

**Curriculum Vitae**  
**Alexander Louis Neumann**

**Home Address:** 400 E. Randolph St. #1013  
Chicago, IL 60601

**Office Address:** Midwest Heart Specialists  
120 Spalding Drive, Suite 206  
Naperville, IL 60540  
Office: (630) 527-2863  
FAX: (630) 527-2640  
E-mail: ANeumann@midwestheart.com

**Date of Birth:** June 10, 1946

**Citizenship:** United States

**Education:**

- 1968 B.S., Zoology, University of California, Davis
- 1968 B.S., Entomology, University of California, Davis
- 1969 Secondary Teaching Credential: Biological Sciences (Major);  
Math, Chemistry (Minors); University of California, Davis
- 1969–72 Graduate School, Entomology and Animal Physiology  
(completed 128 units), University of California, Davis

***Academic and Staff Appointments:***

- 2002-present  
2012 Clinical Director, Echocardiographic Laboratories  
Midwest Heart Specialists & Edward Hospital, Naperville, Illinois  
Technical Director, Echocardiographic Core Laboratory  
Midwest Heart Foundation, Lombard, Illinois  
Program Director, Edward Cardiovascular Institute School of Cardiac  
Ultrasound, Naperville, Illinois  
Associate Professor, Department of Medicine; Rush University  
Chicago, Illinois
- 1992-2002 Associate Professor, Department of Medicine; Rush University  
Technical Director, Echocardiographic Laboratory,  
Rush Heart Institute, Chicago, Illinois
- 1989-92 Research Associate (Associate Professor), Department of Medicine;  
The University of Chicago, Illinois
- 1983–92 Technical Director, Cardiac Non–Invasive Imaging Laboratory,  
University of Chicago Medical Center, Chicago, Illinois

- 1983–89 Research Associate (Assistant Professor), Department of Medicine; The University of Chicago, Chicago, Illinois
- 1980–83 Senior Echocardiographic Technologist, Technical Director, Cardiac Noninvasive Imaging Laboratory; Harvard University/Brigham and Women's Hospital, Boston, Massachusetts
- 1975-80 Technical Director, Cardiac Noninvasive Imaging Laboratory, University of California, Davis – University of California, Sacramento Medical Center, Sacramento, California
- 1974–75 Staff Research Associate II and Cardiac Catheterization Technician; University of California, Davis – University of California, Sacramento Medical Center, Sacramento, California
- 1971–72 Teaching Assistant, Instructor in Animal Physiology; University of California, Davis

***Consultationships (Academic/Clinical/Industrial):***

- 2002 Clinical consultant: Midwest Suburban Echo Society
- 1995 Consultant: Role of Ultrasound/Echocardiographic contrast agents in myocardial perfusion imaging and non-cardiac applications. Booz-Allen & Hamilton Inc, New York
- 1988–92 Consultant in M–mode, Doppler and 2–D Echocardiography; QV Incorporated, Chicago, Illinois.
- 1983–92 Consultant. Hewlett Packard Ultrasound Division, Andover, Maryland
- 1982–85 Consultant in M–Mode, Doppler and 2–D Echocardiography; Ghassamian and Associates, Methuen, Massachusetts
- 1981–83 Consultant in M–Mode, Doppler and 2–D Echocardiography; Framingham Union Hospital, Framingham, Massachusetts
- 1979–91 Consultant in M–Mode, Doppler, and 2–D Echocardiography; Robert Mathews Corporation, Van Nuys, California
- 1983-89 Consultant. Advanced Technology Laboratories, Bothell Washington
- 1976–84 Consultant and Faculty Member for Technicians Workshop in Cardiac Ultrasound, Portland, Oregon

**Grants:**

- 1982-83 NIH/NHLBI (HL28986), "LV Contractility in Patients with Chronic Iron Overload"
- 1983-84 Sterling Winthrop Research Institute, "Physiologic Assessment of the Inotropic, Vasodilator and Afterload Reduction Effects of Milrinone in Humans."
- 1985-87 American Heart Association, Chicago Affiliate, Grant-in Aid.
- 1985-87 NIH, Diabetes Research and Training Center Pilot and Feasibility Study, Grant Award
- 1985-87 American Heart Association Chicago Affiliate, Grant-in-aid, "Noninvasive Determination of Aortic Impedance."
- 1985-87 Juvenile Diabetes Foundation, Wm. Wrigley Jr. Research Grant, "Diabetic Cardiomyopathy: Contribution of Abnormal Contractility, Chamber Compliance and Autonomic Function"
- 1985-89 NIH (AA06677), "Adverse Cardiac Effects of Ethanol in Humans"
- 1986-88 Marion Laboratories, "Assessment of the Effects of Diltiazem on Left Ventricular Systolic Performance and Contractile State."
- 1987-88 Fisons Corporation, "Role of the Beta<sub>2</sub> Adrenoceptor in Mediating Positive Inotropic Activity in the Failing Heart and its Relation to the Hemodynamic Actions of Dopexamine Hydrochloride
- 1988-89 Syntex Laboratories, Inc. (LAB/NICc022/USA), "Effects of Nifedipine and Nicardipine on Left Ventricular Function in Hypertensive Patients"
- 1989-90 Merck, Sharp and Dohme Research Laboratories, "An Open-Label Dose Finding Pilot Study of the Effects of DPI 201-106 on Cardiac Contractility and Hemodynamics in Patients with Dilated Cardiomyopathy."
- 1989-90 Smith, Kline and French Laboratories, "Carvedilol: Effects on Left Ventricular Contractility and Myocardial Oxygen Consumption in Hypertensive Patients with Left Ventricular Dysfunction.
- 1989-91 American Heart Association of Metropolitan Chicago, Grant-in-Aid. "LV Diastolic Function: Importance of Individual Determinants."
- 1989-91 Merck, Sharp and Dohme, Grant-in-Aid. "Effects of Serum Sodium on LV Mechanics."

1990–91	Merck, Sharp and Dohme Research Laboratories: "Effects of the Histamine H <sub>2</sub> antagonist Famotidine on Myocardial Mechanics and Contractile State."
1990–92	NATO Collaborative Research Grant "Comparison of Myocardial Mechanics Following Heart versus Heart–Lung Transplantation."
1991-92	Merck, Sharp and Dohme Research Laboratories: "Inotropic and Afterload Effects of Felodipine in Humans."
1991–92	Norwegian National Research Institute Research Grant. "Integrated Physiologic Analysis of Left Ventricular Regional and Global Load, Contractility, Perfusion and Energetics: Affects of Ischemia and Positive Inotropic Interventions."
1994	Berlex Laboratories. "Study of the Safety, Subject Acceptance, and Efficacy of Levovist Injection in Subjects with Inconclusive echocardiographic examination."
2002	Covalent Group for Mylan Pharmaceuticals, Inc. Core laboratory: "Nebivolol in Hypertension." NEB-203 Phase II study.
2002	Scios study (FUSION): Neseritide in Heart Failure. Core Laboratory for Pilot Study
2003	EUPHORIA Study (utility of ultrafiltration in heart failure): Core Laboratory for Pilot Study
2004	Biosite diastolic dysfunction study: Core Laboratory

***Memberships in Professional Organizations:***

American Heart Association  
Chicago Heart Association  
American Society of Echocardiography  
Chicago Society of Echocardiography  
Midwest Suburban Echo Society

***Professional Committee Memberships:***

1986–87	Steering Committee, Combined University of Chicago – Michael Reese Hospital Program in Noninvasive Cardiac Imaging
1987–89	Education Committee, American Society of Echocardiography
1990	Committee for reviewing/recommending post–CCU care University of Chicago
1990–93	Long Term Goals Committee, American Society of Echocardiography

1990-92	Self-Assessment Committee, American Society of Echocardiography
1994-97	Nomenclature and Standards Committee, American Society of Echocardiography: Quantitation of 2-D and M-Mode Echocardiography Writing Group.
1996-97	Liaison Committee on Medical Education (LCME): Subcommittee on general facilities, Rush-Presbyterian-St. Luke's Medical Center
1996-99	Publications Committee, American Society of Echocardiography
2001-present	Clinical Advisor, Midwest Suburban Echo Society
2002-05	Research Committee, American Society of Echocardiography
2002-05	Board of Directors, American Society of Echocardiography
2004-06	Sonography Council, American Society of Echocardiography

***Manuscript Review Consultant:***

American Journal of Physiology  
 Circulation  
 Journal of American College of Cardiology  
 Circulation Research  
 American Journal of Noninvasive Cardiology  
 Journal of Heart and Lung Transplantation  
 Journal of Critical Care Medicine

***Major Research Interests:***

1. The clinical utility of noninvasive techniques in assessing left ventricular contractile state, ventriculo-vascular coupling and myocardial perfusion in humans.
2. The interaction of the heart and systemic circulation as determinants of left ventricular loading conditions and systemic hypertension.
3. Relationship between myocardial oxygen consumption, ventricular mechanics and left ventricular/arterial coupling.
4. Noninvasive hemodynamics in myocardial and valvular heart disease.

***Presentations/Lectureships/Visiting Professorships:***

1. American Heart Association – Annual Scientific Sessions, Miami Beach, Florida – November, 1976. Quantification of Aortic Stenosis by Assessment of Mitral Valve Early Diastolic Closing Velocity on Echogram.
2. American Heart Association – Annual Scientific Sessions, Miami Beach, Florida – November, 1977. Systematic Correlation of Cardiac Size and Performance to Alterations Heart Rate in Man Determined by Echocardiography.

3. Sacramento Chapter of Cardiopulmonary Technicians, Sacramento, California – August, 1978. Fundamentals of Echocardiography.
4. Peter Bent Brigham Hospital – Noninvasive Conference, Boston, Massachusetts – October, 1980. Two -Dimensional Echocardiography in the Evaluation of Heart Disease.
5. Cape Cod Hospital, Hyannis Port, Massachusetts – October and November, 1981. Lecture Series in M -Mode Echocardiography.
  - a. Physics of Ultrasound
  - b. Anatomy and Physiology of the Cardiovascular System
  - c. M -Mode Echocardiographic Evaluation of the Pulmonic Valve, Aortic Valve, and Adjacent Structures
  - d. M -Mode Echocardiographic Evaluation of the Mitral and Tricuspid Apparatus
  - e. M -Mode Echocardiographic Evaluation of the Right and Left Ventricles.
6. Harvard Medical School, Boston, Massachusetts – April, 1983. Echo Workshop (M –Mode and 2 -D) for Cardiology Board Review Course: "Comprehensive Review of Clinical Cardiovascular Disease, Including Hypertension"
7. Harvard/Massachusetts Institute of Technology Health Sciences and Technology Program – May, 1983. Two -Dimensional Echocardiography.
8. Visiting Professor of Medicine, Harefield Hospital, Harefield, England – May, 1983.
9. The University of Chicago – Cardiology Grand Rounds, Chicago, Illinois –October, 1983. Doppler and Two -Dimensional Echocardiography in the Assessment of Heart Disease.
10. American Cardiology Technologists Association – Annual Scientific Conference, Chicago, Illinois – May, 1984. Two -Dimensional Echocardiography.
11. Third Annual 2 -D and Doppler Echocardiography Symposium, Schaumburg, Illinois – June, 1984. Scanning Techniques – How to Obtain the Standard Echocardiographic Views.
12. Thirty -Eighth Annual Conference on Engineering in Medicine and Biology. Chairman, Imaging Session, Chicago, Illinois – September, 1985.
13. Framingham Union Hospital – Cardiology Rounds – Clinical Doppler Echocardiography – Interpretative and Technical Considerations, Framingham, Massachusetts – November, 1985.
14. American College of Cardiology – Annual Scientific Sessions, Washington, D.C. – March, 1986. Assessment of left ventricular - systemic arterial coupling: A new application of Doppler echocardiography.
15. The University of Chicago – Radiology Rounds, Chicago, Illinois – October, 1986. Noninvasive Assessment of Valvular Heart Disease.
16. The University of Chicago, Radiology Rounds, Chicago, Illinois – October, 1986. Noninvasive Assessment of Myocardial Disease.

17. Visiting Professor of Medicine, University of Witwatersrand, Baragwanath Hospital, Johannesburg, South Africa – January, 1986.
18. Michael Reese Hospital and Medical Center – Cardiology Core Curriculum, Chicago, Illinois – February, 1987. Principles of 2 -D Echocardiography.
19. The University of Chicago – Junior Lecture Series, Chicago, Illinois – April 9, 1987. Non -invasive Assessment in Health and Disease.
20. American College of Cardiology – Annual Scientific Sessions, Atlanta, Georgia – March, 1988. Is it possible to obtain an accurate Doppler estimate of stroke volume in patients with decreased forward flow?
21. American Federation for Clinical Research, Midwest Section, Chicago, Illinois – November, 1988. Relationship between alterations in blood ionized calcium concentration and changes in systemic blood pressure: A hemodynamic evaluation.
22. Visiting Professor of Medicine, Harefield and Brompton Hospital, Harefield and London, England – February, 1989.
23. American College of Cardiology – Annual Scientific Sessions, Anaheim, California – March, 1989. Valve resistance in aortic stenosis: An alternative method for assessing the hemodynamic significance of flow obstruction.
24. Visiting Professor of Medicine, University of Witwatersrand, Baragwanath Hospital, Johannesburg, South Africa – May, 1989.
25. Visiting Professor of Medicine, Harefield Hospital, Harefield, England –August, 1989.
26. American Heart Association – Annual Scientific Sessions, New Orleans, Louisiana – November, 1989. Comparison of Doppler vs catheterization derived dP/dt in dilated cardiomyopathy.
27. Computers in Cardiology, 17th Annual Conference – Chicago, Illinois – June, 1990. Abstract reviewer/grader.
28. University of Chicago Physicians Group, Chicago, Illinois – June & July, 1990. The expanding role of the integrated cardiac ultrasound exam (including TEE) in the evaluation of cardiovascular disease – An Update for the 1990's.
29. Computers in Cardiology; 17th Annual Conference. Chairman, Wall motion session, Chicago, Illinois – September, 1990.
30. American Heart Association – Annual Scientific Sessions, Dallas, Texas –November, 1990. Use of Doppler and external pulse tracings to detect changes in arterial compliance.
31. Rockford Memorial Hospital, Rockford, Illinois – December, 1990; March, 1991. Quantitative Doppler echocardiography.

32. Visiting Professor, Norwegian Biomedical Institute and Regional Hospital, Trondheim, Norway - October, 1991, February, 1992.
33. Visiting Professor, Mayo Clinic, Rochester, Minnesota - January - March, 1993.
34. Rush North Shore Hospital, Skokie, Illinois - February 1993; April 1993. Quantitative Doppler echocardiography.
35. Echocardiography: The Big Picture - Use of echo in the assessment of coronary artery disease and complications of acute myocardial infarction. Detroit, Michigan - April, 1993.
36. Visiting Professor, Christ Hospital, Chicago, IL. Cardiology Grand Rounds - Echocardiography and Prosthetic Valves. May, 1993.
37. American Society of Echocardiography, 5th Annual Conference - San Francisco, Ca - June, 1994. Abstract reviewer/grader; co-chair, How-to-session: Assessment of etiology and severity of valvular regurgitation.
38. Sherman Hospital, Elgin, Illinois - December, 1994. Review of 2-D and quantitative Doppler echocardiography.
39. Echocardiography: The Big Picture II - Quantitative Doppler echocardiography. Detroit, Michigan - April, 1995.
40. Visiting Professor, Little Company of Mary Hospital, Chicago, IL. Comprehensive clinical echocardiography-Systematic image acquisition. January, 1996; February, 1996.
41. American Society of Echocardiography, 7th Annual Scientific Sessions. Abstract reviewer/grader. State-of-the-Art Symposium: Digital rather than videotape storage - The practical issues of implementing the ALL digital echo lab. Chicago, IL. June, 1996.
42. Echocardiology: The Big Picture III - Quantitative Doppler Echocardiography. Detroit, Michigan. April, 1997
43. European Society of Hypertension, 8th annual Scientific Session, Milan, Italy. Mechanisms regulating myocardial oxygen consumption during initiation of high dose beta-blockade with carvedilol in hypertensive cardiomyopathy. June, 1997.
44. Cardiology Rounds, Rush-Presbyterian-St. Luke's Medical Center. Use of Doppler echocardiography in evaluation of valvular regurgitation. August, 1997.
45. Cardiology Rounds, Rush-Presbyterian-St. Luke's Medical Center. Use of Doppler echocardiography in evaluation of valvular stenosis. December, 1997.
46. Sixth World Congress on Heart Failure, Geneva, Switzerland. Invited lecture: Echocardiography in the evaluation of heart failure and heart transplants. Advanced heart failure: Assessment for inotropic therapy and transplantation. May, 1998.



47. Sixth World Congress on Heart Failure, Geneva, Switzerland. Abstract: Detection of cardiac allograft rejection by the echocardiographic analysis of myocardial texture: An integrated backscatter study. May, 1998.
48. Echocardiography: Cardiovascular surgeons board review: Echocardiography. Rush Presbyterian-St. Luke's Medical Center. October, 1998.
49. Visiting Professor, St. Mary's Hospital, Grand Rapids, MI. Echocardiography: Image acquisition and diagnostic criteria. December 11-12, 1998.
50. Fourteenth Annual Advances in Echocardiography Conference: Contrast echocardiography and perfusion imaging. Chicago, IL. Faculty member, September 16-17, 1999.
51. American Society of Echocardiography, 11<sup>th</sup> Annual Scientific Sessions. Program committee member. Advances in Sonography: Systolic function - What to measure? Chicago, IL. June, 2000
52. Cardiology Rounds, Rush-Presbyterian-St. Luke's Medical Center. Use of echocardiography in the evaluation of cardiac masses. December, 2000.
53. Cardiology Rounds, Rush-Presbyterian-St. Luke's Medical Center. Use of echocardiography in coronary artery disease. January, 2001.
54. Rideout and Fremont Hospital: Marysville, California. August 2001.  
Echocardiographic lecture series
  - a. Valve area calculations/PISA
  - b. Quantification of regurgitant lesions
  - c. Evaluation of diastolic function
  - d. Contrast echo in clinical practice
  - e. Echocardiography in cardiomyopathies
55. Cardiology Rounds, Cook County Hospital. Chicago, Illinois. October 2001  
Use of echocardiography in the evaluation of aortic root disease.
56. Cardiology Rounds, Rush-Presbyterian-St. Luke's Medical Center. December 2001 Use of echocardiography in the evaluation of cardiac masses.
57. Midwest Heart Specialists, Good Samaritan Hospital, Downer's Grove, Illinois. Echo/Doppler techniques for assessing intracardiac hemodynamics. March 2002
58. Midwest Suburban Echo Society. Harper College, Palatine, Illinois. July 2002  
Echo/Doppler evaluation of diastolic function.
59. American Society of Echocardiography, Faculty member, 14<sup>th</sup> Annual Scientific Sessions. Advances in Sonography: Diastole (Re) Visited. Pressures and Performance: From IVRT and MPI to E/A and PCWP. Las Vegas, NV. June, 2003.
60. American Society of Echocardiography, Faculty member, 14<sup>th</sup> Annual Scientific Sessions. Advances in Sonography: Making the Diagnosis of Heart Failure: The echo is crucial. Las Vegas, NV. June, 2003.

61. American Society of Echocardiography; Chicago Sonographer Update I: PISA, Theory and Practice in Adult and Pediatric Echocardiography. April 24, 2004, Palatine, IL.
62. American Society of Echocardiography, Faculty member, 15<sup>th</sup> Annual Scientific Sessions. Chair: The Detection of Cardiovascular Disease: Obtaining the perfect Image. San Diego, CA. June, 2004.

## Bibliography

### Manuscripts:

1. DeMaria AN, Vismara LA, Miller RR, Neumann AL, Mason DT. Unusual echographic manifestations of right and left heart myxomas. *Am J Med* 59:713 -720, 1975.
2. DeMaria AN, Vera Z, Neumann AL, Mason DT. Alterations in ventricular contraction pattern in the Wolff -Parkinson -White syndrome: Detection by echocardiography. *Circulation* 53:249 -257, 1976.
3. DeMaria AN, Amsterdam EA, Vismara LA, Neumann AL, Mason DT. Arrhythmias in the mitral valve prolapse syndrome: Prevalence, nature and frequency. *Ann Int Med* 84:656 - 660, 1976.
4. DeMaria AN, Neumann AL, Mason DT. Echographic evaluation of cardiac function. In *Congestive Heart Failure. Mechanisms, Evaluation and Treatment*. Mason DT (ed), Yorke Medical Books, New York, pp 191-224, 1976.
5. DeMaria AN, Angel J, Amsterdam EA, Lee G, Neumann AL, Weinert L, Mason DT. Applications of echocardiography in acute myocardial infarction: Development of a prognostic index and estimation of left ventricular filling pressure. In *Advances in Heart Disease, Vol I*, Mason DT (ed), Grune and Stratton, Inc., pp 367-376, 1977.
6. DeMaria AN, Neumann AL, Lee G, Mason DT. Echocardiography: Applications in office practice. *Cardiovascular Medicine* 1:105-118, 1976.
7. DeMaria AN, Neumann AL, Weinert L, Reimenschneider T, Mason DT. Applications of the pulmonary valve echogram in the diagnosis of congenital and acquired cardiac disorder. In *Advances in Heart Disease, Vol 1*, Mason DT (ed), Grune and Stratton, Inc., pp 377 -387, 1977.
8. DeMaria AN, Neumann AL, Lee G, Mason DT. Echocardiography II: Examination of the mitral valve by echocardiography. *Practical Cardiology* 3:60-72, 1977.
9. DeMaria AN, Neumann AL, Lee G, Mason DT. Echocardiographic identification of the mitral valve prolapse syndrome. *Amer J Med* 62:819 -829, 1977.
10. Awan NA, Miller RR, DeMaria AN, Maxwell KS, Neumann AL, Mason DT. Efficacy of ambulatory systemic vasodilator therapy with oral prazosin in chronic refractory heart failure: concomitant relief of pulmonary congestion and elevation of pump output demonstrated by improvements in symptomatology, exercise tolerance, hemodynamics and echocardiography. *Circulation* 56: 346-354, 1977.
11. DeMaria AN, Neumann AL, Lee G, Fowler W, Mason DT. Alterations in ventricular mass and performance induced by exercise training in man evaluated by echocardiography. *Circulation* 57:237 -244, 1978.

12. DeMaria AN, Neumann AL, Lee G, Mason DT. Mitral valve disease revisited. *Cardiovascular Clinics: Clinical Echocardiography*. F.A. Davis Company, Kotler M, Segal B (eds), pp 59 -84, Philadelphia, 1978.
13. DeMaria AN, Bommer WJ, Neumann AL, Weinert L, Mason DT. The mitral valve echogram - The cornerstone of clinical echocardiography: Disorders affecting the mitral valve evaluated by single and two - dimensional ultrasound. In *Advances in Heart Disease, Vol 2*, Mason DT (ed), Grune and Stratton, Inc., New York, pp 21 -44, 1978.
14. DeMaria AN, Neumann AL, Bommer WJ, Joye JA, Weinert L, Mason DT. Clinical applications of the echogram of the aorta and aortic valve leaflets. In *Advances in Heart Disease, Vol 2*, Mason DT (ed), Grune and Stratton, Inc., pp 71 -96, 1978.
15. DeMaria AN, Neumann AL, Bommer WJ, Weinert L, Mason DT. Echocardiography of the mitral valve. *Handbook of Clinical Ultrasound*, DeVlieger A, Kraus J (eds), John Wiley and Sons, Inc., New York, pp 425 -442, 1978.
16. Bommer WJ, Neumann AL, Mason DT, DeMaria AN. Current status of pulsed -Doppler ultrasound in clinical cardiology. In *Advances in Heart Disease, Vol 2*, Mason DT (ed), Grune and Stratton, Inc., New York, pp 115 -136, 1978.
17. DeMaria AN, Angel J, Neumann AL, Lee G, Amsterdam EA, Mason DT. Noninvasive echocardiographic index for determining prognosis in acute myocardial infarction. In *Advances in Cardiology, Vol 22*: pp 65 -70, Vogel JHK (ed), S. Karger Medical and Scientific Publishers, Basel, Switzerland, 1978.
18. DeMaria AN, Neumann AL, Bommer WJ, Weinert L, Grehl T, Amsterdam EA, Mason DT. Left ventricular thrombi identified by cross -sectional echocardiography. *Ann Int Med* 90:14-18, 1979.
19. DeMaria AN, Neumann AL, Schubart PJ, Lee G, Mason DT. Systematic correlation of cardiac chamber size and ventricular performance determined with echocardiography and alterations in heart rate in normal persons. *Amer J Cardiol* 43:1 -9, 1979.
20. DeMaria AN, Bommer WJ, Neumann AL, Weinert L, Bogren H, Mason DT. Identification and localization of aneurysms of the ascending aorta by cross -sectional echocardiography. *Circulation* 59:755 -761, 1979.
21. Bommer WJ, Weinert L, Neumann AL, Neff J, Mason DT, DeMaria AN. Determination of right atrial and ventricular size by two - dimensional echocardiography. *Circulation* 80:91 -100, 1979.
22. Bommer WJ, Neumann AL, Mason DT, DeMaria AN. Application of echographic contrast studies in evaluating heart disease. In *Advances in Heart Disease, Vol 3*, Mason DT (ed), Grune and Stratton, Inc., New York, 1979.
23. DeMaria AN, Bommer WJ, Neumann AL, Kwan OL, Mason DT. Evaluation of cardiac masses by two -dimensional echocardiography. In *Proceedings of Second International Symposium on Ultrasound Diagnosis, Cairo, Egypt, 1980*.

24. DeMaria AN, Schubart P, Bommer WJ, Neumann AL, Mason DT. Variables capable of influencing echocardiographic measurements. In *Two - Dimensional Echocardiography Clinics in Diagnostic Ultrasound*, Kisslo JA (ed), Churchill Livingstone, New York City, pp 20 -29, 1980.
25. Borow KM, Neumann AL, Wynne J. Sensitivity of end -systolic pressure -dimension and pressure -volume relations to the inotropic state in humans. *Circulation* 65:988 -997, 1982.
26. Tu'Meh SS, Tracy DA, Wynne J, Konstam MA, Kozlowski JF, Neumann AL, Holman BL. Scintigraphic diagnosis of tricuspid regurgitation. *Radiology* 145:463 -466, 1982.
27. Sandor T, Henschke C, Risser TA, Hanlon WB, Neumann AL, Wynne J. Quantitative analysis of left ventricular wall motion and thickness using two -dimensional echocardiography. *IEEE* 14:431 -439, 1983.
28. Borow KM, Henderson IC, Neumann A, Colan S, Grady S, Papish S, Goorin A. Assessment of left ventricular contractility in patients receiving doxorubicin. *Ann Int Med* 99:750 -756, 1983.
29. Henschke CI, Risser TA, Sandor T, Hanlon WB, Neumann A, Wynne J. Quantitative computer -assisted analysis of left ventricular wall thickening and motion by two -dimensional echocardiography in acute myocardial infarction. *Amer J Cardiol* 52:960 -964, 1983.
30. Colan SD, Borow KM, Neumann A. Left ventricular end -systolic wall stress -Velocity of fiber shortening relation: A load independent index of myocardial contractility. *J Am Coll Cardiol* 4:715 -724, 1984.
31. Colan SD, Borow KM, Neumann A. Effects of loading conditions and contractile state on left ventricular early diastolic function. *Amer J Cardiol* 55:790 -796, 1985.
32. Borow KM, Come PC, Neumann A, Baim DS, Braunwald E, Grossman W. Physiologic assessment of the inotropic, vasodilator, and afterload reducing effects of milrinone in subjects without heart disease. *Am J Cardiol* 55:1204 -1209, 1985.
33. Feldman T, Borow KM, Neumann A, Lang RM, Childers RW. Relation of electrocardiographic R wave amplitude to changes in left ventricular chamber size and position in normal subjects. *Am J Cardiol* 55:1168 - 1174, 1985.
34. Borow KM, Neumann A, Arensman FW, Yacoub MH. Left ventricular contractility and contractile reserve in humans after cardiac transplantation. *Circulation* 71:866 -872, 1985.
35. Colan SD, Borow KM, Neumann A. Use of the calibrated carotid pulse tracing for calculation of left ventricular pressure and wall stress throughout ejection. *Am Heart J* 109:1306 -1311, 1985.
36. Borow KM, Colan SD, Neumann A. Left ventricular end -systolic wall stress and the velocity of fiber shortening. *Cardiology Board Review* 2:78 -87, 1985.

37. Lang RM, Borow KM, Neumann A. Metastatic carcinoma involving the left atrium. *Am Heart J* 110:884 -886, 1985.
38. Lang RM, Borow KM, Neumann A, Feldman T. Adverse cardiac effects of acute alcohol ingestion in young adults. *Ann Int Med* 102:742 -747, 1985.
39. Borow KM, Colan SD, Neumann A. Altered left ventricular mechanics in valvular aortic stenosis and coarctation of the aorta: Effects on systolic performance and late outcome. *Circulation* 72:515 -522, 1985.
40. Feldman T, Childers RW, Borow KM, Lang RM, Neuman A. Change in ventricular cavity size: Differential effects on QRS and T wave amplitude. *Circulation* 72:495 -501, 1985.
41. Feldman T, Borow KM, Sarne DH, Neumann A, Lang RM. Myocardial mechanics in hyperthyroidism: Importance of left ventricular loading conditions, heart rate, and contractile state. *J Am Coll Cardiol* 7:967 -974, 1986.
42. Borow KM, Neumann A, Lang RM. Milrinone vs dobutamine: Contribution of afterload reduction and augmented inotropic state to improved left ventricular performance. *Circulation* 73:III 153 -III 161, 1986.
43. Lang RM, Feinstein SB, Feldman T, Neumann A, Chua KG, Borow KM. Contrast echocardiography for evaluation of myocardial perfusion: effects of coronary angioplasty. *J Am Coll Cardiol* 8:232 -235, 1986.
44. Carroll JD, Lang RM, Neumann A, Borow KM, Rajfer S. Differential effects of positive inotropic and vasodilator therapy on diastolic properties in dilated cardiomyopathy. *Circulation* 74:815 -825, 1986.
45. Lang RM, Borow KM, Neumann A, Janzen D. Systemic vascular resistance: An unreliable index of left ventricular afterload. *Circulation* 74:1114 -1123, 1986.
46. Hansen ED, Borow KM, Neumann A, Lang RM, Fujii A, Schumacker P, Wood LDH. Effects of acute lung injury and anesthesia on left ventricular mechanics. *Am J Physiol* 251 (Heart Circ Physiol 20):H1195 -H1204, 1986.
47. Feldman T, Borow KM, Lang RM, Neumann A, Fellner SK. Differentiation of simultaneous changes in preload, afterload, peripheral resistance and left ventricular performance: A clinical model. *Am J Noninvasive Cardiology* 1: 30 -38, 1987.
48. Feinstein SB, Lang RM, Dick C, Neumann A, Al -Sadir J, Chua G, Carroll J, Feldman T, Borow KM. Contrast echocardiographic perfusion studies in humans. *Am J Cardiac Imaging* Vol. I, no. 1:29 - 37, 1987.
49. Lang RM, Borow KM, Neumann A, Feinstein SB. Echocardiographic contrast agents: Effect of microbubbles and carrier solutions on left ventricular contractility. *J Am Coll Cardiol* 9:910 -919, 1987.

50. Lang RM, Feinstein SB, McCoy CE, Frederickson ED, Neumann A, Powsner S, Goldberg LI, Borow KM. Contrast ultrasonography of the kidney - a new method for in vivo evaluation of renal perfusion. *Circulation* 75:229 -234, 1987.
51. Lang RM, Borow KM, Neumann A, Al -Sadir J, Feinstein SB. Effect of intracoronary injections of sonicated microbubbles on left ventricular contractility. *Am J Cardiol* 60:166 -171, 1987.
52. Feinstein SB, Lang RM, Dick C, Neumann A, Al -Sadir J, Chua KG, Carroll J, Feldman T, Borow KM. Contrast echocardiography in humans: Perfusion and anatomic studies. *J Am Coll Cardiol* 11:59 - 65, 1988.
53. Borow KM, Lang RM, Neumann A, Carroll JD, Rajfer S. Physiologic mechanisms governing the hemodynamic responses to positive inotropic therapy in dilated cardiomyopathy. *Circulation* 77:625 -637, 1988.
54. Lang RM, Briller RA, Neumann A, Borow KM. Assessment of global and regional left ventricular mechanics: Applications to myocardial ischemia. In *Echocardiography in Coronary Artery Disease*, Kerber R. (ed), Future Publishing Co., Inc., New York, Chap. 11:1 -37, 1988.
55. Lang RM, Fellner SK, Neumann A, Bushinsky DA, Borow KM. Left ventricular contractility varies directly with blood ionized calcium. *Ann Int Med* 108:524-529, 1988.
56. Lang RM, Borow KM, Neumann A, Carroll JD, Weinert L, Murphy MB, Gahli J, Rajfer SI. Role of the beta -2 adrenoceptor in mediating positive inotropic activity in the failing heart and its relationship to the hemodynamic actions of dopexamine. *Am J Cardiol* 62:46C -52C, 1988.
57. Neumann A, Lang RM, Borow KM. An integrated physiologic assessment of aortic stenosis using Doppler Echocardiography. *Cardio* 5:120 - 125, 1988.
58. Rajfer SI, Carroll JD, Lang RM, Neumann A, Borow KM. Effects of dopamine on left ventricular afterload and contractile state: Relationship to the activation of beta<sub>2</sub> - adrenoceptors and dopamine receptors. *J Am Coll Cardiol* 62:46C -52C, 1988.
59. Lang RM, Neumann A, David D, Borow KM. Physiological assessment of mitral stenosis. *Cardio* 7:52 -60,80,112, 1988.
60. Fellner SK, Lang RM, Neumann A, Spencer KT, Bushinsky DA, Borow KM. Physiologic mechanisms for calcium -induced changes in systemic arterial pressures. *Hypertension* 13:213 -218, 1989.
61. David D, Lang RM, Neumann A, Sareli P, Marcus R, Spencer KT, Borow KM. Comparison of Doppler indices of left ventricular diastolic function with simultaneous high fidelity left atrial and ventricular pressures in idiopathic dilated cardiomyopathy. *Amer J Cardiol* 64:1173 -1179, 1989.
62. Scott WJ, Neumann A, Karp, RB. Ultrasonic debridement of the aortic valve with six -month echocardiographic follow -up. *Amer J Cardiol* 64:1206 -1209, 1989.

63. Borow KM, Neumann A, Aransman FW, Yacoub MH. Cardiac and peripheral vascular responses to adrenoceptor stimulation and blockade after cardiac transplantation. *J Am Coll Cardiol* 14:1224 -1238, 1989.
64. Marcus RH, Neumann A, Borow KM, Lang RM. Transmitral flow velocity in symptomatic severe aortic regurgitation. Utility of Doppler for determination of preclosure of the mitral valve. *Am Heart J* 120:449-451,1990.
65. David D, Lang RM, Neumann A, Borow KM, Akselrod S, Mor -Avi V: Parasympathetically modulated antiarrhythmic action of lidocaine in atrial fibrillation. *Am Heart J* 119:1061 - 1068, 1990.
66. Borow KM, Jaspan JB, Williams KW, Neumann A, Wolinsky Walley P, Lang RM. Myocardial mechanics in young adult patients with diabetes mellitus: Effects of altered load, inotropic state and dynamic exercise. *J Am Coll Cardiol* 15:1508 -1517, 1990.
67. Moscucci M, Weinert L, Karp RB, Neumann A. Prediction of aortic annulus diameter by two-dimensional echocardiography: Application in the preoperative selection and preparation of homograft aortic valves. *Circulation* 84: Suppl III: 76-80, 1991.
68. Lang RM, Pridjian G, Feldman T, Neumann A, Lindheimer M, Borow KM. Left ventricular mechanics in preeclampsia. *Am Heart J* 121:1768-75,1991.
69. Borow KM, Neumann A, David D, Lang RM. The clinical use and accuracy of echo-Doppler techniques for assessing severity of disease in valvular stenotic lesions. Andries E, Stroobandt R, eds. *In Hemodynamics in Daily Practice*, Kluwer Academic Publishers, Netherlands. pp. 21-41, 1991.
70. Marcus RH, Weinert L, Neumann A, Borow KM, Lang RM. Venous air embolism: Diagnosis by spontaneous right -sided echocardiography. *Chest* 99:784 -785, 1991.
71. Marcus RH, Chua KG, Josephson M, Neumann A, Borow KM, Lang RM. Vagolytic therapy in acute cardiac tamponade associated with dissecting aortic aneurysm. *Am Heart J* 121:926 -929, 1991.
72. Marcus RH, Lang RM, Neumann A, Borow KM. A physiologic approach to drug therapy in dilated cardiomyopathy. *Echocardiography* 8:173 -186, 1991.
73. Santoro IH, Neumann A, Carroll JD, Borow KM, Lang RM. Pulsus paradoxus: A definition revisited. *J Am Soc of Echocardiography* 4:408-412, 1991.
74. Spencer KT, Lang RM, Neumann A, Borow KM. Doppler and electromagnetic comparisons of instantaneous aortic flow characteristics in primates. *Circ Research* 68:1369 -1377, 1991.
75. David D, Lang RM, Marcus RH, Neumann A, Spencer KT, Feldman T, Carroll JD, Sareli P, Borow KM. Doppler echocardiographic estimation of transmitral pressure gradients and correlations with micromanometer gradients in mitral stenosis. *Am J Cardiol* 67:1161 - 1164, 1991.



76. Fellner SK, Lang RM, Neumann A, Bushinsky DA, Borow KM. Parathyroid hormone and myocardial performance in dialysis patients. *Am J of Kidney Diseases* 18:320-5, 1991.
77. Lang RM, Marcus RH, Neumann A, Janzen D, Hansen D, Fujii A, Borow KM. A time-course study of the effects of pentobarbital, fentanyl and morphine chloralose on myocardial mechanics: comparison with conscious animal data. *J Appl Physiol.* 73:143-150, 1992.
78. Borow KM, Marcus RH, Neumann A, Lang RM. Modern non-invasive techniques for the assessment of ventricular function. *In: Heart Disease, Fourth Edition: Clinical Update.* Braunwald E, ed. 2:31-40, 1992.
79. Borow KM, Ehler D, Berlin R, Neumann A. Influence of histamine receptors on basal left ventricular contractile tone in humans: assessment using the H<sub>2</sub> receptor antagonist esmolol as pharmacologic probes. *J Am Coll Cardiol* 19:1229-36, 1992.
80. Borow KM, Neumann A, Marcus RH, Sareli P, Lang RM. Effects of simultaneous alterations in preload and afterload on measurements of left ventricular contractility in patients with dilated cardiomyopathy: comparisons of isovolumic, ejection phase and end-systolic force-velocity indexes. *J Am Coll Cardiol* 20:787-795, 1992.
81. Sochanski M, Lang RM, Weinert L, Bednarz J, Neumann A, Ehler D, David D. Hemodynamic prerequisites for the occurrence of diastolic mitral valve regurgitation. *Am J Cardiol* 17:1470-73, 1993.
82. Borow KM, Neumann A, Lang RM, Ehler D, Valentine - Bates B, Wolff A, Friday K, Murphy M. Noninvasive assessment of the direct action of oral nifedipine and nicardipine on left ventricular contractile state in patients with systemic hypertension: Importance of reflex sympathetic responses. *J Am Coll Cardiol* 21 939-49, 1993.
83. Marcus RH, Korcarz C, McCray G, Neumann A, Murphy M, Borow KM, Weinert L, Bednarz J, Gretler DD, Sareli P, Lang RM. Noninvasive method for determination of arterial compliance using Doppler echocardiography and subclavian pulse tracings: Validation and clinical application of a physiological model of the circulation. *Circulation* 89:2688-99, 1994.
84. Soble JS, Neumann A, Liebson, PR. Echocardiography in the critically ill. *In: Critical Care Medicine Principles of Diagnosis and Management.* Parnilo JE and Bone RC (eds.) Mosby-Year Book, Inc. St. Louis, MO (7:81-108), 1995.
85. Soble JS, Neumann A. Valvular heart disease producing critical illness. *In: Critical Care Medicine Principles of Diagnosis and Management.* Parnilo JE and Bone RC (eds.) Mosby-Year Book, Inc. St. Louis, MO. (30:533-50). 1995.
86. Stein JH, Brodenick L, Neumann A, Snell JR, Hanashiro PK, Caralis DG. A unique left-to-right shunt characterized by multimodality cardiac imaging. *Chest* 107: 1162-64, 1995.
87. Liebson PR, Soble JS, Neumann A. Echocardiography in the assessment of cerebrovascular events. *In: Atlas of Cerebrovascular Disease,* Gorelick PB (ed), Current Medicine Philadelphia, PA, 1996.

88. O'Connor CJ, Rothenberg DM, Soble JS, Macioch JE, McCarthy R, Neumann A, Truman KJ. The effect of esmolol pretreatment on the incidence of regional wall motion abnormalities during electroconvulsive therapy. *Anesth Analg* 82: 143-7, 1996.
89. Passen EL, Rodriguez ER, Neumann A, Tan CD, Parrillo JE. Cardiac Hemochromatosis: Images in Cardiovascular Medicine. *Circulation* 94: 2302-3, 1996.
90. Wu KL, Soble J, Stein J, Neumann A, Marcus RH, Roberge J: A method for noninvasively computing left atrial pressure. *Proceedings of the IEEE Computers in Cardiology*, p. 51, 1996.
91. Volgman AS, Soble JS, Neumann A, Mukhtar KN, Iftikhar F, Vallesteros A, Liebson PR. Effects of left atrial size on recurrence of atrial fibrillation after electrical cardioversion: Atrial dimension versus volume. *Am J Cardiac Imaging*, 10: 261-5, 1997.
92. Lee SH, Saltzberg MT, Neumann A, Wolfer J, Soble JS, Roberge J: Using synthetic M-mode imaging to measure temporal differences in left ventricular contraction patterns during ischemia. *Proceedings of the IEEE Computers in Cardiology*, 1997.
93. Stein JH, Neumann A, Preston LM, Costanzo MR, Parrillo JE, Johnson MR, Marcus RH: Echocardiography for the hemodynamic assessment of patients with advanced heart failure and potential heart transplant recipients. *J Am Coll Cardiol*, 30:1765-72, 1997.
94. Stein JH, Neumann A, Marcus RH: Clinical estimation of right atrial pressure from the jugular venous pulse: echocardiographic insights into accuracy and sources of error. *Am J Cardiol*, 80:1615-18, 1997.
95. Neumann A, Soble JS, Anagnos PC, Kagzi M, Parrillo JE. Accurate non-invasive estimation of left ventricular end-diastolic pressure: comparison with catheterization. *J Am Soc Echocardiogr.*, 11:126-31, 1998.
96. Soble JS, Yuirow G, Brar R, Satmos T, Neumann A, Garcia M, Stoddard MF, Cherian PK, Bhamb B, Thomas JD. Comparison of MPEG digital video with super VHS tape for diagnostic echocardiographic readings. *J Am Soc Echocardiogr.*, 11:819-25, 1998.
97. Stein JH, Neumann A, Preston LM, Vandenberg BJ, Parrillo JE, Calvin JE, Marcus RH. Improved risk stratification in unstable angina: Identification of patients at low risk for in-hospital cardiac events by admission echocardiography. *Clin Cardiol*, 21:725-30, 1998.
98. Lee SH, Saltzberg M, Soble J, Neumann A, Roberge J. Using temporal analysis of regional synthetic M-mode images to identify stress-induced myocardial ischemia. *Computers in Cardiology*;25:241-4, 1998.
99. Kim B, Stamos T, Neumann A, Soble JS, Roberge J. Fully automated stroke volume determination from digital color flow echocardiographic images. *Computers in Cardiology*; 26:169-72, 1999.

100. Garcia MJ, Thomas JD, Greenberg N, Sandelski J, Herrera C, Mudd C, Wicks J, Spencer K, Neumann A, Sankpal B, Soble J. Comparison of MPEG-1 digital videotape with digitized sVHS videotape for quantitative echocardiographic measurements. *J Am Soc Echocardiogr*, 14(2):114-21, 2001.
101. Hollenberg SM, Dumasius A, Easington C, Colilla SA, Neumann A, Parrillo JE. Characterization of a hyperdynamic murine model of resuscitated sepsis using echocardiography. *Am J Resp Crit Care Med*, 164:891-895, 2001.
102. Kumar A, Anel A, Bunnell E, Zanotti S, Habet K, Haery C, Marshall S, Neumann A, Ali A, Kavinsky C, Parrillo JE: Preload-independent mechanisms are partially responsible for improved cardiac output following large volume saline infusion in normal volunteers. *Critical Care*, 8:R128-R136, 2004.
103. Kumar A, Anel R, Bunnell E, Habet K, Neumann A, Wolff D, Rosenson R, Cheang M, Parrillo JE: Effect of large volume infusion on left ventricular volumes, performance and contractility parameters in normal volunteers. *Intensive Care Med*, 30:1361-1369, 2004.
104. Kumar A, Anel R, Bunnell E, Habet K, Zanotti S, Marshall S, Neumann A, Ali A, Kavinsky C, Cheang M, Parrillo JE. PWP and CVP fail to predict ventricular filling volume, cardiac performance or the response to volume infusion in normal subjects. *Crit Care Med.*, 32; 691-699, 2004.
105. Kumar A, Bunnell G, Lynn M, Anel R, Habet K, Neumann A, Parrillo JE: Experimental human endotoxemia is associated with depression of load-independent contractility indices\* Prevention by the lipid A analogue E5531. *CHEST* 126:860–867, 2004.
106. Kumar A, Zanotti S, Bunnell G, Habet K, Anel R, Neumann A, Cheang M, Cutler D, Parrillo JE: Interleukin-10 administration blunts the pro-inflammatory cytokine and metabolic response without affecting hemodynamic response to endotoxin challenge in healthy volunteers. *Crit Care Med.*, 33; 331-340, 2005

## **Abstracts:**

1. DeMaria AN, Amsterdam EA, Vismara LA, Markson W, Brocchini R, Neumann AL, Mason DT. Prevalence, nature and frequency of arrhythmias in the mitral valve prolapse syndrome during ambulatory monitoring. *Clin Res* 23:78, 179, 1975.
2. DeMaria AN, Lies J, King J, Neumann AL, Miller RR, Vismara LA, Amsterdam EA, Mason DT. Abnormalities of left ventricular segmental contraction on echogram in coronary disease: Correlation with cineangiography and electrocardiography. *Clin Res* 23:78, 179, 1975.
3. DeMaria AN, Neumann AL, Amsterdam EA, Vismara LA, Miller RR, Mason DT. Relative potency of provocative maneuvers to induce outflow obstruction in idiopathic hypertrophic subaortic stenosis: Valsalva > isoproterenol > amyl nitrate > post -extrasystole. *Clin Res* 23:78, 179, 1975.
4. DeMaria AN, Neumann A, Tonkon MJ, Mason DT. Noninvasive assessment of digitalis - induced increase in contractility in normal man. Superiority of systolic time intervals compared to echocardiographic fiber shortening rate. *Clin Res* 23:78, 1975.
5. DeMaria AN, Vismara LA, Neumann AL, Angel J, Amsterdam EA, Mason DT. Mitral valve motion, cardiac dimensions and left ventricular performance determined by echogram in clinical ischemic papillary muscle dysfunction. *Clin Res* 23:79, 179, 1975.
6. Olson HG, DeMaria AN, Angel J, Miller RR, Mason DT. Quantification of aortic stenosis by assessment of the mitral valve early diastolic closing velocity on echogram. *Clin Res* 23:83, 200, 1975.
7. DeMaria AN, Bogren H, Caudill CC, Vismara LA, Miller RR, Amsterdam EA, Neumann AL, Mason DT. Evaluation of the non -valvular factors of cardiac performance, left ventricular contractile pattern and coronary anatomy of the mitral valve prolapse syndrome. *Amer J Cardiol* 35:132, 1975.
8. DeMaria AN, Angel J, Amsterdam EA, Neumann AL, Miller RR, Mason DT. Effects of sodium nitroprusside on left ventricular size and performance in myocardial infarction determined by ultrasound. *The Pharmacologist* 17:244, 1975.
9. DeMaria AN, Vera Z, Neumann AL, Awan N, Mason DT. Alterations in ventricular contraction pattern in the Wolff -Parkinson -White syndrome: Detection by echocardiography. *Circulation* 52:Suppl III:33, 1975.
10. DeMaria AN, Neumann AL, Amsterdam EA, Vismara LA, Miller RR, Mason DT. Comparative sensitivity of provocative tests on outflow obstruction in idiopathic hypertrophic subaortic stenosis. *Circulation* 52:Suppl II:175, 1975.
11. DeMaria AN, Neumann AL, Lee G, Fowler W, Angel J, Mason DT. Echocardiographic documentation of improved cardiac performance induced by exercise training. *Circulation* 52:Suppl II:222, 1975.

12. Neumann AL, DeMaria AN, Vismara LA, Angel J, Amsterdam EA, Mason DT. Echocardiographic characteristics of papillary muscle dysfunction due to coronary heart disease. *Circulation* 52:Suppl II:222, 1975.
13. Angel J, DeMaria AN, Neumann AL, Miller RR, Mason DT. Effects of sodium nitroprusside on left ventricular size and performance in myocardial infarction determined by ultrasound. 20th Annual Conference, American Institute of Ultrasound in Medicine. Winston - Salem, North Carolina, October, p 99 1975.
14. Angel J, DeMaria AN, Amsterdam EA, Miller RR, Neumann AL, Weinert L, Mason DT. Alterations in left ventricular size and performance induced by sodium nitroprusside in myocardial infarction patients: Evaluation by echocardiography. *Clin Res* 24:2:80, 1976.
15. DeMaria AN, Neumann AL, Lee G, Fowler W, Angel J, Mason DT. Echocardiographic documentation of the ability of exercise training to enhance cardiac performance. *Clin Res* 24:2:81, 1976.
16. Neumann AL, Vismara LA, Angel J, Amsterdam EA, Mason DT, DeMaria AN. Specific echographic features of papillary muscle dysfunction in coronary heart disease: Ultrasound profile of depressed cardiac function, diffuse dyssynergy and mitral accelerated closure with distinctive double configuration. *Amer J Cardiol* 37:159, 1976.
17. Neumann AL, DeMaria AN, Miller RR, Mason DT. Quantification and etiologic significance of mitral and interventricular septal flutter on echogram in patients with aortic regurgitation. *Proc World Federation Ultrasound in Medicine*, San Francisco, August, 1976.
18. DeMaria AN, Neuman AL, Tonkon MJ, Mason DT. Clinical superiority of systolic time intervals compared to echographic fiber shortening rate determined by digitalis -induced increase in contractility. *Circulation* 54:Suppl 2:214, 1976.
19. Joye J, DeMaria AN, Neumann AL, Miller RR, Vismara LA, Mason DT. Electrocardiographic abnormalities in hypertrophic cardiomyopathy: Relation to cardiac hypertrophy and intra - ventricular obstruction. *Circulation* 54:Suppl 2:209, 1976.
20. Neumann AL, DeMaria AN, Miller RR, Mason DT. Noninvasive quantification of valvular aortic stenosis by echographic mitral valve early diastolic closing velocity. *Circulation* 54:Suppl 2:83, 1976.
21. Lee G, DeMaria AN, Miller RR, Bogren H, Neumann AL, Joye JA, Mason DT. Relation of coronary artery diameter to left ventricular hypertrophy in man: Demonstration of coronary enlargement less proportional than cardiac mass. *Clin Res* 25:92, 233, 1977.
22. Barr S, DeMaria AN, Neumann AL, Weinert L, Miller RR, Mason DT. Left ventricular mass in valvular heart disease: Echocardiographic - electrocardiographic correlations. *Clin Res* 25:207, 1977.
23. DeMaria AN, Riggs K, Bogren H, Miller RR, Vismara LA, Neumann AL, Mason DT. Observer variability in the cineangiographic diagnosis in mitral valve prolapse syndrome. *Clin Res* 25:216, 1977.

24. DeMaria AN, Neumann AL, Schubart P, Lee G, Mason DT. Systematic correlation of cardiac size and performance with alterations in heart rate in man determined by echocardiography. *Clin Res* 25:216, 1977.
25. Harris FJ, Tonkon MJ, Miller RR, DeMaria AN, Yucht S, Neumann AL, Borhani NO, Mason DT. Clinical pharmacology of the new beta blocking agent, timolol, in the treatment of chronic essential hypertension: Noninvasive cardiovascular and pulmonary assessment of efficacy. *Clin Res* 25:92, 1977.
26. Neumann AL, DeMaria AN, Miller RR, Mason DT. Quantitative and etiologic significance of mitral and interventricular septal flutter on echogram in patients with aortic regurgitation. *Clin Res* 25:252, 1977.
27. Weinert L, Bommer WJ, Neumann AL, George L, Mason DT, DeMaria AN. Evaluation of right atrial and right ventricular size by cross - sectional echocardiography: Comparison of normal and right ventricular overload. *Circulation* 56:Suppl 2:24, 1977.
28. DeMaria AN, Bommer WJ, Weinert L, Neumann AL, Mason DT. Abnormalities of cardiac structure in mitral prolapse syndrome: Evaluation by cross -sectional echocardiography. *Circulation* 56:Suppl 2:111, 1977.
29. DeMaria AN, Neumann AL, Schubart P, Lee G, Mason DT. Systematic correlation of cardiac size and performance to alterations in heart rate in man determined by echocardiography. *Circulation* 56:Suppl 2:219, 1977.
30. Kaku R, Neumann AL, Bommer WJ, Weinert L, Mason DT, DeMaria AN. Sensitivity and specificity of the pulmonic valve echogram. *Circulation* 58:Supp 2:232, 1978.
31. Kaku R, Neumann AL, Bommer WJ, Weinert L, Mason DT, DeMaria AN. Usefulness of the pulmonic valve echogram in the detection of pulmonary hypertension. *Clin Res* 26:94, 1978.
32. Bommer WJ, Neef J, Neumann AL, Weinert L, Lee G, Mason DT, DeMaria AN. Indicator - dilution curves obtained by photometric analysis of two -dimensional echo -contrast studies. *Amer J Cardiol* 41:370, 1978.
33. DeMaria AN, Bommer WJ, George L, Neumann AL, Weinert L, Mason DT. Combined peripheral venous injection and cross -sectional echocardiography in the evaluation of cardiac disease. *Amer J Cardiol* 41:370, 1978.
34. Pratt C, Whitcomb C, Neumann AL, Mason DT, Amsterdam EA, DeMaria AN. Relationship of vegetations on echogram to the clinical course and systemic emboli in bacterial endocarditis. *Amer J Cardiol* 41:384, 1978.
35. Neumann AL, Bommer WJ, Weinert L, Grehl T, Mason DT, Amsterdam EA, DeMaria AN. Identification of left ventricular thrombi by cross - sectional echocardiography. *Amer J Cardiol* 41:392, 1978.
36. Bommer WJ, Yoon D, Grehl T, Mason DT, Neumann AL, DeMaria AN. In vitro and in vivo evaluation of porcine bio -prostheses by cross - sectional echocardiography. *Amer J Cardiol* 41:405, 1978.

37. Oliver L, Neumann AL, Miller RR, Mason DT, DeMaria AN. Detection of myocardial dysfunction in mitral regurgitation by echogram: Comparison of wall thickening with angiographic measurements. *Clin Res* 26:257, 1978.
38. Lee G, DeMaria AN, Miller RR, Bogren H, Neumann AL, Joye JA, Mason DT. Relation of coronary artery diameter to left ventricular hypertrophy in man: Coronary enlargement less proportional than cardiac mass. *Clin Res* 26:246, 1978.
39. DeMaria AN, Riggs K, Bogren H, Miller RR, Lee G, Neumann AL, Mason DT. Observer variability in the cineangiographic diagnosis of mitral valve prolapse syndrome. *Clin Res* 26:227, 1978.
40. Bommer WJ, Bogren H, Neumann AL, Mason DT, DeMaria AN. Localization of calcium in the mitral valve annulus: Comparison of M-mode and two-dimensional echocardiography. *Clin Res* 26:220, 1978.
41. DeMaria AN, Bommer WJ, Neumann AL, Weinert L, Miller RR, Joye JA, Mason DT. Value and limitations of cross-sectional echocardiography in the diagnosis and quantification of valvular aortic stenosis. *Clin Res* 26:227, 1978.
42. Bommer WJ, Weinert L, Neff J, Neumann AL, Vera Z, Mason DT, Klein RC, DeMaria AN. The magnitude and temporal sequence of abnormal septal contraction in left bundle branch block: Evaluation by two-dimensional echocardiography. *Clin Res* 26:221, 1978.
43. Klein RC, Vera Z, Neumann AL, DeMaria AN, Mason DT. Electrocardiographic diagnosis of left ventricular hypertrophy in the presence of left bundle branch block. *Clin Res* 26:244, 1978; *Circulation* 58:Suppl 2:197, 1978.
44. DeMaria AN, Bommer WJ, Neumann AL, Weinert L, Barstow T, Kaku R, Mason DT. Evaluation of tricuspid valve prolapse by two-dimensional echocardiography. *Circulation* 58:Suppl 2:43, 1978.
45. DeMaria AN, Joye JA, Bommer WJ, Neumann AL, Weinert L, Lee G, Mason DT. Sensitivity and specificity of cross-sectional echocardiography in the diagnosis and quantification of valvular aortic stenosis. *Circulation* 58:Suppl 2:232, 1978.
46. Weinert L, Bommer W, Neumann AL, Mason DT, DeMaria AN. Evaluation of septal configuration, papillary muscle position, and dynamics of outflow obstruction in hypertrophic cardiomyopathy by two-dimensional echocardiography. *Circulation* 58:Suppl 2:228, 1978.
47. Bommer WJ, Neumann AL, Mason DT, DeMaria AN. In vivo evaluation of the catenoid shape of the interventricular septum in idiopathic hypertrophic subaortic stenosis with two-dimensional echocardiography. *Amer J Cardiol* 43:347, 1979.
48. Bommer WJ, Chun T, Kwan OL, Neumann AL, Mason DT. Biplane apex echocardiography versus biplane cineangiography in the assessment of left ventricular volume and function. *Amer J Cardiol* 45:471, 1980.

49. Tu'Meh SS, Tracy DA, Wynne J, Konstam MA, Kozlowski JF, Neumann AL, Olman BL. Scintigraphic diagnosis of tricuspid regurgitation. *Circulation* 64:Suppl 2:261, 1981.
50. Risser TA, Wynne J, Sloss LJ, Goldman L, Neumann AL, VanDevanter S, Koster JK Jr, Cohn LH, Collins JJ. Accuracy of two-dimensional echocardiography in screening for intracardiac thrombus. *Circulation* 64:Suppl 4:93, 1981.
51. Henschke C, Risser TA, Wynne J, Neumann AL, Hanlon WB, Sandor T. Quantitative regional left ventricular motion and thickening by computer-assisted echocardiography. *Circulation* 66:Suppl II:188, 1982.
52. Borow KM, Colan S, Neumann AL. Effects of preload augmentation on the left ventricular end-systolic indices of contractile state in humans. *Clin Res* 31:702, 1983.
53. Hansen DE, Neumann AL, Schumacker PT, Borow KM, Wood LDH. Does acute lung injury depress left ventricular function? *Chest* 86:294, 1984.
54. Feldman T, Childers R, Borow KM, Neumann A, Lang RM. Effect of changes in left ventricular chamber size on electrocardiographic R wave amplitude. *Clin Res* 32:778A, 1984.
55. Borow KM, Come P, Neumann A, Baim DS, Braunwald E, Grossman W. Milrinone (WIN 47203): Differentiation of its inotropic and vasodilator effects in humans. *J Am Coll Cardiol* 3:472, 1984.
56. Borow KM, Neumann A, Arensman FW, Radley-Smith R, Yacoub MH. Inotropic and chronotropic effects of beta-receptor stimulation and blockade after cardiac transplantation. *Clin Res* 32:776, 1984.
57. Feldman T, Childers RW, Borow KM, Neumann A, Lang RM. Relation of ECG R wave amplitude to changes in left ventricular size. *Circulation* 70:Suppl II:434, 1984.
58. Hansen DE, Borow KM, Neumann A, Schumacker PT, Wood LDH. Does acute lung injury related cardiomyopathy exist? *Circulation* 70:Suppl II:381, 1984.
59. Walley K, Hersh N, Borow KM, Neumann A, Schumacker P, Wood LDH. Reduced resistive afterload does not change the left ventricular end-systolic pressure-dimension relation in fentanyl anesthetized dogs. *Fed. Proc.* 44(4):1017, 1985.
60. Lang RM, Borow KM, Neumann A, Feldman T. Unmasking of the negative inotropic effect of acute ethanol ingestion. *Circulation* 70:Suppl II:118, 1984.
61. Borow KM, Neumann A, Arensman FW, Radley-Smith R, Yacoub MH. Left ventricular contractile state and reserve capacity in humans after cardiac transplantation. *Circulation* 70:Suppl II:46, 1984.
62. Carroll JD, Chua KG, Neumann A, Borow KM. Heterogeneity of the ischemic response to coronary occlusion during angioplasty: Role of collaterals. *Clin Res* 32:777, 1984.
63. Colan S, Borow KM, Neumann A. Echocardiographic diastolic function indices: Effect of preload, afterload and contractile state. *Circulation* 70:Suppl II:455, 1984.



64. Lang RM, Borow KM, Neumann A, Feldman T. Adverse cardiac effects of acute alcohol ingestion in young adults. *Clin Res* 32:779A, 1984.
65. Feldman T, Borow KM, Neumann A, Sarne DH, Lang RM, DeGroot LJ. What are the factors influencing augmented left ventricular shortening in hyperthyroidism? *J Am Coll Cardiol* 5:535, 1985.
66. Borow KM, Lang RM, Neumann A. Does dobutamine's afterload reducing effect contribute significantly to its physiologic mechanism of action? *J Am Coll Cardiol* 5:509, 1985.
67. Feinstein SB, Lang RM, Frederickson ED, McCoy CE, Borow KM, Neumann A. A new standardized model for regional myocardial perfusion by contrast echocardiography. *Clin Res* 33:183, 1985.
68. Williams KA, Feinstein SB, Neumann A, Carroll JD, Freir PA, Kremser CB, Al - Sadir J, Chua KG, Borow KM. Microbubble contrast echocardiography for the assessment of valvular regurgitation: Comparison with cineangiography and Doppler echocardiography. *Clin Res* 33:238, 1985.
69. Borow KM, Neumann A, Arensman F, Yacoub M. Clinical evidence for differential sensitivity of alpha and beta adrenergic receptors after cardiac transplantation. *Circulation* 72:Suppl III:129, 1985.
70. Feinstein SB, Lang RM, Neumann A, Al -Sadir J, Chua KG, Carroll JD, Keller MW, Powsner SM, Borow KM. Intracoronary contrast echocardiography in humans: Perfusion and anatomic correlates. *Clin Res* 33:483, 1985; *Circulation* 72:Suppl III:57, 1985.
71. Lang R, Borow KM, Neumann A, Janzen D, Altman D. Systemic vascular resistance: An unreliable index of left ventricular afterload. *Clin Res* 33:810, 1985.
72. Lang RM, Feinstein SB, Powsner SM, McCoy C, Frederickson E, Neumann A. Contrast ultrasonography of the kidney: A new method for evaluating renal perfusion. *Clin Res* 33:810, 1985.
73. McElroy PA, Chua KG, Jain A, Neumann A, Borow KM. Pacing -induced ischemia post infarction: Evaluation of patients after streptokinase. *Clin Res* 33:812, 1985.
74. Neumann A, Borow KM, Shroff SG, Janzen D, Altman D. Measurement of systemic input impedance: A new application of Doppler echocardiography. *Clin Res* 33:814, 1985.
75. Carroll JD, Lang R, Neumann A, Borow KM, Rajfer S. Differential effects of positive inotropic and vasodilator therapy on diastolic properties in dilated cardiomyopathy. *Circulation* 72:Suppl III:368, 1985.
76. Lang R, Borow KM, Neumann A, Feinstein SB. Echo contrast agents: Effect of sonicated microbubbles and carrier solutions on left ventricular contractility. *Circulation* 72:Suppl III:368, 1985.

77. Borow KM, Lang R, Neumann A, Carroll JD, Rajfer S. Dopamine vs dobutamine: Inotropic and afterload effects in dilated cardiomyopathy. *Circulation* 72:Suppl III:304, 1985.
78. Borow KM, Lang R, Neumann A, Carroll JD, Rajfer S. Limiting effects of positive inotropic therapy for the failing left ventricle. *Circulation* 72:Suppl III:304, 1985.
79. Feinstein SB, Lang R, Geiser E, Powsner S, Neumann A, Borow KM. A new method for real time assessment of regional myocardial perfusion. *J Am Coll Cardiol* 7:189, 1986.
80. Lang R, Borow KM, Neumann A, Al -Sadir J, Feinstein SB. Effect of intracoronary injections of sonicated microbubbles on left ventricular contractility in humans. *J Am Coll Cardiol* 7:189, 1986.
81. Neumann A, Borow KM, Shroff S, Janzen D, Altman D. Assessment of left ventricular - systemic arterial coupling: A new application of Doppler echocardiography. *J Am Coll Cardiol* 7:60, 1986.
82. Feinstein SB, Lang RM, Dick C, Powsner S, Keller M, Neumann A, Borow KM. Human Perfusion Studies: Intracoronary contrast echocardiography. Presented at the Joint Scientific Sessions Councils on Circulation and Basic Science, Snowmass, Colorado, 1986.
83. Silverman PR, Feinstein SB, Lang RM, Powsner SM, Janzen DL, Wolinski PE, Neumann A, Borow KM. Hemodynamic effects of contrast echo solutions. *Clin Res* 34:344A, 1986.
84. Lang RM, Feinstein SB, Powsner SM, McCoy C, Frederickson E, Neumann A, Goldberg LI, Borow KM. A new method for real -time assessment of renal perfusion. *Clin Res* 34:601A, 1986; *Anesth* 65(3A):27, 1986.
85. Carroll JD, Lang RM, Neumann A, Borow KM, Rajfer SI. Left ventricular filling dynamics in dilated cardiomyopathy. Presented at the Annual Meeting for the Advancement of Medical Instrumentation. Special Symposium on Cardiac Mechanics, Chicago, Illinois, 1986.
86. Borow KM, Lang R, Neumann A, Janzen D, Altman D. Systemic vascular resistance: An unreliable index of left ventricular afterload. *J Am Coll Cardiol* 7:35, 1986.
87. Borow KM, Neumann A, Shroff SG, Janzen D. Noninvasive assessment of the left ventricle as a pulsatile pump: Effects of inotropic and afterload challenges on ventricular power. *J Am Coll Cardiol* 7:34, 1986.
88. Spencer KT, Borow KM, Neumann A, Reisman L, Powsner S. Effects of heart rate on aortic pressure, flow, and energetics in humans: A noninvasive study. *Clin Res* 34:902, 1986.
89. Feldman T, Borow KM, Lang RM, Neumann A, Fellner SK. Left ventricular performance during hemodialysis: a clinical model for differentiation of simultaneous changes in preload, afterload, peripheral resistance, and contractility. *Clin Res* 34:893, 1986.
90. Borow KM, Spencer KT, Neumann A, Weber R, Powsner S, Murphy M. Noninvasive hemodynamic profile of systemic hypertension in humans: Pressure, flow, and energy characteristics. *Circulation* 74:Suppl IV:1691, 1986.

91. Lang RM, Feinstein SB, Feldman T, Chua KG, Neumann A, Borow KM. Contrast echocardiography for evaluation of myocardial perfusion: Effects of coronary angioplasty. Presented at Chicago Cardiology Group, Chicago, Illinois, 1986; *Circulation* 74:Suppl IV:1890, 1986.
92. Lang RM, Borow KM, Neumann A, Bushinsky DA, Fellner SK. Effects of varying serum ionized calcium concentration on left ventricular contractility in humans. *Clin Res* 34:897, 1986; *Circulation* 74:Suppl IV:1595, 1986.
93. Briller RA, Neumann A, Lang RM, Borow KM. Reliability of 2d echo for wall stress analysis: A global and regional study. *Clin Res* 34:890A, 1986.
94. Borow KM, Jaspán J, Williams KA, Neumann A, Altmann D, Lang RM. Diabetic cardiomyopathy in young adult patients: Fact or fiction? *Clin Res* 34:900, 1986, *Circulation* 74: Suppl IV:1778, 1986.
95. Reisman L, Lang RM, Neumann A, Spencer KT, Borow KM. Does increased heart rate alter LV contractile state in humans? *J Am Coll Cardiol* 9:43A, 1987.
96. Lang RM, Feinstein SB, McCoy CE, Frederickson ED, Neumann A, Powsner SM, Goldberg LI, Borow KM. Contrast ultrasonography of the kidney: a new method for in vivo evaluation of renal perfusion. *J Am Coll Cardiol* 9:215A, 1987.
97. Feinstein SB, Lang RM, Neumann A, Al-Sadir J, Chua KG, Carroll JD, Borow KM. Contrast echocardiography during cardiac catheterization to assess regional myocardial perfusion in humans. *J Am Coll Cardiol* 9:113A, 1987.
98. Lang RM, Borow KM, Neumann A, Spencer KT, Bushinsky DA, Fellner SK. Effects of blood ionized calcium on myocardial mechanics in humans. *J Am Coll Cardiol* 9:6A, 1987.
99. Borow KM, Neumann A, Briller R, Spencer KT, Werth D. Can the modified Bernoulli equation be used to accurately determine intraventricular pressures throughout systole in patients with valvular aortic stenosis. *J Am Coll Cardiol* 9:236A, 1987.
100. Spencer KT, Lang RM, Shroff SG, Neumann A, Borow KM. Can Doppler echocardiography accurately assess instantaneous aortic flow characteristics? Comparisons with simultaneous electromagnetic flow meter. *Circulation* 76:Suppl IV:95, 1987.
101. Lang RM, Borow KM, Neumann A, Marcus R, Sareli P. Is atrial pacing an effective therapeutic option for improving left ventricular performance in dilated cardiomyopathy? *Clin Res* 35:834A, 1987.
102. Borow KM, Neumann A, Lang RM, Sareli P, Marcus R, Rajfer SI. Influence of preload on  $(dP/dt)_{max}$  in dilated cardiomyopathy. *Clin Res* 35:828A, 1987.
103. Fellner SK, Bushinsky DA, Lang RM, Neumann A, Borow KM. Blood ionized calcium modulates left ventricular contractility in hemodialysis patients. *Kidney Int* 31:346A, 1987.

104. Lang RM, Borow KM, Pridjian G, Feldman T, Neumann A, Wolinsky P, Lindheimer M. Depressed left ventricular function in preeclampsia: Increased afterload or cardiomyopathy? *Circulation* 76:Suppl IV:95:460, 1987.
105. Lang RM, Borow KM, Neumann A, Carroll JD, Weinert L, Rajfer SI. Role of the beta -2 adrenoceptor in mediating positive inotropic activity in the failing ventricle. *Circulation* 76:Suppl IV:95:460, 1987.
106. Lang RM, Borow KM, Neumann A, Carroll JD, Weinert L, Rajfer SI. An assessment of the positive inotropic and afterload reducing effects of dopexamine hydrochloride in heart failure. Symposium on "Focus on heart failure." Proceedings 18: Paris, France 1987.
107. Lang RM, Carroll JD, Rajfer SI, Weinert L, Neumann A, Borow KM. Limitations of the coefficient of passive chamber stiffness in dilated cardiomyopathy. *J Am Coll Cardiol* 11:36A, 1988; 1st International Symposium on Heart Failure - Mechanisms and Management. Jerusalem, Israel 140:1989.
108. David D, Lang RM, Neumann A, Spencer KT, Sareli P, Marcus R, Borow KM. Reliability of Doppler derived indices of left ventricular diastolic function in patients with dilated cardiomyopathy: Comparison with simultaneously obtained left atrial and ventricular micromanometer pressures. *J Am Coll Cardiol* 11:119A, 1988.
109. Borow KM, Neumann A, Lang RM. The end -systolic pressure -dimension relation: A reliable measure of left ventricular contractility in myopathic ventricles? *J Am Coll Cardiol* 11:244A, 1988.
110. Borow KM, Neumann A, Lang RM, Sareli P, Marcus R, Rajfer SI. Assessment of left ventricular contractility in dilated cardiomyopathy: Comparison of non -ejection phase indices. *J Am Coll Cardiol* 11:142A, 1988.
111. Borow KM, Feldman T, Neumann A, Lang RM, Chiu CY, Carroll JD. Time related changes in left ventricular contractility after balloon aortic valvuloplasty. *J Am Coll Cardiol* 11:235A, 1988.
112. Neumann A, Spencer KT, Lang RM, Paix G, Sareli P, Marcus R, Borow KM. Is it possible to obtain an accurate Doppler estimate of stroke volume in patients with decreased forward flow? *J Am Coll Cardiol* 11:121A, 1988.
113. Marcus RH, Sareli P, Borow KM, Lang RM, Neumann A, Di Nicola G. Is amrinone a positive inotrope? 15th Southern African Cardiac Congress, Cape Town, 1988 (Proceedings: 12A, 1988)
114. Pridjian G, Lang RM, Feldman T, Neumann A, Borow KM, Lindheimer M. Cardiac output and load independent left ventricular contractility in preeclampsia assessed noninvasively. International Society for the study of hypertension, 1988.
115. Lang RM, Borow KM, Weinert L, Bednarz J, Neumann A, Nelson K, David D, Murphy MB. Nocturnal blood pressure: An important determinant of left ventricular hypertrophy in hypertensive patients. *Clin Res* 36:841A, 1988.

116. Borow KM, Neumann A, Sareli P, Marcus R, Lang RM. Physiologic evaluation of the major determinants of myocardial oxygen consumption in patients with dilated cardiomyopathy. *Clin Res* 36:816A, 1988.
117. David D, Neumann A, Lang RM, Sareli P, Marcus R, Borow KM. Correlation between simultaneously recorded Doppler and catheter measurements of instantaneous transmitral pressure gradients in patients with dilated cardiomyopathy. *Clin Res* 36:817A, 1988.
118. Neumann A, Lang RM, Fellner SK, Spencer KT, Bushinsky DA, Borow KM. Relationship between alterations in blood ionized calcium concentration and changes in systemic blood pressure. *Clin Res* 36:825A, 1988.
119. Borow KM, Lang RM, Bednarz J, Weinert L, Neumann A, Elliot WJ, Spencer KT, Murphy MB. Assessment of LV mechanics in high resistance versus high flow sustained hypertension. *Circulation* 78: Suppl II:75, 1988.
120. Lang RM, Borow KM, Weinert L, Bednarz J, Neumann A, Nelson K, David D, Murphy MB. Circadian blood pressure patterns in hypertensive patients: Importance of nocturnal blood pressure. *Circulation* 78: Suppl II:517, 1988.
121. Lang RM, Borow KM, Neumann A, Marcus R, Sareli P. Analysis of the variable effects of positive inotropic therapy on determinants of myocardial oxygen consumption in dilated cardiomyopathy. *Circulation* 78: Suppl II:28, 1988; 1st International Symposium on Heart Failure - Mechanisms and Management. Jerusalem, Israel 184:1989.
122. David D, Neumann A, Lang RM, Borow KM. Can the double product or triple product accurately predict myocardial oxygen consumption during changes in contractility? *Circulation* 78: Suppl II:55, 1988.
123. Lang RM, Fellner SK, Neumann A, Spencer KT, Bushinsky DA, Borow KM. Physiologic mechanisms for calcium -induced changes in blood pressures. *Circulation* 78: Suppl II:540, 1988.
124. McCray G, Lang RM, Murphy M, Spencer KT, Barnes E, Bednarz J, Weinert L, David D, Korcarz C, Neumann A, Borow KM. Noninvasive assessment of arterial compliance in patients with systemic hypertension. *J Am Coll Cardiol* 13:244A, 1989.
125. David D, Neumann A, Lang RM, Sareli P, Marcus R, Borow KM. Can the modified Bernoulli equation accurately estimate instantaneous transmitral pressure gradients in patients with cardiac pathology? *J Am Coll Cardiol* 13:234A, 1989.
126. Lang RM, David D, Neumann A, Weinert L, Borow KM. In vivo assessment of the independent effects of heart rate, contractility and systolic loading conditions on myocardial oxygen consumption. *J Am Coll Cardiol* 13:101A, 1989.
127. Neumann A, Feldman T, Borow KM, Lang RM, Ford L. Valve resistance in aortic stenosis: An alternative method for assessing the hemodynamic significance of flow obstruction. *J Am Coll Cardiol* 13:244A, 1989.

128. David D, Lang RM, Neumann A, Sareli P, Marcus R, Borow KM. In patients with dilated cardiomyopathy: Is the double product an accurate predictor of myocardial oxygen consumption during positive inotropic interventions? 1st International Symposium on Heart Failure - Mechanisms and Management. Jerusalem, Israel 75:1989.
129. Borow KM, Lang RM, Neumann A, Carroll JD, Rajfer SI. Physiologic mechanisms governing hemodynamic responses to positive inotropic therapy in patients with dilated cardiomyopathy. 1st International Symposium on Heart Failure - Mechanisms and Management. Jerusalem, Israel 136:1989.
130. David D, Lang RM, Neumann A, Spencer KT, Sareli P, Marcus R, Borow KM. In patients with dilated cardiomyopathy, does the Doppler derived E/A ratio accurately track changes in left ventricular diastolic function? Comparison with simultaneously obtained left atrial and left ventricular micromanometer pressures. 1st International Symposium on Heart Failure - Mechanisms and Management. Jerusalem, Israel 194:1989.
131. Lang RM, Borow KM, Neumann A, Carroll JD, Weinert L, Rajfer SI. Role of the beta -2 adrenoceptor in mediating positive inotropic activity in the failing ventricle. 1st International Symposium on Heart Failure - Mechanisms and Management. Jerusalem, Israel 653:1989.
132. Sochanski M, Weinert L, Lang RM, Neumann A, Ehler D, David D. Diastolic mitral regurgitation: Pathophysiology and hemodynamic prerequisites. Clin Res 37:889A, 1989.
133. Feldman T, Carroll JD, Neumann A, Chiu YC. Does annulus dilatation contribute to increased valve area from aortic valvuloplasty? Clin Res 37:876A, 1989.
134. David D, Lang RM, Korcarz C, Neumann A, Mor -Avi V, Axelrod S, Borow KM. Parasympathetic modulated antiarrhythmic action of lidocaine in atrial fibrillation. Circulation 80: Suppl II: 597, 1989.
135. Spencer K, Lang RM, Bednarz J, Neumann A, Weinert L, Chua KG, Al - Sadir J, David D, Borow KM. Noninvasive assessment of LV -systemic - arterial coupling using Doppler and calibrated subclavian artery tracings. Circulation 80: Suppl II: 170, 1989.
136. Chiu YC, Neumann A, Lang RM, Feldman T, Carroll JD. Power dissipation across the stenotic aortic valve. Circulation 80: Suppl II: 648, 1989.
137. Neumann A, Korcarz C, Lang RM, Sareli P, Marcus R, Borow KM. Comparison of Doppler vs catheterization derived dP/dt in dilated cardiomyopathy. Circulation 80: Suppl II: 175, 1989.
138. Borow KM, Lang RM, Neumann A, Weinert L, Marcus R, Sareli P. Effects of dopamine on left ventricular mechanics and energetics: Importance of differential receptor activation. J Am Coll Cardiol: 15:210A, 1990.
139. Lang RM, David D, Neumann A, Weinert L, Bednarz J, Korcarz C, Borow KM. Left ventricular pressure is an inadequate measure of fiber load in the force -length analysis of myocardial oxygen consumption. J Am Coll Cardiol: 15:49A, 1990.

140. Teplinsky K, Lang RM, Neumann A, Sareli P, Middlemost S, Essop R, Borow KM. Mechanisms regulating myocardial oxygen consumption in non -ischemic dilated cardiomyopathy. *J Am Coll Cardiol*: 15:100A, 1990.
141. Lythall D, Lang RM, Hruck J, Mitchell A, Neumann A, Ilsley C, Bassuk A, Borow KM, Yacoub M. Influence of donor heart "ischemic time" on left ventricular contractility in heart transplantation: Assessment using the conductance catheter. *British Cardiac Society* (In Press).
142. Murphy MB, Tiegar S, Sareli P, Neumann A, Fumo MA, Borow KM, Lang RM. Circadian variation in blood pressure in African and American blacks and American whites. *Amer Jour of Hypertension*: 3:37A, 1990.
143. McCray G, Neumann A, Sareli P, Essop R, Middlemost S, Korcarz C, Murphy MB, Borow KM, Lang RM. Validation of a new noninvasive method for determination of aortic capacitance. 13th Scientific Meeting of the International Society of Hypertension: *Jour of Hypertension* (8) (Suppl 3): 590,1990 and *Amer Jour of Hypertension*: 3:32A, 1990.
144. Marcus RH, Lang RM, Neumann A, Janzen D, Hansen D, Fujii A, Borow KM. Identification of a hemodynamically inert general anesthetic regimen in animals. *Clin Res* 38:883A, 1990.
145. Korcarz C, Neumann A, Essop R, Middlemost S, Borow KM, Lang RM. Comparison of simultaneous Doppler and electromagnetic measurements of instantaneous aortic flow characteristics in humans. *Clin Res* 38:808A, 1990, *Circulation* 82:III - 723, 1990.
146. McCray G, Marcus R, Korcarz C, Neumann A, Sareli S, Essop R, Middlemost S, Murphy MB, Borow KM, Lang RM. Validation of a new noninvasive method for determination of aortic compliance. *Clin Res* 38:814A, 1990.
147. Lang RM, Neumann A, Korcarz C, Marcus R, Spencer K, Sareli P, Borow KM. Validation of a new noninvasive method for determination of LV - peripheral vascular coupling. *Circulation* 82:Suppl III:734, 1990.
148. Weinstein NK, Carroll JD, Neumann A, Feldman T. Relation of the carotid shudder to turbulent blood flow in aortic stenosis. *Circulation* 82:Suppl III:735, 1990.
149. Moscucci M, Weinert L, Karp RB, Neumann A. Determination of aortic annulus diameter by 2D -Echo: Implications for the preoperative selection of homograft aortic valves. *Circulation* 82:Suppl III:482, 1990.
150. Neumann A, Fellner S, Korcarz C, Borow KM, Lang RM. Use of Doppler and external pulse tracings to detect changes in arterial compliance. *Circulation* 82:Suppl III -129A, 1990.
151. Lang RM, Fellner SK, Neumann A, Bushinsky D, Borow KM. Parathyroid hormone (PTH) and myocardial performance in dialysis patients. *Am Soc of Nephrology* 1:293, 1990.
152. Fellner SK, Santoro I, Lang RM, Neumann A. Cardiovascular performance in dialysis patients before and after correction of anemia with RHuEPO. *Am Soc of Nephrology* 1:397, 1990.

153. Santoro I, Neumann A, Borow KM, Fellner S, Lang RM. Use of erythropoietin to assess the pathophysiologic mechanisms regulating the high output state of chronic anemia. *J Am Coll Cardiol* 17:97A, 1991.
154. Bassuk A, Marcus R, Neumann A, Mitchell A, Ilesley C, Lythall D, Borow KM, Lang RM. Inferior vena caval balloon occlusion elicits neurohumorally mediated peripheral vascular responses. *J Am Coll Cardiol* 17:146A, 1991.
155. Lang RM, Ehler D, Valentine B, Neumann A, Weinert L, Bednarz J, Murphy M, Borow KM. Differential effect of B-blockers and calcium antagonists on aortic compliance and left ventricular afterload in patients with systemic hypertension. *J Am Coll Cardiol* 17:221A, 1991.
156. Borow KM, Neumann A, Ehler D, Valentine B, Murphy M, Lang RM. Unmasking of the intrinsic inotropic effect of vasodilators: a new method using pharmacologic probes. *J Am Coll Cardiol* 17:27A, 1991.
157. Marcus R, Weinert L, Bednarz J, McCray G, Neumann A, Bassuk A, Fumo M, Murphy M, Lang RM. Viscosity:compliance ratio -a new noninvasive age -sensitive index of arterial viscoelasticity. *J Am Coll Cardiol* 17:27A, 1991.
158. Marcus RM, McCray G, Lavenant M, Neumann A, Korcarz C. A new noninvasive method for determination of arterial viscoelastic properties -Comparison with invasive data and evaluation of model performance. *Am J Hypertension* 4:62A, 1991.
159. Marcus R, Weinert L, Neumann A, Borow K, Lang R. Differential sensitivity of myocardial oxygen consumption to changes in pulsatile and steady power output in dilated cardiomyopathy. *J Am Coll Cardiol* 19:107A, 1992.
160. Marcus R, David D, Neumann A, Weinert L, Borow K, Lang R. Double product does not predict myocardial oxygen demands during dobutamine stress testing. *J Am Soc Echocardiogr* 5:312, 1992.
161. Marcus R, Weinert I, Borow K, Neumann A, Lang R. In vivo dissection of the determinants of myocardial oxygen consumption in cardiomyopathy using physiologic probes. *Circulation* 86:Suppl 1:2577,1992.
162. Bjornstad K, Neumann A, Aakhus S, Hatle L, Borow KM. Effect of alterations in left ventricular loading conditions on the timing and magnitude of coronary blood flow during systole. *J Am Coll Cardiol* 21 (2): 371A (796-1), 1993.
163. Borow KM, Neumann A, Bjornstad K, Buland A, Aakhus A, Hatle L. Differentiation between alterations in regional afterload (wall stress) and depressed contractility in myocardial ischemia: use of finite element method. *J Am Coll Cardiol* 21(2): 372A(796-4), 1993.
164. Lang R, Marcus R, Neumann A, Weinert L, Sarelli P, Borow K. Effects of dopamine on left ventricular mechanics and energetics: importance of differential receptor activation. 2nd International Symposium on Heart Failure sponsored by the International Society of Heart Failure. *J Heart Failure* 1:383, 1993.



165. Soble JS, Neumann A, Anagnos PC, Kagzi MW, Liebson PR, Parrillo JE. Accurate non-invasive estimation of left ventricular end-diastolic pressure: comparison with catheterization, *Circulation* 88:suppl IV:1172, 1993.
166. Kakavas P, Soble JS, Kim DH, Neumann A, Liebson PR, Parrillo JE. Posterolateral wall thickening is relatively preserved in dilated cardiomyopathy, *Circulation* 88:Suppl IV:1626, 1993.
167. Lang R, Neumann A, Essop RM, Weinert L, Lukas MA, Sareli P. Mechanisms regulating myocardial oxygen consumption (MVO<sub>2</sub>) during initiation of high dose  $\beta$ -blockade with carvedilol in hypertensive cardiomyopathy, *Circulation* 88:Suppl IV:549, 1993.
168. Hollenberg, SM, Neumann, AL, Schupp, E, Parrillo, JE. Comparison of stroke volumes obtained by echocardiography and thermodilution in septic patients. *Crit Care Med* 22:A112, 1994.
169. Redfield MM, Neumann A, Tajik AJ, Seward JB, Borow KM. Effect of long acting oral felodipine and nifedipine on left ventricular contractility in patients with systemic hypertension: Differentiation between reflex sympathetic and direct contractile responses. *J Am Coll Cardiol* 23:348A(790-6), 1994.
170. Anagnos PC, Kelly RF, Soble JS, Neumann A, Liebson PR, Parrillo JE. Clinical and echocardiographic findings in patients with dynamic left ventricular mid-cavity obstruction. *J Am Coll Cardiol* 23:193A(894-11), 1994.
171. Kures PR, Soble JS, Neumann A, Jensen D, Pekofske A, Liebson PR, Parrillo JE. Frequency of intrapulmonary right to left shunt detected by contrast echocardiography in advanced liver disease. *J Am Soc Echocardiogr* 7:S63(27E), 1994.
172. Bunnell E, Neumann A, Lynn M, Friedhoff LT, Rogers SL, Habet K, Parrillo JE. E5531, An endotoxin antagonist blocks the hyperdynamic and depressant cardiovascular effects of endotoxin in healthy subjects. *Crit Care Med* 23:A151, 1995.
173. O'Connor CJ, Rothenberg DM, Soble JS, Macioch JE, McCarthy R, Neumann A. Regional wall motion abnormalities during electroconvulsive therapy: Effect of esmolol pretreatment. *Anesth Analg* 80:S352, 1995.
174. Soble JS, Neumann A, Anagnos PC, Kagzi M, Liebson PR, Parrillo JE. Accurate non-invasive estimation of left ventricular end-diastolic pressure: Comparison with catheterization. *J Heart Failure* 2(1): 561, 1995.
175. Soble JS, Volgman AS, Mukhtar KN, Iftikhar F, Valksteros A, Neumann A, Liebson PR. Effect of left atrial size by echocardiography on recurrence of atrial fibrillation after electrical cardioversion: Atrial dimension vs. volume. *J Am Soc Echocardiogr* 8: 368 (7B), 1995.
176. Tamburro PA, Kakavas PW, Neumann A, Tanis DH, Kim DH, Schaer GL, Liebson PR, Marcus RH, Soble TS. Comparison of integrated backscatter and conventional ultrasound tissue characterization during experimental coronary occlusion. *J Am Soc Echocardiogr* 8: 392 (31D), 1995.

177. Soble JS, Song I, Kim DH, Roberge J, Marcus RH. Computer generated synthetic m-mode: A new method for measurement of wall thickening as a parameter of regional left ventricular systolic function. *Circulation* 92: Suppl I: 1323, 1995.
178. Kakavas PW, March RJ, Macioch JE, Guynn TP, Neumann A, Elgar R, Najafi H, Parrillo JE, Liebson PR, Marcus RH. Effects of transmyocardial laser revascularization on regional left ventricular function and contractile reserve: Evaluation by resting and dobutamine stress echocardiography. Presented at Chicago Cardiology Group, Chicago, Illinois, 1995; *Circulation* 92: Suppl I: 842, 1995.
179. Stein JH, Neumann A, Preston LM, Soble JS, Quinn SM, Parrillo JE, Costanzo MR, Marcus RH, Johnson MR. Doppler/echocardiographic determination of transpulmonary gradient and pulmonary vascular resistance: An algorithm for assuring hemodynamic suitability for orthotopic heart transplantation. *J Heart Lung Trans* 15(2): S84(183), 1996.
180. Soble JS, Stamos T, Kim B, Neumann A, Stein JH, Kim DH, Parrillo JE, Roberge J, Marcus RH. Accuracy of computerized quantitative analysis of digital color flow doppler images for stroke volume determination. *J Am Coll Cardiol* 27(2):267A (984-114), 1996.
181. Soble JS, Stamos T, Kim B, Neumann A, Schmitt J, Harry M, Sehgal N, Schaer G, Hursey T, Roberge J, Marcus RH. Stroke volume from computerized analysis of digital Color flow images: Comparison with transonic flow probe. *J Am Coll Cardio* 27(2): 267A(984-113), 1996.
182. Bauer MR, Soble JS, Song I, Neumann A, Liebson PR, Parrillo JE, Roberge J, Marcus RH. Accuracy of computer generated synthetic M-mode for left ventricular regional wall thickening. *J Am Coll Cardiol* 27(2):7A (1050-2), 1996.
183. Stein JH, Neumann A, Preston LM, Soble JS, Quinn SM, Costanza MR, Parrillo JE, Johnson MR, Marcus RH. Non-Invasive determination of transpulmonary gradient and pulmonary vascular resistance in potential heart transplant candidates: Can right heart catheterization be avoided? *J Am Coll Cardiol* 27(2):143A(736-1), 1996.
184. Soble JS, Stein JH, Wu KL, Neumann A, Kim DH, Parrillo JE, Roberge J, Marcus RH. Computer assisted noninvasive measurement of left atrial pressure. *J Am Coll Cardiol* 27(2):7A (1050-1), 1996.
185. Stein JH, Neumann A, Preston LM, Rabin DL, Vandenberg BJ, Parrillo JE, Calvin JE, Marcus RH. Admission echocardiography predicts in-hospital cardiac events in patients with unstable angina. *J Am Coll Cardiol* 27(2):377A(1022-61), 1996.
186. Stein JH, Neumann A, Preston LM, Soble JS, Quinn SM, Parrillo JE, Johnson MR, Marcus RH. Is Doppler echo a non-invasive alternative to Swan-Ganz catheterization in patients with advanced heart failure? *J Am Coll Cardiol* 27(2):173A (757-1), 1996.

187. Wu KL, Soble JS, Stein J, Neumann A, Marcus RH, Roberge J. A method for non-invasively computing left atrial pressure. Presented at IEEE Computers in Cardiology Conf., Indianapolis, IN, 1996.
188. Song I, Roberge J, Neumann A, Marcus RH, Soble JS. Tracking regional left ventricular wall movement using 2D echocardiographic cine-loops in concert with synthetic M-mode images. Presented at IEEE Computers in Cardiology Conf., Indianapolis, IN, 1996.
189. Stamos TD, Kim B, Bokowski JW, Neumann A, Duffy EC, Roberge J, Marcus RH, Soble JS. Accuracy of computerized quantitative analysis of digital color flow images for determination of atrial septal defect flow. *Circulation* 94:Suppl I: 1378, 1996.
190. Stein JH, Neumann A, Marcus RH. Clinical estimation of right atrial pressure from the jugular venous pulse: Echocardiographic insights into accuracy and sources of error. *Circulation* 94: Suppl I: 2603, 1996.
191. Stamos TD, Kim B, Neumann A, Roberge J, Soble JS, Marcus RH. Fully automated stroke volume determination using computerized analysis of digital color flow images. *Circulation* 94: Suppl I: 2204, 1996.
192. Neumann A, Lang R, Essop MR, Weinert L, Lukas MA, Sareli P. Mechanisms regulating myocardial oxygen consumption during initiation of high-dose B-blockade with carvedilol in hypertensive cardiomyopathy. Milan, Italy. Proceedings 8th European Meeting on Hypertension: 15 (Suppl 4): 598 (P3.26), 1997.
193. Brar R, Yurow G, Neumann A, Stamos T, Garcia M, Stoddard M, Cherian PK, Thomas J, Soble JS. Comparison of MPEG digital image compression with super VHS for diagnostic echocardiography readings. *J Am Soc Echocardiogr* 10: 409 (102G), 1997.
194. Saltzberg MT, Neumann A, Marcus RH, Kraft SW, Soble JS. Comparison of anatomic M-mode derived regional LV wall thickening to paired ultrasonic crystals. *J Am Soc Echocardiogr* 10:427 (401R), 1997.
195. Lee SH, Saltzberg MT, Neumann A, Wolfer J, Soble JS, Roberge J. Using synthetic M-mode imaging to measure temporal differences in left ventricular contraction patterns during ischemia. *IEEE Computers in Cardiology Conf.*, Lund, Sweden, 1997.
196. March RJ, Macioch JE, Donoghue DO, Klontz BC, Neumann A, Liebson PR, Soble JS. Transmyocardial laser revascularization preserves segmental left ventricular contractile reserve: A blinded echocardiographic evaluation. *Circulation* 96:Suppl 1:3276, 1997.
197. Saltzberg MT, Lee SH, Roberge J, Neumann A, Soble JS. Quantitation of the temporal sequence of regional left ventricular contraction with ischemia: A synthetic M-mode study. *Circulation* 96:Suppl 1:2253, 1997.
198. Donoghue J, Macioch JE, Neumann A, Soble JS, Liebson PR, March RJ. Transmyocardial laser revascularization increases dobutamine-induced angina threshold in patients with refractory angina. *J Am Coll Cardiol* 31(2):226A (867-5), 1998.

199. Liebson PR, Saltzberg MT, Neumann AL. Echocardiographic assessment of the transplanted heart and ventricular assist devices. *J Heart Failure*. 5(1):117(#468), 1998.
200. Saltzberg MT, Neumann AL, Dumasius A, Liebson PR. The echocardiographic assessment of cardiac allograft rejection: A comparison of multiple parameters. *J Heart Failure*. 5(1):134(#535), 1998.
201. Neumann AL, Saltzberg MT, Dumasius A, Liebson PR. Detection of cardiac allograft rejection by the echocardiographic analysis of myocardial texture: An integrated backscatter study. *J Heart Failure*. 5(1):133(#529), 1998.
202. Lee SH, Saltzberg M, Soble J, Neumann A, Roberge J. Temporal analysis of regional synthetic M-mode to identify abnormal stress echocardiographic studies. *Computers in Cardiology* 1998;25:241-244 (Presented at Computers in Cardiology, 25<sup>th</sup> Annual Conference, Cleveland, OH, 1998)
203. Garcia MJ, Thomas JD, Greenberg N, Spencer K, Krauss D, Herrera C, DeLeo C, Neumann A, Sandelski J, Soble J. Comparison of MPEG-1 digital video with sVHS tape for quantitative echocardiographic measurements. *J Am Soc Echocardiogr* 1999;12:369 (Presented at the American Society of Echocardiography, 10<sup>th</sup> Annual Scientific Sessions, Washington, D.C.)
204. Saltzberg M, Neumann A, Dumasius A, Mattea A, Heroux A, Kao W, Winkel E, Costanzo M. Persistent unexplained heartmate<sup>TM</sup> left ventricular assist device tachycardia: using echocardiography to elucidate the underlying cause. (Presented at 9<sup>th</sup> Congress of the European Society for Organ Transplantation, Oslo, Norway, 1999).
205. Volgman AS, Neumann A, Pinski SI, Patel S, Trohman RG. Anatomic and hemodynamic correlates of signal-averaged P-wave duration. *PACE* 22(6), pt II:A41, 1999. (Presented at XI<sup>th</sup> World Symposium on Cardiac Pacing and Electrophysiology, Berlin, Germany, 1999)
206. Stamos T, Neumann A, Nwaukwa C, African americans develop greater wall mass in response to aortic stenosis. *J Am Coll Cardiol*. 35(2):533A(1160-54), 2000.
207. Heaven D, Neumann A, Haw J, Pinski SL, Trohman RG. Do non-thoracotomy implantable cardioverter - defibrillator leads cause significant tricuspid regurgitation? Presented at the 12<sup>th</sup> Interventional Congress on Cardiac Electrophysiology, Nice, France, 2000. *Europace Supplement D, Vol 1, (122PW/10) July 2000*.
208. Sgarbossa EB, Pinski SL, Stevenson J, Kim S, Neumann A, Rich S, McLaughlin V, Trohman RG. Diagnosis of true right atrial enlargement: How useful are the classical ECG signs? Accepted for presentation: American College of Cardiology; March, 2001.
209. Saltzberg M, Neumann A, Horton DP. Nesiritide Serial Outpatient Infusions Over 12 Weeks Show Trends Towards Improved Left Ventricular Systolic Function Compared to "Standard" Therapy. *J Heart Lung Transplantation*, Vol 23, No. 2S, S120, 2004.