LLOYD MARKS, MD, MBA, FACC

CONTACT INFORMATION
Lloyd Marks, MD, MBA, FACC
956 Wyandotte Trail
Westfield, NJ 07090
908-347-2662
e-mail: marksnj@erols.com

CURRENT POSITIONS:

FOUNDER, MEDICAL INVENTION CONSULTING: 2018 – Current
I provide advice to medical inventors (e.g. anesthesiologists, cardiologists), investors regarding due diligence, academic institutions (e.g. Rutgers, Stevens Institute, DeVry University) and corporations (e.g. Datascope, Canon) regarding M&A activity, and protection and commercialization of medical technology – and provide advice and expert testimony regarding medical device patent litigation. My website is at www.medicalinventionconsulting.com

FOUNDER AND MEDICAL DIRECTOR, MGI MEDICAL: 2000 - Current
This early stage startup company is commercializing a new medical monitoring device, the "Pulse Flowmeter" which provides an early warning sign of impending shock, before blood pressure falls. I am the inventor of the technology. It's initial use is for monitoring occult GI bleeding and post -operative bleeding. However, it is a platform technology with potential uses for managing peripheral vascular disease, heart failure and syncope. Information can be found at www.mgimedical.com

CONSULTANT FOR ACUMEN, LLC – I review carts for Medicare regarding correct diagnosis and coding

PRIOR POSITIONS:

2017-2021	Medical Consultant, State of New Jerset, Departmernt of Labor, Division of Disability Determination , Part Time -I reviewed social security disability claims for the State of NJ
1997 -2015	Solo Private Practice of Pediatric and Adult Congenital Heart Disease - Services include clinical evaluation, electrocardiography, echocardiography, stress testing, Holter/event monitoring, diagnostic cardiac catheterization and interventional cardiac catheterization
1994 - 1997	Chief, Division of Pediatric Cardiology, The Children's Hospital of New Jersey, Newark, NJ (Our division had 4 full-time and 2-part time pediatric cardiologists).

1986 - 1994	Director of the Cardiovascular Laboratory, St. Christopher's Hospital for Children, Philadelphia, PA (where 350 procedures were performed annually). I specialized in interventional pediatric cardiology.
1983 - 1986	Staff Pediatric Cardiologist, University Hospital, State University of New York at Stony Brook, Stony Brook, NY

EDUCATION:

1967 - 1971	B.S. Electrical Engineering. Massachusetts Institute of Technology ; major field index 5.0/5.0
1972 - 1976	M.D., University of Michigan Medical School
2016	MBA, Haslam School of Business, University of Tennessee

POSTDOCTORAL CLINICAL TRAINING:

1976 - 1977	Pediatrics Resident PL-1, University of California, San Diego
1978 - 1979	Pediatrics Resident PL-2, PL-3, Children's Hospital National Medical Center, Washington, D.C.
1980 - 1983	Fellow in Pediatric Cardiology, The Johns Hopkins University School of Medicine, Baltimore, MD.

ADDITIONAL GRADUATE EDUCATION:

1993 - 1994	Drexel University - 3 graduate courses (10 credits) in engineering mathematics 4.0/4.0 index, non-matriculated
2000 - 2002	Rutgers University - 4 graduate courses (12 credits) in medical instrumentation, digital signal processing, modeling of biologic systems and computation - 4.0/4.0 index, non-matriculated

CERTIFICATION:

1977	Diplomate, National Board of Med Examiners (#168085)
1980	Diplomate, American Board of Pediatrics (#24583)
1985	Diplomate, Sub-Board of Pediatric Cardiology (#0744)

LICENSURE:

1977	District of Columbia Medical License (#10616) inactive
1980	Maryland State Medical License (#D24596) inactive
1983	New York State Medical License (#155825) active
1986	Pennsylvania State Medical License (#MD-036389-E) active
1994	New Jersey State Medical License (#61495) active

HONORS:

1971	National Science Foundation Fellowship
1971	Tau Beta Pi Engineering Honorary
1971	Eta Kappa Nu Electrical Engineering Honorary
2016	Physician Leader of the Year, Haslam School of Business, University of Tennessee

ACADEMIC APPOINTMENTS:

1983 - 1986	Assistant Professor of Pediatrics, State University of New York at Stony Brook, Stony Brook, NY.
1983 - 1986	Assistant Professor of Electrical Engineering, State University of New York at Stony Brook, Stony Brook, NY.
1986 - 1991	Assistant Professor of Pediatrics, Section of Pediatric Cardiology, Temple University School of Medicine, Philadelphia, PA.
1991 - 1994	Associate Professor of Pediatrics, Section of Pediatric Cardiology, Temple University School of Medicine, Philadelphia, PA.
1988 - 1994	Adjunct Professor of Biomedical Engineering, Drexel University, Philadelphia, PA.
1995 - 2012	Adjunct Professor of Biomedical Engineering, New Jersey Institute of Technology, Newark, NJ.
Current (1996 -)	Clinical Associate Professor of Pediatrics, New Jersey Medical School, University of Medicine and Dentistry of New Jersey, Newark, New Jersey
Current (1998-)	Adjunct Associate Clinical Professor, Mt. Sinai Medical School, New York, NY

Current (2016-) Visiting Scientist for Biomedical Engineering, Rutger's University

HOSPITAL POSITIONS/APPOINTMENTS:

1994 - 2015 UMDNJ Hospital, Newark, NJ

1997 – 2015 St. Barnabas Medical Center, Livingston, NJ

1997 - 2015 Newark Beth Israel Medical Center, Newark, NJ

1997 - 2015 JFK Medical Center, Edison, NJ

Current (1998 -) St. Joseph's Medical Center, Paterson, NJ

PROFESSIONAL SOCIETIES:

Current (1986 -) Fellow of the American College of Cardiology

Current (1992 -) American Heart Association, Member of the
Council on Cardiovascular Disease in the Young

Current (1994 -) American Institute of Medical and Biological Engineering
Representative, Council of Societies (1994 - 1995)
Fellow (1996 -)

1990 - 1993 Institute for Electrical and Electronic Engineers (IEEE)
Chair, IEEE Health Care Engineering Policy Committee (1992-1993)

1985 - 1995 Association for the Advancement of Medical Instrumentation
Member, Board of Directors (1989 - 1995)
Chairman, Medical Device Research Committee (1991 - 1995)
Vice-chair for Medical Device Research (1992 - 1995)

2020 – present Member Association of Uniuversity Technology Managgers (AUTM). I am on the AUTM Finance Committee

TEACHING EXPERIENCE:

As a clinical attending at teaching institutions for 15 years, I taught hundreds of medical students, residents, and pediatric cardiology fellows via didactic lectures, daily rounds, a core departmental lecture series, a core divisional lecture series, and one-on-one interaction.

As a bioengineer/researcher I have mentored more than 40 engineering students in the design, and particularly the user interface, of a wide variety of medical devices, some of which have been used in successful clinical trials (as noted in publications section).

As a clinical researcher, I mentored most of the St. Christopher's/Temple pediatric cardiology fellows particularly in experimental design and statistics; I co-authored papers with 5 of the fellows (Abdallah, Singh, Levchuck, Stauffer, Marangi).

I organized a statistics course for all St. Chrisopher's Hospital for Children fellows.

OTHER POSITIONS:

1969 - 1971	Research Assistant, M.I.T. Research Laboratory of Electronics
1971 - 1972	Design Engineer, Gelman Instrument Corporation, Major Project - Digital Protein Electrophoresis Analyzer, design and prototype
1977	Staff Fellow, Laboratory of Technical Development, National Heart, Lung, and Blood Institute, N.I.H., Bethesda, MD. Continued development and animal trials of a laser doppler flowmeter
1980	Research Associate, Department of Infectious Diseases, Children's Hospital National Medical Center, Washington, D.C. I conducted a clinical study evaluating Erythromycin-Sulfisoxizole in the treatment of otitis media.

CONSULTING:

2015	DeVry University and Canon Inc – Advice re virtual reality model of the human heart
2005	Datascope - Advised re: decision to acquire company that made external - in-hospital external defibrillator and helped design user interface for monitors
2019 -current	Medical Invention Consulting, LLC – Provide advice to inventors 9e.g anesthesiologists) , investors conducting due diligence (e.g. Datascope) and academic institutions (e.g. Rutgers) that are evaluating the commercial potential of new medical technology. Also, having been involved in long, complex patent litigation, I provide advice and expert testimony to patemt attornets.– website www.medicalinventionconsulting.com

MAJOR COMMITTEE ASSIGNMENTS:

1990	Member, Strategic Planning Panel, National Center for Research Resources, National Institutes of Health
1993	Technical Reviewer, Pennsylvania Department of Commerce Seed Grant Program
1993 - 1994	Hospital Infrastructure Committee, St. Christopher's Hospital for Children, Philadelphia, PA

1995 - 1996 Search Committee for Chief of Pediatric Cardiovascular Surgery, United Hospitals, Newark, NJ

1995 - 1996 New Jersey State Cardiac Health Advisory Panel
Subcommittee on Cardiac Catheterization
Subcommittee on Technology Assessment

LEADERSHIP ROLES AT NATIONAL MEETINGS:

National Meeting Cochair
- 1989 Annual Meeting of the Association for the Advancement of Medical Instrumentation (AAMI)
- 1986 AAMI Annual Meeting

Symposium Chair
- 1991 Annual International Meeting of the Institute of Electrical and Electronic Engineers Engineering in Medicine and Biology Section, "Advocacy for Biomedical Engineering"

Session Chair
- 1994 AAMI Annual Meeting, "Cardiovascular Function and Assist"
- 1992 AAMI Annual Meeting, "Research Funding for Biomedical Engineering"
- 1991 AAMI Annual Meeting, "Medical Technology Transfer"
- 1990 AAMI Annual Meeting, "Interventional Cardiology"
- 1989 AAMI Annual Meeting, "The Use of Computational Systems in Arrythmia Monitoring, Analysis and Management"
- 1986 AAMI Annual Meeting, "Applications of Microcomputers in Medicine"
- 1985 AAMI Annual Meeting, "Innovative Biotechnology: Tracing the Path From Invention to Clinical Use"

Session Cochair
- 1986 AAMI Annual Meeting, "Microcomputer Technology and Applications"

Course Codirector
- April 1986 AAMI Annual Meeting, "Basics of Electronics and Computers for Physicians"

VOLUNTEER ACTIVITIES:

Pre-covid – Taught ESL to Hispanics in Plainfield public library
Pre-Covid – Taught ESL to Iraqi immigrants at Temple Emanuel, Westfield
March, 2010 – current – Run a weekly chat group for seniors in Westfield, many of whom are/were homebound
Member - Senior Advisory Council – Westfield, NJ - 2019-2021
Mentor to Biomedical Engineering senior design students who are building devices for the disabled – Mt foundation funds the program
Member 50th Reunion Committee for MIT class of ‘71
Friends of Brightwood Park (Westfield, NJ), Board of Directors

AVOCATIONS:
Guitar, Golf, Skiing, Biking, Sailing, Kayaking

PUBLICATIONS:

ORIGINAL PEER REVIEWED REPORTS:

1. Collins DL, Marks LA, Edwards D, Kirkpatrick SE, Nyhan WL. Management of Infants with Congenital Diaphragmatic Hernia. West J Med. 1977;127(6):479-86

2. Rodriquez WJ, Schwartz RH, Sait T, Khan W, Chhabra OP, Gold B, Chang MJ, Reddy S, Marks LA, Gold J, Ruey P, Ross S. Erythromycin-Sulfisoxazole vs Amoxicillin in the Treatment of Acute Otitis Media in Children. AJDC. 1985;139(8):766-70

3. Marks LA. Digital Enhancement of the Peripheral Admittance Plethysmogram. IEEE Trans Biomed Engr. 1987;34(3):192-198

4. Marks LA, Short KL, Hoffman D, Lew A. Microprocessor Based Robotic System for Control of Fluid Connections in the Cardiac Catheterization Laboratory. IEEE Trans Biomed Engr. 1988; 35(2):161-6

5. Marks LA, Anaise D, Yland M. Renal Admittance Plethysmography. Proc 14th Northeast Bioengineering Conference. 1988; 14:122-125

6. Marks LA: An Ergonomically Efficient, Descriptive Text Oriented, Microcomputer Based Echocardiogram Measurement and Database System. Proc 16th Northeast Bioengineering Conference. 1990;16:43-4

7. Marks LA, Smith S, Brophy T, Grane R, Moore T. Clinical Application of an Audio Ectopic Beat Detector. Proc 12th Int Conf IEEE EMBS. 1990;12(5):1992-3

8. Marks LA. Medical Technology Transfer: The Inventor's Perspective. Biomed Inst Tech. 1991; 25:35-41

9. Marks LA, Mehta AV, Marangi D. Percutaneous Transluminal Angioplasty of Stenotic Blalock-Taussig Shunts: Effect on Choice of Initial Palliation in Cyanotic Congenital Heart Disease. JACC. 1991; 18(2):546-51

10. Abdallah HI, Karmazin N, Marks, LA. Late Presentation of Misalignment of Lung Vessels. Crit Care Med 1993;21(4):628-30

11. Abdallah HI, Marks LA, Balsara R, Davis D, Russo P. Staged Repair of Pentalogy of Cantrell. Ann Thorac Surg, 1993;56:979-80

12. Marks LA, ed., Wooley M, Miller M, Dunst IP, Thompson CR, Larson A, Rudolph D, Corman J. Advocacy for Biomedical Engineering Seminar. IEEE EMBS Magazine 1993;121(2):25-33

13. Marks LA, Groch AJ. Validation of Variable Width Blood Pressure Cuff. Proc 15th Int Conf IEEE EMBS. 1993;15(2):926-927

14. Abdallah HI, Toomey K, O'Riordan AC, Davidson A, Marks LA. Familial Occurrence of Discrete Subaortic Membrane. Pediatric Cardiology 1994;15:198-200

15. Levchuck S, Marks LA, Robinson B. Intussusception of the Catheter Sheath: A Non-emergency. Pediatric Cardiology. 1995;16:85-86

16. Stauffer NR, Greenberg SB, Marks LA, Singh GK, Siderio DL. Validation of Right Ventricular Volume Measurements by Magnetic Resonance Imaging in Small Hearts Using a Fetal Lamb Model. Investigative Radiology. 1995(Feb);30:87-89

17. Alpert BS, Marks L, Cohen M. K5=Diastolic Pressure. Pediatrics 12/1996;98(5):1002

18. Greenberg SB, Marks LA, Eshaghpour EE. Evaluation of Magnetic Resonance Imaging in Coarctation of the Aorta: The Importance of Multiple Imaging Planes. Ped Cardiology. 8/1997; 18(5):345-9

19. Marks LA, Groch A. Optimizing Cuff Width for Noninvasive Measurement of Blood Pressure. Blood Pressure Monitoring. 2000; 5:153-158

20. Fermi, FS, Marks L. Design of Electrodes for Pulse Volume Measurement/Impedance Plethysmography. Proceedings of the IEEE 26th Annual Northeast Bioengineering Conference. Feb, 2000

PUBLISHED LETTERS:

Davidson A, Marks LA. Shots and Shunts. Pediatric Cardiology 1996;17:132-133

MEDICAL DEVICE PATENTS:

1. Marks LA. Computer Assisted Admittance Plethysmograph. U.S. Patent Office, Arlington, Virginia. Oct 22, 1985; #4548211

2. Marks LA. Method of and Apparatus for Detecting Cardiac Rhythm Disturbance. U.S. Patent Office, Arlington, Virginia. Nov 15, 1988; #4784153

3. Marks LA. Multi-function Fluid Communication Control System. U.S. Patent Office, Arlington, Virginia. Apr 11, 1989;#4819653

4. Marks LA. Aperture Occlusion Device. U.S. Patent Office, Arlington, Virginia. Apr 28, 1992; #5108420

5. Marks LA. Multilumen Angiography Catheter. U.S. Patent Office, Arlington, Virginia. Jun 16, 1992; #5108420

6. Marks LA. Precision Radiology Scaling Device. U.S. Patent Office, Arlington, Virginia. Sep 22, 1992; #5149965

7. Marks, LA. Fluid Communication Manifold and Control System. U.S. Patent Office, Arlington, Virginia. Dec 8, 1992; #5168901

8. Marks LA. Stereoscopic Fluoroscopy Device. U.S. Patent Office, Arlington, Virginia. Aug 3, 1993; #5233639

9. Marks LA. Calibrated Adjustable Width Blood Pressure Cuff. U.S. Patent Office, Arlington, Virginia. Sep 14, 1993; #5243991

10. Marks LA. Safety Needle and Method of Using Same. U.S. Patent Office, Arlington, Virginia. Oct, 26, 1993; #5256152

11. Marks LA. Multiple Blood Pressure Cuff System. U.S. Patent Office, Arlington, Virginia. May 6, 1997; #5626142

12. Marks LA. Adjustable Blood Pressure Cuff and Method of Using Same. U.S. Patent Office, Arlington, Virginia. May 5, 1998; #5746213

13. Marks LA, Smith M. Signal Averaging Using Gating Signal Obtained from Autocorrelation of Input Signals. U.S. Patent Office, Arlington, Virginia. Dec 12, 2006; #7147601

14. Marks LA, Smith M. Signal Methods of Diagnosis Using Pulse Volume Measurement. U.S. Patent Office, Arlington, Virginia. Feb 3, 2009; #7485094

15. Marks LA, Smith M. Method and Device for Measuring Peripheral Vascular Function. Mar 3, 2009; US Patent #7497832

16. Marks LA, Smith M. Impedance Based Device for Non-Invasive Measurement of Blood Pressure and Ankle Brachial Index. Feb 15, 2011; US Patent #7887491

17. Smith M, Marks LA. Peripheral Impedance Plethysmography Electrode and System with Detection of Electrode Spacing. May 17, 2011; US Patent #7945318

18. Marks, LA. Safety needle and method of using same. October 25, 2011; U.S. Patent No. 8,043,268

19. Marks LA, Smith M. Stretch Electrode and Method of Making Physiologic Measurements" US Pat #8019401

20. Marks LA, Smith M. Device for Non-Invasive Measurement of Blood Pressure and Ankle Brachial Index. April 2, 2013;US Patent #8,409,105

21. Marks LA. Safety Needle and Method of Making Same. December 21, 2013. US Patent # 8,617,118

22. Marks LA. Impedance Plethysmogram with Concurrent Processing, March 19, 2019, # 10,231,635

<u>Non-Medical Patents</u>

23. Marks, LA. Foldable Frame Apparatus. September 23, 1977. US Patent # 4,140,141

24. Marks, LA. Pivotable Joint and Joint Locking Mechanism for a Foldable Frame. December 3, 1991. US Patent # 5,069,238

25. Marks, LA. Footwear Fastening System and Method of Using Same. September 24, 1996. US Patent # 5,557,864

26. Marks LA, Weber DW. Method of and Apparatus for Buoyancy Compensation for Divers. April 10, 2012. US Patent # 8,152,413

Pending Patents

Marks, LA - Impedance Plethysmogram Using Optical Gating Signal and Structure with Integrated Electrodes and Optical Sensor

Marks, LA -Device and Means for Attaching temporary license plates to cars

Marks LA and Marks MS - Rapid release ski straps with safety release

ABSTRACTS:

Chang MJ, Rodriquez WJ, Kahn WN, Marks L: Chlamydia Trachomatis in Otitis Media in Children. 20th Interscience Conf on Antimicrobial Agents and Chemotherapy. 1980; 20:526

Marks LA, Zahka KG, Kidd L, Cutilletta AF. Oscillatory Waveforms in Forearm Admittance Plethysmography. Ped Res. 1983; 17(4):117A

Marks LA, Brinker JA, Zahka KG, Kidd L, Cutilletta AF: Computer Assisted Admittance Plethysmography. Ped Res. 1984; 18(4):127A

Marks LA, Brinker JA, Zahka KG, Kidd L, Cutilletta AF. Peripheral Flow Dynamics After Femoral Artery Catheterization Using Computer Assisted Plethysmography. Ped Res. 1984; 18(4):127A

Marks LA, Brinker JA, Cutilletta AF. Improving the Measurement of Pulse Volume. AAMI 20th Annual Meeting Proc. 1985; 20:58

Marks LA, Smith S, Brophy T, Grane R, Moore T. A Microprocessor Based ECG Analyzer and Tone Generator Which Permits Immediate Recognition and Categorization of Ectopic Rhythms by Sound. JACC. 1989; 13(2):188A

Marks LA, Smith S, Brophy T, Grane R, Moore T. A New Audio Monitor for Detecting Ectopic Rhythms: An Algorithm that Generates Sounds with each QRS Complex which Vary with QRS Shape. AAMI 24th Annual Proc. 1989; 24:58

Marks LA. Technology Transfer: The Inventor's Perspective. AAMI 25th Ann Proc 1990; 25:48

Marks LA, Marangi D, Luks GB. Non-displaced Spherical Reference Object Reduces Error in the Angiographic Measurement of Cardiac Structures. Proc PA Chapter ACC. Sep., 1990

Marks LA, Smith S, Brophy T, Grane R, Moore T. Identification of Dysrhythmias During Cardiac Catheterization with an Audio Ectopic Beat Detector. Proc PA Chapter ACC. Sep., 1990

Marks LA, Marangi D, Luks GB. Minimizing Error in the Angiographic Estimation of Pulmonary Artery Size. Ped Res. 1990; 27(4):22A

Marks LA. Derived Stereo Fluoroscopy. Radiology. 1990; 177(P):254

Marks LA, Biancaniello TM. Reversal of Subclavian Steal Following Balloon Angioplasty for Coarctation Restenosis. Proc PA Chapter ACC. Sep., 1991

Stauffer NR, Singh GK, Greenberg SB, Marks LA. Validation of Right Ventricular Volumes by Magnetic Resonance Imaging in Fetal Lamb Hearts. Radiology. 1992;189(P):159

Singh GK, Yap YS, Delany DP, Monro JL, Keeton BR, Salmon AP, Stauffer NR, Greenberg, BS, Donner RM, Marks LA. Cine MRI Assessment of Right Ventricular Function for Long Term Followup of Primary Repair of Tetralogy of Fallot in Infancy. JACC, Feb 1994; 24A

Marks LA, Groch AJ. Improving the Non-Invasive Measurement of Blood Pressure with a New Algorithm for Cuff Width Optimization. AAMI 29th Annual Proceedings. 1990;29:62

Marks LA, Groch AJ. Detection of Blood Loss with Digitally Enhanced Admittance Plethysmography. AAMI 29th Annual Proceedings. 1990;29:62

Abdallah HI, Culpepper WS, Williams L, Ochsner J, Russo P, Davis DA, Marks LA. Labetalol vs Nitroprusside to Treat Hypertension After Coarctation Repair. Circulation. 1994;90(4)part 2: I-203

Greenberg SB, Marks LA, Eshaghpour E. Magnetic Resonance Imaging of Coarctation of the Aorta: Importance of Multiple Imaging Planes. Soc Ped Radiol 37th Annual Proc. Apr 1994

Marks LA, Groch AJ. Optimizing Cuff Width for the Noninvasive Measurement of Blood Pressure. Circulation 1994;90(4)part 2: I-616

Marks LA, Groch AJ. Early Noninvasive Detection of Hypovolemia Secondary to Acute Blood Loss Using Pulse Volume Analysis. JACC 1995 Feb;25:23A-24A

Marks LA. The Effect of the Physical Properties of a Blood Pressure Cuff upon the Accuracy of Non-Invasive Blood Pressure Measurement. AAMI 32nd Annual Proceedings. 1997;32:40-41