and heart failure	Research Scientist, Inserm, France
Dadfarmay, Sina	Med Student	6/25-9/30/01	BS		BNP Promoter for gene therapy	Medical Student, Royal College of Surgeons, Ireland
Dalal, Rishikesh	Pre-Doc	2002-3		Harvard University	Transcript Profiling following SERCA2a gene transfer	Departmental funds
Davia, Kerry	Post Doc	3/98-9/98	PhD	Imperial College School of Medicine	Isolation of Human Cardiomyocytes	Scientist, Glaxo-Welcome, UK
Grazette, Luanda	Post Doc	6/3/99-6/01	MD/MPH	Harvard/MGH	erb-B2 Receptors in Failing Hearts	Instructor in Medicine, Harvard Medical School
del Monte, Federica	Post Doc	2/98-03	MD/Ph.D	Univ."La Sapienza" of Rome, Imperial College, London	Targeted Gene Transfer in Failing Hearts	Assitant Professor of Medicine, Harvard Medical School Princip. Invest. Cardiovascular Res Center
Heist, Kevin	Post-Doc	7/02-	MD, PhD	Stanford University	Role of CAMkinase in heart failure	Cardiac Electrophysiology MGH

Hayase, Motoya	Instructor	2002-2005	MD	Toyoshima University, Japan	Guided delivery of genes	NHLBI (Hajjar)
Huq, Fawzia	Post-Doc	4/01-6/03	MD	University of Sydney	Gene Transfer in Failing Human Hearts	Resident, University of Texas, Southwestern
Iyer, Vivek	Pre-Doc		MS	Harvard	Excitation Contraction Coupling Modeling	
Jang, Monica	HS Stud.	7-9/00-01		Phillips Exeter Academy, New Hampshire	Viral gene transfer	Undergraduate, MIT
Kaprielian, Roger	Post Doc	9/1/99-2001	Ph.D	University of Toronto	Modulating Ito in Failing Hearts	Medical Information Scientist, Astra Zeneca
Kuri, Manuel	Visiting Scientist	Post-doc	PhD	Universidad Pan-Americana, Mexico City	Modulation of Ito current and Cardiac Hypertrophy by Ras	Instructor in Physiology,
Lamers, Frouke	Post Doc	1/7-31/98	MD	Erasmus University of Rotterdam	Adenoviral Vectors for gene transfer	Medical Resident, Erasmus University of Rotterdam

Name	Type	Dates	Degree	Institution	Project	Current Position
Mansour, Moussa	Post Doc	7/01-6/04	MD	Massachusetts General Hospital	Gene Transfer of the Na/Ca Exchanger in Atrial Fibrillation	Instructor in Medicine
Mestel, Celine	Pre-Doc	3/1-8/31/00	BS	Massachusetts Institute of Technology	CAR in Aging cardiomyocytes	Junior at MIT
Miyamoto, Michael	Post Doc	6/9/97-9/98	MD	Massachusetts General Hospital	Gene Transfer of SERCA in Aortic	Private practice, Cardiology, CA
Park, Woo Jin	Post Doc	2003	PhD		Proteomics in Heart Failure	
Perry, Curt	Student	7/17-8/17/01		Cambridge Rindge & Latin School (CRLS)	Infectivity in Aging Myocytes	Cambridge Rindge & Latin School (CRLS)
Ranu, Hardeep	Post Doc	11/15/98-1/31/00	PhD	Imperial College School of Medicine	Na/Ca exchanger in Failing Hearts	Post-doctoral fellow, Renal Unit, MGH
Sakata, Naoya	Volunteer		Student	Kobe University of Commerce		
Sato, Takuya	Post-Doc	2002-2004	PhD	Mitsubishi Pharma	Effect of MCC 135 on Failing Cardiomyocyte Contractility	Mitsubishi Pharmaceuticals, Japan
Schmidt, Ulrich	Post Doc	1996-2001	MD/Ph.D	University of Munich	Gene Transfer of Bcl2 in Failing Hearts	NHLBI (K08) Mentored Clinical Scientist Award
Soltesz, Edward	Post Doc	2001-02	MD	Harvard Medical School	Gene Transfer in Porcine Model of Cardiomyopathy	Clinical Fellow, Harvard Medical School
			MD	American University of Beirut	Transcript Profiling analyses	Resident, Boston Medical Center
Tabchy, Adel	Post-Doc	2003-4				
Tsuji, Tsuyoshi	Post Doc	2001-03	M.D.	Nara University	Measurement of Metabolic Parameters in heart failure	Assistant Professor of Surgery, Nara University
Villa-Petroff, Martin	Visiting Scientist	2002	PhD	Centro de Investigaciones Cardiovasculares. Facultad de Medicina, Argentina	Gene Transfer of Na/Ca in Failing Hearts	Biologist, Centro de Investigaciones Cardiovasculares Facultad de Medicina, Argentina
Yerevanian, Armen	HS Student	2000		High school, Manoogian school, CA	Infectivity in Aging Cardiac Myocytes	High school, Manoogian school, CA

Yerevanian, Alex	HS Student	2004		High School, Demirdjian High School, CA			
Zhu, Xinsheng	Post-Doc	2002-4	Ph.D.	University of Wisconsin	Septic Shock and Heart Failure	Instructor, Dept of Anesthesia, MGH	

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Name	Type	Dates	Degree	Institution	Project	Funding
Bukhari, Fariya	Post-Doc	2004-	MD	University of Arizona	Sarcoplasmic Reticulum Content in Heart Failure	NHLBI (Hajjar)
Chemaly, Elie	Post-Doc	2004-	MD	State University of NY	Zinc finger protein targeting calcium cycling	NHLBI (Hajjar)
Hadri, Lahouaria	Post-Doc	2005-	MD	Universite de Paris	PICOT & Cardiac hypertrophy	NHLBI (Hajjar)
Hoshino, Kozo	Post-Doc	2003-	MD	Kyoto University	Gene & Cell Delivery to the Heart	Japanese Cardiology Fellowship
Jin, Hongwei	Post-Doc	2005-	PhD	Chinese Academy of Medical Science & Peking Union Medical College	K channels in heart failure	NHLBI (Hajjar)
Kawase, Yoshiaki	Post-doc	2003-	MD	Gifu University, Japan	Gene transfer in large animals	NHLBI (Hajjar)
Kuhn, Bernhard	Post-doc	2005-	MD	Boston Children's Hospital	Regenerative potential of the myocardium	NHLBI (Kuhn)
Lebeche, Djamel	Post Doc	8/1/99-	Ph.D.	Boston University	Kv Channels & hypertrophy	K01/NIH/NHLBI
Ly, Hung	Post-Doc	2005-	MD	Universite de Montreal	Cell delivery and MR tracking	Fonds de la Recherche-Quebec
Palomeque, Julieta	Post-Doc	9/1/2004-	MD, PhD	Faculty of Medical Siciences, La Plata, Argentina	AAV vectors in gene transfer	NHLBI(Hajjar)
Pomerantseva, Irina	Post-Doc	2002-	MD	Moscow Medical Academy	Stem cell therapy in heart failure	NHLBI (Hajjar)
Prunier, Fabrice	Post-Doc	2005-	MD, PhD	Universite de Paris	Gene Therapy in Heart Failure	Societe Francaise de Cardiologie
Yoneyama, Ryuichi	Post-doc	2003-	MD	Tokyo University	MRI tagging of stem cells	Departmental Funds
Sakata, Susumu	Post-Doc	2003-	PhD	Nara University	Energetics in the Failing Heart	Nara University Scholarship

Takewa, Yoshiaki	Post-doc	2005-	PhD	Nara University	Surgical gene transfer in large animals	Nara University Scholarship

Technicians:

1. Lifan Liang MD (2000-)
2. Cathy McMahon (2005-)
3. Jimmy Lough (2005-)

2. Regional, National, and International Contributions

a. Invited Presentations (Lecturer) [e.g. plenary presentations, visiting professorship]:

Local Presentation:

1999 Research Seminar in Aging, Institute of Aging, Harvard Medical School, Boston, MA
2000 Gordon Research Conference, Cardiac Regulatory Mechanisms, New London, NH
2000 "Improvement in Diastolic Function in Aging Hearts by Targeted Gene Transfer" American Federation of Aging, Boston, MA
2001 NASPE 22nd Annual Scientific Session, Boston, MA
2002 Cardiology Grand Rounds, Sturdy Memorial Hospital, Attleboro, MA
2002 Cardiology Grand Rounds, Beth Israel Hospital, Boston, MA
2002 Cardiology Grand Rounds, Brigham & Women's Hospital, Boston, MA
2003 Cardiac Grand Rounds, Union Hospital, Lynn, MA
2003 Harvard Medical School Division on Aging Research, Fellowship Review Meeting Boston, MA
2003 AstraZeneca: Toprol XL in Heart Failure, Framingham, MA
2003 AstraZeneca: Beta Blockers & Heart Failure, Plymouth, MA
2003 "Updates on new Dyslipidemia Therapies", AstraZeneca Crestor Program, Waltham, MA
2003 Grand Rounds Leonard Morse Hospital, Natick, MA
2003 Updates on Dyslipidemia, AstraZeneca, Springfield, MA
2003 ACCF: New Management of Advanced Heart Failure, Boston, MA

Regional Presentations:

1992 Cardiovascular Grand Rounds, Division of Cardiology, UCLA, Los Angeles, CA
1996 Cardiovascular Research Seminar, University of Cincinnati, OH
1996 Heart Failure Seminar, Columbia University, New York, NY
1997 Cardiovascular Grand Rounds, University of Maryland, Baltimore, MD
2000 Cardiology & Medical Grand Rounds, Piedmont Hospital, Atlanta, GA
2000 Medical Grand Rounds, Charlotte Hospital, Torrington, CT
2001 Invited Distinguished Faculty, Cardiovascular Center, University of Illinois, Chicago, IL
2000 Visiting Professor, University of Miami, Department of Medicine, Miami, FL
2000 Visiting Professor, University of Cincinnati, Division of Cardiology and Department of Pharmacology, Cincinnati, OH
2000 BWH Cardiac Center Nursing Symposium: Cardiovascular Care 2000, Bartlett, NH
2002 Cardiology Grand Rounds, University of California at San Diego, San Diego, CA
2001 Research Seminar, University of California at San Diego, San Diego, CA
2001 Medical Grand Rounds, Gene Therapy in Cardiovascular Disease, Roger Williams Medical Center, Providence, RI
2001 Cardiology Grand Rounds, Ohio State University Medical Center, Columbus, OH
2001 Cardiology Grand Rounds, Hanhnemann Hospital/Penn State, Philadelphia, PA
2001 Medical Cardiac Grand Rounds, Emory University Hospital, Atlanta, GA
2001 Vascular Biology Seminar, Emory University Hospital, Atlanta, GA
2001 Medical Grand Rounds, Washington University, St Louis, MO
2001 Cardiology Grand Rounds, Washington University, St Louis, MO
2001 Biomedical Engineering Seminar, Johns Hopkins University, Baltimore, MD

2002 Cardiovascular Seminar, Albert Einstein Medical Center, Bronx, NY
2002 Guest Speaker, 10th Annual Cardiovascular Symposium, Bradley Memorial Hospital, CT
2002 Gordon Research Conference, Cardiac Regulatory Mechanisms, CT
2002 Gordon Research Conference, "Cardiac Regulatory Mechansisms."
"Mechanisms for rescue of the failing Heart", New London, CT
2003 "Under the Microscope: Attacking Heart Failure on the Cellular level"
St. Vincent's Catholic Medical Center, Manhatten, New York, NY
2004 Invited Speaker "Angiotension Receptor Antagonist in Heart Failure", Cardiovascular Continuing Education Symposium, Providence, RI
2004 Invited Speaker "Hypertension and Heart Failure", NAMCP Continuing Medical Education, Norwalk, CT

National Presentations:

1995 Forum of Young Cardiovascular Investigators, Astra Merck, San Francisco, CA
1995 "Molecular Mechanisms of Cellular Dysfunction in Heart Failure", American Heart Association, Basic Science Council, Anaheim, CA
1998 "Gene Transfer of SERCA", American Heart Association, Basic Science Council, Dallas, TX
1999 "Gene Transfer of SERCA2a" Heart Failure Society of America, "Late Breaking Science", San Francisco, CA
2000 "Experimental Models of Cardiovascular Disease", Society of Toxicology, Philadelphia, PA
2001 "Improving Contractile Function by Gene Transfer in Human Heart Cells" Doris Duke Yearly Scientific Meeting, VA
2000 "The Future of Gene Therapy for Heart Failure", North American Society of Pacing and Electrophysiology (NASPE), Washington, DC
2000 "Gene Transfer in Heart Failure", Heart Lung, and Blood Diseases, National Institutes of Health, Baltimore, MD
2000 Enhancing Contractile Function by Gene Transfer in Failing Human Hearts" Heart Failure Society of America, "Late Breaking Science", Boca Raton, FL
2000 American Heart Association (AHA) 73rd Scientific Sessions, New Orleans, LA
2001 Satelite Symposium, Cardiac Remodeling, Minneapolis, MN
2001 Heart Failure Society of America, Washington, DC
2001 American College of Cardiology (ACC) 50th Scientific Sessions, Orlando, FL
2001 Experimental Biology 2001 Symposium, Orlando, FL
2001 The First Annual Fall Cardiovascular Symposium, Maui, Hawai
2001 American Heart Association, Anaheim, CA
2001 "Gene Therapy in Heart Failure", Symposium, Avigen Inc., Alameda, CA
2002 Clinical Course, Gene Therapy, North American Society of Pacing & Electrophysiology 23rd Annual Session, San Diego, CA
2002 International Society for Heart Research, Madison, WI
2002 Invited Speaker, "Gene Therapy in Heart Failure" Medtronic Symposium, Keystone, CO
2002 Invited Speaker, "Techniques in Gene Transfer in Rodent Models of Heart Disease." AHA, Snowbird, CO
2002 Invited Speaker, "Targeting Signaling Pathways in the Failing Heart." Symposium, Bristol Myers Squibb, NJ
2002 Invited Speaker, Therapeutics Horizon in Heart Failure, San Diego, CA
2003 Invited Speaker, Division of Cardiology, University of Minnesota, Minneapolis, MN
2003 Seminar, Dept of Physiology & BioPhysics, Case Western University, Cleveland, OH

2003 "Beta Blockers: Standard of Care in Heart Failure" Grand Round, Div.of Cardiology, University of Michigan, Ann Arbor, MI

2003 FASEB Summer Research Conference on: "Transport ATPases: Genomics, Mechanisms and Targeting the ATPase Pump". "Rescuing Diseased Myocardium by Relevance to Diseases". Vermont Academy, Saxton, VT

2003 "Disease Interrupted: Using Beta Blockers in the Treatment of Heart Failure": Olean General Hospital, Olean, NY

2003 "Gene Therapy for Heart Failure", GUIDANT Biologics Advisory Board Meeting for Heart Failure, Minneapolis, MN

2003 "New Developments in Gene Therapy". 7th Annual Scientific Meeting, Heart Failure Society of America, Las Vegas, NV

2003 "Maximizing Approaches in the Evaluation and Management of Patients with Dyslipidemia". APOLLO Dyslipidemia Grand Rounds: a CME Grand Rounds Series, San Francisco, CA

2003 "Under the Microscope: Attacking Heart Failure on the Cellular Level", Newark Beth Israel Medical Center, Newark, NJ

2003 "Gene Therapy in Medical Rx Session", No Boundaries: State-of-the-Art Medical/Surgical Approaches to Advanced Heart Failure, Mohegan Sun Casino, Unkersville, CT

2003 "Gene Therapy in Heart Failure", Medical Grand Rounds at Geisinger, Harrisburg, PA

2004 Invited Speaker "Gene Therapy for Heart Failure", Cardiology Colloquim on Heart Failure, Dayton,OH

2004 Invited Speaker "Genetic Editing of Dysfunctional Myocardium: Mechanistics Insights" Orlando, FL

2004 Speaker "Targeted Cardiac Gene Transfer"-The American Society of Gene Therapy Minneapolis, MN

2004 Speaker "Targeted Gene Transfer for Diastolic Dysfunction"—American Federation of Aging Research, Beeson Award, Park City, Utah

2004 "Rescuing the Failing Heart with Gene Transfer". Invited Speaker Cardiology Grand Rounds University of Virginia, Charlottesville, VA

2004 "Targeting Calcium cycling in Failing Heart with Gene Transfer". Invited Speaker Cardiology Grand Rounds, University of Louisville, KY

2005 "Targeted Gene Transfer in Heart Failure" Invited Speaker Cardiology Grand Rounds, University Hospitals of Cleveland, Case Western Reserve University, Cleveland, OH

2005 "Calcium cycling in heart failure" Heart & Vascular Center for the MetroHealth System and Director, Heart & Vascular Research Center, MetroHealth Campus, Case Western Reserve University

2005 "Gene Therapy in Heart Failure" Cardiology Division, Dartmouth Medical Center, NH

2005 "From basic Mechanisms to Targeted Gene Therapy in Heart Failure" Cardiology Division, Mount Sinai Medical Center, NY

International Presentations:

1991 Gargellen Conference, Cellular and Molecular Alterations in the Failing Human Heart, Gargellen, Austria

1996 American Lebanese Medical Association, Beirut, Lebanon

1996 Cardiovascular Grand Rounds, American University of Beirut, Beirut, Lebanon

1997 "Gene Transfer in Myocardium", European Society of Cardiology, Heart Failure '97, Cologne, Germany
1997 Transition from Cardiac Hypertrophy to Failure, Cologne, Germany
1999 Gene Transfer of Calcium Cycling Proteins in Heart Failure, Toronto Heart Failure Summit, American College of Cardiology, Toronto, Canada
1999 Manipulation of SERCA2a in the Heart by Gene Transfer, International Symposium on Molecular Approaches to the Therapy of Heart Failure, Gottingen, Germany
1999 Fifth Annual AstraZeneca Cardiovascular Young Investigators Forum, Banff, Alberta. Canada
1999 "Therapie Genique de l"insuffisance Cardiaque" Institut de Myologie, Hopital de la Salpetriere, Paris, France
1999 "Therapie Genique de l'insuffisance Cardiaque" Hopital Necker, Paris, France
2000 IV International Conference on Myocardial Function, Padova, Italy
2000 Expert Meeting on New Targets in Congestive Heart Failure, Boehringer Ingelheim, Frankfurt, Germany
2001 International Symposium: Cardiac Function: Improving Function in Failing Hearts by Targeted Gene Transfer, Osaka, Japan
2001 "Heart Failure: From Molecular Mechanisms to Targeted Gene Transfer", Nara University, Nara Japan
2001 "Basic Mechanisms of why the heart fails", Fu Wai Hospital, Beijing, China
2001 "New Therapeutic Approaches in Heart Failure", Beida Hospital, Beijing, China
2001 "Basic Mechanisms of why the heart fails", Union Hospital, Beijing, China
2001 "Targeting apoptic pathways by gene transfer in cardiac muscle", "Cardiac transplantation in the year 2000," Fu Wai Hospital, Beijing, China
2001 XVII ISHR World Congress, Winnipeg, Canada
2001 "Gene Therapy for Heart Failure", 50th Anniversary of the Egyptian Society of Cardiology, American College of Cardiology, Cairo, Egypt
2001 "SERCA2a gene transfer in Heart Failure", 3rd Cologne Conference on Heart Failure, Cologne, Germany
2001 "Gene transfer in animals *in vivo*," European Heart Failure 2001, Barcelona, Spain
2001 "Novel Treatments for Heart Failure", Japanese Heart Failure Society, Sendai, Japan
2001 Gene Transfer of SERCA2a in Heart Failure, Toronto Heart Failure Summit, American College of Cardiology, Toronto, Canada
2001 "Targeting SERCA2a in Heart Failure", Mitsubishi Chemicals, Tokyo, Japan
2002 "Targeting Signaling Pathways in Heart Failure" Department of Pharmacology, University of Wurzburg, Wurzburg, Germany
2002 Targeting calcium cycling proteins by gene transfer "*in vivo* and *in vitro*" The Journal of Physiology Symposium at the joint meeting of the UK, German and Scandinavian Physiological Societies, Tübingen, Germany.
2002 Gene Transfer of calcium cycling proteins in heart failure, Toronto Heart Failure Summit, American College of Cardiology, Toronto, Canada
2002 Targeting signaling pathways in hypertrophy and heart failure. Xth Annual Meeting of the International Society of Heart Research (ISHR), La Plata, Argentina
2000 Gene Therapy for Heart Failure. Xth Anual meeting of the International Society of Heart Research (ISHR), La Plata, Argentina
2002 "Gene Therapy for Heart Failure." Molecular Mechanisms in Heart Failure. Tokyo,

Japan
2002 "Molecular Mechanisms of Heart Failure and Novel Therapeutic Strategies", Keynote Speaker, Japanese Heart Failure Society, Tokyo, Japan
2002 "Rescuing the Failing Heart by Targeted Gene Transfer." Symposium, Yokohama City University, Yokohama, Japan.
2002 "Gene Therapy for Heart Failure." Samsung Symposium in Cardiac and Vascular Disease. Seoul, Korea
2003 "Improving Deficit Calcium Regulation in Heart Failure" European Society of Cardiology (ESC) Congress, Vienna, Austria

2004 "Gene Therapy for Heart Failure", International Society for Heart Research-Latin American Section, Iguazu Falls, Argentina
2004 "Targeted Gene Therapy in Heart Failure", 8th Annual Scientific Meeting of the Japanese Heart Failure Society, Gifu, Japan
2004 "Gene Therapy in Heart Failure", The International Congress of Cardiology of the Lebanese Society of Cardiology, Beirut, Lebanon
2004 "Program in Cardiovascular Gene Therapy". Xinjiang Medical University, Uruqmi, China
2004 "Gene Therapy for Heart Failure", 3rd International Congress of the Helleric College of Cardiology & Cardiac Surgery, Athens, Greece.
2004 "Therapie Genique pour l'Insuffisance Cardiaque" Hopital Pitie-Salpetriere, Paris, France
2005 "Towards Clinical Gene Therapy in Heart Failure" Keynote Speaker, German Society of Cardiology, Mannheim, Germany
2005 "From Basic Mechanisms to Clinical Trials in Heart Failure." 7th Cologne Conference on Heart Failure.
2005 "In vivo Tracking of Stem cells" Ernst Schering Research Foundation Workshop 60, Kobe, Japan
2005 "Gene therapy for heart failure" Gwangju Institute, Gwangju Korea
2005 "Cibles Genetiques dans l'Insuffisance cardiaque" Hopital Lemoyne, Montreal, Canada
2005 "Insuffisance Diastolique" Hopital Notre-Dame, Montreal, Canada
2005 "Therapie Genique pour l'Insuffisance cardiaque" Hopital L'Enfant Jesus, Quebec, Canada
2005 "Cible Genique pour l'Insuffisance cardiaque" Hopital L'Hotel Dieu, Quebec, Canada
2005 "Targeting Signaling Pathways in Heart Failure" Queen Victoria Hospital, Montreal, Canada
2005 "Therapie Genique pour l'Insuffisance cardiaque" Montreal Heart Institute, Montreal, Canada
2006 "Gene Transfer of SERCA2a and phospholamban: preclinical results and current clinical studies" New Frontiers in Cardiology, Munich

b Professional and Educational Leadership Roles:

National:

1997 Chair, Scientific Session, "Models of Heart Failure", American Heart Association
1997 Chair, Scientific Session, "Contractile Mechanisms", European Society of Cardiology

1999	Chair, Scientific Session, "Gene Therapy in Experimental Models", American Heart Association
2000	Faculty at National Consultant Meeting, β-blockers in Heart Failure, Astra Zeneca, Atlanta, GA
2000	Faculty at National Consultant Meeting, β-blockers in Heart Failure, Astra Zeneca, New Jersey
2001	Chair, "Gene Therapy in Experimental Models", American Heart Association
2001	Faculty at National Consultant Meeting, Astra Zeneca, Miami, FL
2000-	Chair, North American Society of Pacing & Electrophysiology. "Arrhythmias and Calcium Homeostasis" and "Basic Science V: Remodeling: Good or Bad Memories", San Diego, CA

Regional:

1999	Novartis New England Cardiology Panel Meeting, Boston, MA
2000	Editorial Board, Journal of Molecular & Cellular Cardiology
2001	Faculty at National Consultant Meeting, β-blockers in Heart Failure, Astra Zeneca, Boston, MA
2001-	Editorial Board, Circulation Research

3. Description of Teaching Awards

None

4. Major Curriculm Offerings, Teaching Cases or Innovative Educational Programs Developed

2000 Institute of Continuing Healthcare Education: β-Blockers: Standard of care in heart failure, Atlanta, GA
Helped organize the curriculum on beta blockers in heart failure with the relevant slides and clinical material for national presentations with 40 other leading specialists in heart failure .

2000 ASTRAZENECA – National Consultant Meeting on Heart Failure, Phoenix, AZ
Helped organize the curriculum on beta blockers in heart failure with the relevant slides and clinical material for national presentations with 100 other leading specialists in heart failure.

2000 Novartis New England Cardiology Panel Meeting, Boston, MA
Organized the molecular gene therapy part for this one day course on heart failure. Forty cardiologists from the Boston area attended the conference.

2002 Director, "Cardiovascular Cell & Gene Therapy Conference", Cambridge, MA
Organized all the scientific sessions and the invitation of 40 speakers worldwide on the topic of gene and cell therapies in cardiovascular diseases for the two and half day conference. Two hundred attendees who were cardiologists, scientists from universities and biotechnology firms and medical students.

2004 Director, "Cardiovascular Cell & Gene Therapy Conference II", Cambridge, MA

Organized all the scientific sessions and the invitation of 50 speakers worldwide on the topic of gene and cell therapies in cardiovascular diseases for the two and half day conference. Two hundred attendees who were cardiologists, scientists from universities and biotechnology firms and medical students.

E. Report of Clinical Activities -- Massachusetts General Hospital

1. Practice: Heart Failure and Cardiac Transplantation.

2. Patient Load: 150-200 mainly post-cardiac transplantation patients with complex medical issues and patients with end-stage heart failure.

3. Time Commitment:

- Two months a year attending in the Heart Failure & Cardiac Transplantation Service. Supervision of one cardiology fellow. 40 hrs/week.
- One half day clinic every two weeks for general cardiology and evaluation of patients with severe heart failure. 5 hrs/2 weeks.
- One weekend per month covering Cardiac Transplantation.
- Three weeks general cardiology consult per year. Supervision of two cardiology fellows. 20 hrs/week.
- Weekly cardiac transplantation meeting. 1 hr/week.
- Monthly Boston cardiac transplantation meeting. 3 hrs/month.
- Weekly heart failure meeting. 1 hr/week.

PART III: Bibliography

Original Reports

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2. Gwathmey JK, Slawsky MT, **Hajjar RJ**, Briggs GM, Morgan JP. Role of intracellular calcium handling in force interval relationships of human ventricular myocardium. J Clin Invest 1990; 85(5): 1599-1628.
3. Gwathmey JK, **Hajjar RJ**. Effect of protein kinase C activation on sarcoplasmic reticulum function and apparent myofibrillar Ca^{2+} sensitivity in intact and skinned muscles from normal and diseased human myocardium. Circ Res 1990; 67: 744-752.
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Patents:

1. Evaluation of Delivery of and Use of Agents to Treat Heart Disorder"

2. Reduction of Vascular Restenosis and Smooth Muscle Proliferation by Gene Transfer of SERCA"

3. Anti-hypertrophic effects and inotropic effects of PICOT