

Curriculum Vitae

Stephen W. Downing, M.D., F.A.C.C., F.A.C.S.

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Education:

- 1979-83 Georgetown University, Washington, D.C.
Degree: B.A. (English)
- 1981-82 University of St. Andrews, Scotland
Courses: Honors English, Physics
- 1983-87 Georgetown University School of Medicine
Degree: M.D., Cum Laude

Post Graduate Training:

- 1987-88 Intern, Department of Surgery
Hospital of the University of Pennsylvania
Philadelphia, Pennsylvania
- 1988-89 Junior Resident, Department of Surgery
Hospital of the University of Pennsylvania
- 1989-91 Post-Doctoral Fellow, Harrison Dept. of
Surgical Research, University of Pennsylvania
School of Medicine, Philadelphia, Pennsylvania
- 1991-92 Senior Resident, Department of Surgery
Hospital of the University of Pennsylvania
- 1992-93 Chief Resident, Department of Surgery
Hospital of the University of Pennsylvania
- 1993-94 Cardiothoracic Research Fellow,
Washington University School of Medicine
St. Louis, Missouri

1994-96 Fellow, Division of Cardiothoracic Surgery
Washington University School of Medicine
St. Louis, Missouri

Academic Appointments:

1989-1992 Assistant Instructor in Surgery,
Univ. of Pennsylvania School of Medicine
1992-1993 Instructor in Surgery,
Univ. of Pennsylvania School of Medicine
1993-1996 Assistant in Surgery,
Washington University School of Medicine
1997-2002 Assistant Professor of Surgery,
University of Maryland School of Medicine
2002- Clinical Assistant Professor of Surgery,
State University of New York at Buffalo

Hospital Appointments:

1996-1997 Attending Physician, Moses Cone Memorial Hospital
Greensboro, North Carolina
1996-1997 Attending Physician, Wesley Long Community Hospital
Greensboro, North Carolina
1997-2002 Attending Physician, University of Maryland Medical System,
Baltimore, Maryland
2002- Mercy Hospital, Sisters of Charity Hospital, St. Joseph's Hospital,
Buffalo, NY
2006 Erie County Medical Center (SUNY at Buffalo)
Buffalo, NY

Certification: National Board of Medical Examiners, 1987
American Board of Surgery, 1994 (Recertified 2004)
American Board of Thoracic Surgery, 1997

Licensure: Commonwealth of Pennsylvania 1988
MD-042905-E (inactive)

State of North Carolina 1996
96-00521 (inactive)

State of Maryland 1997
D0052696 (inactive)

State of New York 2002
224769

Academic Honors and Awards:

1980	Assured Admission, Georgetown University School of Medicine
1983-87	Promoted with Distinction, Georgetown University School of Medicine
1986	Alpha Omega Alpha Medical Honor Society
1987	Cahill Award for Surgery Georgetown University School of Medicine
1990	Inouye Award for Outstanding Teaching Dept. of Surgery, University of Pennsylvania
1992	Jonathan E. Rhoads Research Award Dept. of Surgery, University of Pennsylvania

Society Memberships

1995	Association for Academic Surgery
1995	Ravdin – Rhoads Society

1996	American Heart Association, Council on Cardiothoracic and Vascular Surgery
1999	Fellow, American College of Cardiology
1999	Southern Thoracic Surgical Association
2000	Fellow, American College of Surgeons
2001	International Society for Minimally Invasive Cardiac Surgery
2002	Member, Society of Thoracic Surgeons

Committees and Administration:

1989-91	Surgical Intensive Care Unit Committee Hospital of the University of Pennsylvania
1987-92	Resident's Executive Council, Department of Surgery, Hospital of the University of Pennsylvania (President 1990-91)
1989-92	Operating Room Committee Hospital of the University of Pennsylvania
1992-93	Education Committee, Department of Surgery, Hospital of the University of Pennsylvania
1992-93	Education Committee, Department of Surgery, Hospital of the University of Pennsylvania
1999 – 2002	Credentials Committee, University of Maryland Medical Center
2002-	Critical Care Committee, Mercy Hospital
2002- 2003	CIPA Medical Management Committee, Catholic Health System
2006-	Medical Director Cardiothoracic Intensive Care Unit Mercy Hospital

Editorial Service

- 1996 – present Guest Reviewer, Annals of Thoracic Surgery
- 2002- present Guest Reviewer, Journal of the American College of Cardiology
- 2004- present Guest Reviewer, Journal of Thoracic and Cardiovascular Surgery
- 2004- present Guest Reviewer, Circulation

Community Service

Catholic Relief Services, Site visit to Instituto De Cardiologia Y Cirugia Cardiovascular, Havana, Cuba. December 1998

American Heart Association Board Member 2004-2006

Other

Scientific Advisory Board, Guided Delivery Solutions, Santa Clara, CA (Company licensed patent and is working toward commercialization)

Patents

6,840,246 B2 Apparatuses and methods for performing minimally invasive diagnostic and surgical procedures inside of a beating heart.

Filed: Methods and devices for treating atrial septal defects (11/407,326)

Bibliography

Articles

- 1) Walsh DB, Downing SW, Nauta R, Gomes MN. Metastatic cancer: A relative contraindication to vena caval filter placement. *Cancer* 1987;59:161-163.
- 2) Walsh DB, Downing SW, Ahmed SW, Wallace RB. Valvular obstruction of blood flow through saphenous veins. *J Surg Res* 1987;42:39-42.
- 3) Downing SW, Savage EB, Gupta KB, Bogen DK, Edmunds LH Jr., Tyson GS. Myocardial creep and contractile dysfunction after ventricular distention. *Surgical Forum* 1990;41:221-223.
- 4) Savage EB, Downing SW, Tyson GS. Repair of antero-apical left ventricular aneurysm: Changes in ventricular mechanics, hemodynamics and oxygen consumption. Influence of changes in regional end systolic elastance on global function. *Surgical Forum*. 1991;42:221-223.
- 5) Downing SW, Llaneras M, Georgi D, Wood DC, Savage EB, Edmunds LH Jr. Left ventricular assistance without thoracotomy: Mediastinal and transeptal approaches to the left heart. *Ann Thorac Surg* 1992;53:132-138.
- 6) Shigeta O, Glusko P, Downing SW, Lu W, Niewiarowski S, Edmunds LH Jr. Protection of platelets during long-term extracorporeal membrane oxygenation in sheep with a single dose of a disintegrin. *Circulation* 1992;86(5 Suppl1): II398-404.
- 7) Savage EB, Downing SW, Ratcliffe MB, Fallert M, Gupta KB, Tyson GS, Bogen DK, Edmunds LH Jr. Repair of left ventricular aneurysm. Changes in ventricular mechanics, hemodynamics, and oxygen consumption. *J Thorac Cardiovasc Surg* 1992;104(3): 752-62.
- 8) Downing SW, Savage EB, Streicher JS, Bogen DK, Tyson GS, Edmunds LH Jr. The stretched ventricle. Myocardial creep and contractile dysfunction after acute non-ischemic ventricular distention. *J Thorac Cardiovasc Surg* 1992;104(4):996-1005.
- 9) Downing SW, Edmunds LH Jr. Vasoactive substances and cardiopulmonary bypass. *Ann Thorac Surg* 1992;54(6):1236-43.
- 10) Fallert MA, Mirotznik MS, Downing SW, Savage EB, Foster KR, Josephson ME, Bogen DK. Myocardial electrical impedance mapping of ischemic sheep hearts and healing aneurysms. *Circulation* 1993;87(1):199-207.
- 11) Llaneras MR, Nance ML, Streicher JT, Linden PL, Downing SW, Lima JA, Deac R, Edmunds LH Jr. Pathogenesis of ischemic mitral regurgitation. *J Thorac Cardiovasc Surg* 1993;105(3): 439-42.

- 12) Moulton MJ, Creswell LL, Downing SW, Szabo BA, Vannier MW, Pasque MK. Ventricular interaction in the pathologic heart: A model-based study. *ASAIO J* 1994;40:M773-M783.
- 13) Glick DB, Downing SW, Sicard GA Jr, Lobner DC, Choi DW, Kouchoukos NT, Allen BT. Extracellular concentrations of neuroexcitatory amino acids during spinal cord ischemia. *Surgical Forum*, 1994;45:255-257.
- 14) Moulton MJ, Downing SW, Platt JW, Creswell LL, Vannier MW, Pasque MK. Assessment of myocardial mechanics using magnetic resonance imaging. IEEE Computer Society Press, Bethesda MD. pp361-364, 1994
- 15) Moulton MJ, Creswell LL, Downing SW, Actis RL, Szabo BA, Vannier MW, Pasque MK. Calculation of regional ventricular wall strains using magnetic resonance imaging tissue-tagging. *Proc. Int. Conf. IEEE EMBS*. 1994;16:549-550 .
- 16) Downing SW, Bavaria JA. Intraperitoneal migration of an AICD generator placed in a posterior rectus pocket. (letter) *Ann Thorac Surg*, 1995;59:786-7.
- 17) Moulton MJ, Downing SW, Creswell LL, Fishman DS, Amsterdam DM, Szabo BA, Cox JL, Pasque MK. Mechanical dysfunction in the border zone of an ovine model of left ventricular aneurysm. *Ann Thorac Surg* 1995 Oct;60(4):986-97; discussion 998.
- 18) Downing SW, Moulton MJ, Creswell LL, Szabo BA, Vannier MW, Pasque MK. Advanced models of the heart for clinical applications. *Surgical Forum* 1995; 46:283-286.
- 19) Moulton MJ, Pasque MK, Szabo BA, Actis RL, Downing SW, Creswell LL. Myocardial material property determination in the in vivo heart using magnetic resonance imaging. *Int J Card Imaging* 1996;12:153-67
- 20) Moulton MJ, Pasque MK, Vannier MW, Szabo BA, Actis RL, Downing SW, Creswell LL. Spline surface interpolation for calculating 3-D ventricular strains from MRI tissue tagging. *Am J Physiol* 1996 Jan; 270(1 Pt 2):H281-97
- 21) Moulton MJ, Pasque MK, Szabo BA, Downing SW, Ungacta FF, Creswell LL. Magnetic resonance imaging provides evidence for remodeling of the right ventricle after single-lung transplantation for pulmonary hypertension. *Circulation* 1996 Nov 1;94(9 Suppl):II312-9
- 22) Attar, S, Cardarelli MG, Downing SW, Rodriguez A, Wallace DC, West RS, McLaughlin JS. Traumatic aortic rupture: Recent outcome with regard to neurologic deficit. *Ann Thorac Surg* 1999;67:959-65
- 23) Cardarelli M, Attar S, Downing S. Acute aortic dissection: A comparative study. *J Pennsylvania Association for Thoracic Surgery* 1999;7:34-37
- 24) Downing SW. Transmyocardial laser revascularization (letter) *N Engl J Med* , 1999:342:436

- 25) Downing, SW, Cardarelli MG, Sperling J, Attar S, Wallace DC, Rodriguez A, Brown J, Whitman GJR, McLaughlin JS. Heparinless partial cardiopulmonary bypass for the repair of aortic trauma. *J Thorac Cardiovasc Surg* 2000;120:1104-11
- 26) Wei C, Cardarelli MC, Downing SW, McLaughlin, JS. The effect of angiotensin II on mitogen-activated protein kinase in human cardiomyocytes. *J. Renin-Angiotensin-Aldosterone System* 2000; 1:379-384
- 27) Downing SW, Cardarelli M et al. Spiral CT scan as the sole diagnostic modality for aortic trauma. *Ann Thorac Surg* 2001; 72: 495-502
- 28) Downing SW, Herzog W, Gilbert TP: Beating heart mitral valve repair: Preliminary model and methods. *J Thorac Cardiovasc Surg* 2002 Jun;123(6):1141-6.
- 29) Downing SW, Herzog W, et al. Feasibility of Beating Heart ASD closure under Real-Time 3-D echo guidance. *Heart Surg Forum*. 2002;5(2):96-9.
- 30) Drummond C, Downing SW. Clamshell incision for off-pump coronary artery bypass grafting. *J Thorac Cardiovasc Surg*. 2003 May;125(5):1157-8
- 31) Cardarelli MC, Downing SW, Brown J, McLaughlin JS, Griffith, BP. Management of traumatic aortic rupture: A 30 year experience. *Ann Surg*. 2002 Oct;236(4):465-70.
- 32) Downing, SW. Risks of biologic glues in aortic surgery. (Letter) *Ann Thorac Surg*. 2003 Mar;75(3):1063
- 33) Hoffman JW, Gilbert TB, Cardarelli MC, Downing SW: Non-heparinized partial cardiopulmonary bypass for repair of traumatic aortic rupture. *The Journal of Extracorporeal Technology*; 34(2), 2002
- 34) Menon NG, Downing SW, Goldberg NS, Silverman R. Seroma prevention using an albumin-glutaraldehyde-based tissue adhesive in the rat mastectomy model. *Ann Plast Surg*. 2003 Jun;50(6):639-43.
- 35) Downing, SW. Invited commentary *Ann Thorac Surg* May 2005;79:1529 (see Furst W, Banerjee A Release of Glutaraldehyde from albumin-glutaraldehyde tissue adhesive causes significant in-vitro and in-vivo toxicity *Ann Thorac Surg* May 2005 79:1522-1528

Abstracts:

- 1) Tyson GS, Downing SW, Miller JM, Hargrove WC, Josephson ME. Emergent surgery for ventricular tachycardia. *Circulation (suppl)* 1990;82-III:587.

- 2) Fallert MA, Mirotznik MS, Downing SW, Savage EB, Foster KR, Josephson ME, Bogen DK. Myocardial electrical impedance mapping in ischemic sheep hearts and healing aneurysms. *Circulation (suppl)* 1990;82-II;451.
- 3) Lima JAC, Ferrari VA, Palmon LC, Reichek N, Llanares MR, Tallant B, Edmunds LH Jr, Downing SW, Chang CN, Axel L. Myocardial rigid body translation and rotation by magnetic resonance tissue tagging before and after infarction. *Circulation (suppl)* 1991;84-I;201.
- 4) Lima JAC, Reichek N, Ferrari VA, Palmon LC, Llanares MR, Tallant B, Young A, Downing SW, Edmunds LH Jr, Axel L. Two dimensional systolic deformation of infarcted myocardium by magnetic resonance with tissue tagging. *Circulation (suppl)* 1991;84-II;670.
- 5) Downing, SW; Moulton MJ; Wyers, SG; Creswell, LL; Borello, JA; Vannier, MW; Szabo, BA, Pasque MK. Determination of biventricular material properties in pulmonary hypertension. Proceedings of the Association for the Advancement of Medical Instrumentation Cardiovascular Science and Technology Conference. December 1993, p. 119
- 6) Moulton, MJ; Creswell, LL; Downing, SW; Actis, RL; Meyers, KW; Szabo, BA; Vannier, MW; Pasque, MK. Myocardial material properties determined by nonlinear optimization, magnetic resonance imaging, and non-linear finite element analysis. Proceedings of the Association for the Advancement of Medical Instrumentation Cardiovascular Science and Technology Conference. December 1993, p. 120
- 7) Moulton MM, Creswell LA, Downing SW, Actis RL, Szabo BA, Vannier MW, Pasque MK. Myocardial material properties determined by nonlinear optimization, magnetic resonance imaging and non-linear finite element analysis. *Circulation* 90 (suppl) 1994;I-13.
- 8) Williams EB, Glick DB, Downing SW, Rottman JN. Induction of 72kD gelatinase in the infarct borderzone: evidence for regional regulation of matrix metalloproteinase activity in remodeling. *Circulation* 90 (suppl) 1994;I-106.
- 9) Glick DB, Downing SW, Moulton MJ, Scheussler RB, Boineau JP, Pasque MK, Cox JL. Electrophysiology in the borderzone of left ventricular aneurysms. *Circulation* 90 (suppl) 1994;I-183.
- 10) Moulton, MJ; Creswell, LL; Downing, SW; Szabo, BA; Vannier, MW; Pasque, MK. Calculation of regional ventricular wall strains using magnetic resonance tissue tagging. *Proc IEEE Eng Med Biol* 1994; PartI-549
- 11) Moulton MJ, Creswell LL, Downing SW, Szabo BA, Vannier MW, Pasque MK. Validation of a new method for calculating continuous transmural distribution of strain in ventricles using magnetic resonance imaging. *J Am Coll Cardiology (special)* 113A-114A, 1995

- 12) Moulton, MJ, Downing, SW; Platt, JW; Creswell, LL, Vannier, MW; Pasque, MK.
Assessment of myocardial mechanics using magnetic resonance imaging. Proc Computers in Cardiology, p94, September 1995.
- 13) Downing SW, Benjamin ME, Connerney I, Cardarelli MG, Brown J, Whitman GJR. Cost effective carotid artery screening before CABG. Circulation (suppl) 1999; I-667

Chapters:

- 1) Downing SW, Golden MA. Peripheral Vascular Complications of Coronary Endovascular Stent Placement. In: Herrmann HC, Hirshfeld JW Jr (eds) Clinical Use of the Palmaz-Schatz Intracoronary Stent .1st ed. Mount Kisco, N.Y.: Futura Publishing, 1993:137-150.
- 2) Downing SW. Cardiac Pump Function. In: Savage EB and Fishman SJ (eds) Essentials of Basic Science in Surgery. 1st ed. Philadelphia: J.B. Lippincott, 1993:91-101.
- 3) Downing SW, Kouchoukos NT. Ascending Aortic Aneurysms. In: Edmunds LH Jr. (ed) Cardiac Surgery in the Adult. McGraw-Hill, 1996: 1165-1195

Presentations

- 1) New developments in cardiac surgery. American Heart Association, patient education seminar, Baltimore, MD 1998
- 2) Aortic Dissection, Current state of the art. Memorial Lecture, Northwest Hospital, Baltimore, MD 1998
- 3) Rapid, reliable diagnosis of aortic trauma with spiral CT scanning. Pennsylvania Thoracic Society, 1999
- 4) Cost-effective carotid artery screening before CABG. American Heart Association, Atlanta GA. 1999
- 5) Heparinless cardiopulmonary bypass for the repair of aortic trauma. American Association for Thoracic Surgery. Toronto, Ontario. 2000
- 6) Spiral CT scanning as the sole diagnostic modality for aortic trauma. Southern Thoracic Surgical Association, Marco Island, 2000
- 7) Off-Pump CABG via Clamshell Incision, Cardiothoracic Techniques and Technologies Meeting, New Orleans, LA 2001

- 8) Off-pump mitral valve repair: Preliminary results. American Association for Thoracic Surgery. San Diego, CA. 2001
- 9) Feasibility of Beating Heart ASD Closure under 3-D echo guidance. International Society for Minimally Invasive Cardiac Surgery, Munich, Germany. 2001
- 10) Image Guided Cardiac Surgery, Harvard CIMIT Forum, Boston, MA 2001