CURRICULUM VITAE, MICHAEL H. NATHANSON

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DATE OF BIRTH: August 9, 1955 **PLACE OF BIRTH:** Detroit, Michigan

EDUCATION:

Univ. of California, Berkeley	B.S. 1976	Mathematical Statistics
Mass. Inst. of Technology, Cambridge	M.S. 1977	Biomedical Engineering
Case Western Reserve U., Cleveland	Ph.D.1983	Biomedical Engineering
Case Western Reserve U., Cleveland	M.D. 1985	Medicine
Yale Univ. Med. School, New Haven	Postdoc. 1990	Digestive Diseases

PROFESSIONAL EXPERIENCE:

1985-88: Resident, Medicine, Columbia-Presbyterian Medical Center
1988-90: Postdoctoral Fellow in Digestive Diseases, Yale Univ. School of Medicine
1990-91: Instructor of Medicine, Yale University School of Medicine
1990-94: Lecturer in Cell Biology, Yale University School of Medicine
1991-95: Assistant Professor of Medicine, Yale University School of Med.
1994-95: Assistant Professor of Cell Biology, Yale Univ. School of Med.
1994- : Director, Center for Cell Imaging (Yale confocal microscopy facility)
1995-99: Assoc. Professor of Medicine and Cell Biology, Yale Univ. School of Med.
1999-2002: Assoc. Professor of Medicine and Cell Biology (with tenure), Yale Univ.
2002- : Professor of Medicine and Cell Biology, Yale University School of Medicine
2003- : Chief, Section of Digestive Diseases, Yale University School of Medicine
2007- : Director, Klatskin Medical Service
2009- : Director, Yale Liver Center

2012-16: Editor-in-Chief, Hepatology (Current impact factor – 11.7)
2014- : Gladys Phillips Crofoot Professor of Medicine

CURRENT GRANT SUPPORT:

NIH P01-DK57751. Regulation of liver by nuclear calcium signaling (2001-2021); Overall PI and Director of Project 1 and Cores A and C. Annual award amount: $1,640,475

NIH T32-DK07356. Investigative training in hepatology (1984-2019); PI. Annual award amount: $295,281

NIH P30-DK34989 (Yale Liver Center) – Center Director (2009-19), Deputy Director (2002-09), Morphology Core Director (1996-2014). Annual award amount: $1,153,979

CNPq/MCTI (PI: M.F. Leite) – 300990/20147-6. UFMG Visiting Researcher Fellowship (2014-2017).

NIH R56-DK99470. Regulation of cholestasis by Inositol trisphosphate receptors (2015-17). Annual award amount: $245,000

NIH S10-OD23598 – Shared instrumentation grant to purchase a swept-field confocal microscope for CCMI (2017-18). Award amount: $600,000

PENDING GRANT SUPPORT:

NIH R01-DK114041. Calcium waves in hepatocytes – mechanisms and effects (2017-2022); PI.

NIH R01-DK112797. Regulation of ITPR3 expression in cholangiocytes (2017-22); PI.

PREVIOUS (COMPLETED) GRANT SUPPORT:

NIH S10-OD20142 – Shared instrumentation grant to purchase a gated STED super-resolution microscope for CCMI (2015-16).

NIH R01-DK45710. Calcium waves in hepatocytes – mechanisms and effects (1995-2015); PI.

CT DPH Biomedical Research Project. Regulation of the balance between fatty liver, growth, and liver cancer by InsP3R isoforms. (2013-2015).

NIH R03-TW08709 (2012-15); PI. Trafficking of the EGF receptor to the nucleus: Mechanisms and Effects.

NIH R01-DK61747. Regulation of cholangocytes by InsP3 receptor isoforms (2002-2013); PI (multiple PI with B. Ehrlich)

NIH S10-RR026372 (2010-11); PI. A confocal endomicroscope for clinical research.

NIH S10-RR028855 (2010-11); PI. A laser scanning confocal microscope for research and education.

NIH R01 DK45710 ARRA Administrative Supplement (2009-10); PI

NIH P01 DK57751 ARRA Administrative Supplement (2009-10); PI

NIH P30 DK34989 ARRA Administrative Supplement (2009-10); PI

AGA Consortium Planning Grant (2007-08)

NIH R03-TW01451 (2001-2007); PI

American Heart Association Grant-in-Aid (2002-05)

NIH Shared Instrument Grant S10-RR16663 (2002)

NIH Shared Instrument Grant S10-RR13709 (1999)

NSF Multi-user instrument grant DBI-9730059 (1998; declined)

Salsbury Cove Research Award, MDIBL (1998, 1999)

Established Investigator Grant, American Heart Association (1998-2001)

Feasibility Grant, Cystic Fibrosis Foundation (1998-2000)

Liver Scholar Award, American Liver Foundation (1994-97)

Grant-in-Aid, American Heart Association (1994-97)

AGA Foundation/Fiterman Basic Research Award (1994-95)

New Investigator Award, NIEHS/Mt. Desert Island Biol. Laboratory (1994, 1995)

Whitaker Foundation Biomedical Engineering Research Grant (1991-94)

AGA/Procter & Gamble Research Scholar Award (1991)

Clinician-Scientist Award, American Heart Association (1989-94)

Postdoctoral Research Award, American Liver Foundation (1989-91)

Medical Scientist Training Program (1978-84)

Graduate Fellow, National Science Foundation (1976-78)

OTHER AWARDS, HONORS, AND NATIONAL ASSIGNMENTS:

NIH Special Emphasis Panel ZDK1 GRB-8 (2016), Acting Chairman

NIH Special Emphasis Panel ZRG1 CB-T 30 (2015)

NIH Special Emphasis Panel ZDK1 GRB-8 (2015), Acting Chairman

Fellow, AASLD (elected 2014)

NIH Molecular and Integrative Signal Transduction (MIST) Study Section, temporary member (2012)

Search Committee, UCL Sheila Sherlock Chair of Hepatology (2011)

NIH Special Emphasis Panel ZDK1 GRB-2 (2011)

NIH Special Emphasis Panel ZDK1 GRB-8 (2010), Acting Chairman

NIH Special Emphasis Panel ZRG1 CB-Q 30P (2009), Acting Chairman

VA Medical Research Eligibility Committee (2009-2012)

FAPESP-Fulbright Scholar Award, 2007

Howard M. Spiro Teaching Award, 2006

NIH Special Emphasis Panel ZDK1 GRB-8 (2009), Chairman

NIH Special Emphasis Panel ZDK1 GRB-G (2007), Chairman

NIH Cell Structure and Function (CSF) Study Section, *ad hoc* reviewer (2006)

NIH Hepatobiliary Pathophysiology (HBPP) Study Section, temporary member (2005, 2006)

NIH Special Emphasis Panel ZRG1 SSS-U (2005), Chairman

NIH Special Emphasis Panel CDF-4 (ZRG1 CB-F) (2002-06, 2008-09; chair in 2005 and 2006)

NIH/NIDCR Special Emphasis Panel ZDE1-PW (2004)

NIH General Medicine A-2 (GMA-2) Study Section, temporary member (1999, 2001)

VA Merit Review Board for Gastroenterology (1998-2001, 2004)

NIH (NLM) Biomedical Library Review Committee, *ad hoc* reviewer (2000)

NIH Cell Biology and Physiology (CBY-2) Study Section, temporary member (1995)

VA Merit Review Board for Gastroenterology, *ad hoc* reviewer (1993-1997, 2006)

Martin Wahl Memorial Fund Award (Case Western Reserve University, 1985)

Dr. Harry Goldblatt Scholarship Award (CWRU, 1984)

Alpha Omega Alpha (CWRU)

B.S. with Highest Honors (University of California, Berkeley)

Phi Beta Kappa (UC Berkeley)

Tau Beta Pi (UC Berkeley)

EDITORIAL BOARDS:

1. Journal of Investigative Medicine (Associate Editor), 1999-2015

2. Journal of Hepatology, 1996-99, 2005-07

3. Hepatology (*Hepatology Elsewhere* section), 1996-2001

4. Journal of Clinical Gastroenterology, 2003-13

5. American Journal of Physiology/Gastrointestinal & Liver Physiology, 2003-08

6. Hepatology, 2004-16

7. Faculty of 1000, Section Head for Liver Biology and Pathobiology, 2005-

8. GI Cancers Insight, 2008-13

9. Hepatology (Editor-in-chief), 2012-2016

SOCIETIES:

American Federation for Medical Research

Secretary-Treasurer (Eastern Section), 1994-95

Secretary-Treasurer (National), 1995-1999

American Association for the Study of Liver Diseases

Basic Research Committee, 1999-2001

Abstract Review Committee, 2001-04, 2007-10

Nominating Committee, 2008-09

Association of American Physicians

American Society for Clinical Investigation

American Gastroenterological Association

Inter-Urban Clinical Club

Mount Desert Island Biological Laboratory (Publications Committee, 1995-2000)

Gastroenterology Research Group

American College of Physicians

Biomedical Engineering Society

American Liver Foundation (CT chapter), Medical Advisory Committee

BOARD CERTIFICATIONS:

National Board of Medical Examiners (7/1/86)

American Board of Internal Medicine (9/15/88)

ABIM - Gastroenterology Subspecialty (11/5/91; re-certified 11/7/01 and 11/14/11)

TEACHING ACTIVITIES AT YALE:

Courses

1. Lectures on Biliary Pathophysiology (Yale Physicians Associates Program), 1988, 1989, 1990 and director of the Digestive Diseases curriculum in 1990.

2. Lab instructor for GI histology (1st year graduate and medical students), 1990-91, 1991-92, 1992-93, 1993-94.

3. Small group instructor for Digestive Diseases workshops (2nd year medical students), 1990-91, 1991-92, 1992-93, 1993-94, 1994-95, 1995-96, 1996-97, 1998-99, 1999-2000, 2000-01, 2001-02, 2002-03, 2003-04, 2004-05, 2005-06, 2006-07, 2009-10, 2011-12, 2012-13, 2013-14.

4. Research supervisor for course MB&B 470A, Research in Biochemistry and Biophysics, Fall Semester 1990 (supervising an independent research project by Andrew Lee, a Yale College junior).

5. Lectures on Hepatology (Yale Nursing School), 1990-2004.

6. "Confocal and video microscopy." Lecture to Yale graduate students as part of course Cell Biology 610B, Research Strategies in Cell Biology and Molecular Genetics, January 23, 1991.

7. Module Coordinator for the Digestive Diseases Module (for 2nd year medical students), 1993-94, 1994-95, 1995-96, 1996-97, 1998-99, 1999-2000, 2000-01, 2001-02.

8. "Hemochromatosis and other inherited liver diseases." Lecture to 2nd year medical students during the Digestive Diseases Module, 1993-94, 1994-95, 1995-96, 1996-97, 1997-98, 1998-99, 1999-2000, 2000-01.

9. Lab instructor for course Cell Biology 502a (Histology for 1st year medical students), 1994-95, 1995-96, 1996-97, 1998-99, 2000-01, 2001-02, 2002-03.

10. Director of the weekly clinical and research seminar programs for the Digestive Diseases Section, 1994-97, 1998-2003.

11. "Cell signaling." Lecture to 1st year medical students as part of course Cell Biology 502a, September 29, 1998.

12. "Cell signaling." Lecture to graduate students as part of course Cell Biology 602a (1998).

13. Tutorial on cell signaling. Seminar given as part of course Cell Biology 602a (1997, 1998, 2000, 2001).

14. Abdominal pain conference for 3rd year medical students, January 21, 1999; June 10, 1999;

August 5, 1999; October 28, 1999.

15. "Hepatitis and cholestasis." Lecture to physicians associates (PA) students, January 21, 1999, January 20, 2000, January 17, 2001, January 29, 2002, and January 15, 2003.

16. “Bile formation, bile acids, and gallstones.” Lectures (2 hrs) to first year medical students, February 21, 2001.

17. Research supervisor for course MCDB 475, Research in Biology, Spring Semester 2001 (supervising an independent research project by Allison O’Neill, a Yale College senior).

18. "Hepatobiliary and pancreatic tumors." Lecture to 2nd year medical students during the Digestive Diseases Module, 2002-03.

19. “Interpretation of liver tests.” Lecture to PA students, January 5, 2004.

20. “Principles of confocal and two-photon microscopy.” Lectures to graduate students in Investigative Medicine, January 12 and 15, 2004.

21. “Interpretation of liver tests – case presentations.” Lecture to 2nd year medical students, February 5, 2004.

22. “Interpretation of liver tests.” Lecture to physicians associates students, February 9, 2005.

23. “Interpretation of liver tests.” Lecture to physicians associates students, February 8, 2006.

24. “Liver and pancreatic biology.” Lectures to MCDB grad. students, March 21 and 23, 2006.

25. “Liver and pancreatic biology.” Lectures to MCDB grad. students, March 27 and 29, 2007.

26. “Interpretation of liver tests.” Lecture to physicians associates students, April 9, 2007.

27. “Interpretation of liver tests – case presentations.” Lecture to 2nd year medical students, February 18, 2008.

28. “Liver and pancreatic biology.” Lectures to MCDB grad. students, February 26 and 28, 2008.

29. “Interpretation of liver tests.” Lecture to PA students, May 13, 2008.

30. “Liver and pancreatic biology.” Lectures to MCDB grad. students, February 24 and 26, 2009.

31. “Interpretation of liver tests.” Lecture to PA students, May 5, 2009.

32. “Liver and pancreatic biology.” Lectures to MCDB graduate students, February 23 and 25, 2010.

33. “Interpretation of liver tests.” Lecture to PA students, April 21, 2010.

34. “A 19 year old male with jaundice.” Professor rounds for internal medicine house staff and medical students, April 27, 2010.

35. “Interpretation of liver tests.” Lecture to PA students, January 26, 2011.

36. “Liver and pancreatic biology.” Lectures to MCDB grad. students, February 22 and 24, 2011.
37. "Cholestasis and cholestatic syndromes." Lecture to 2nd year medical students during the Digestive Diseases Module, March 28, 2011.
38. “Liver and pancreatic biology.” Lectures to MCDB grad. students, February 14 and 16, 2012.
39. “Interpretation of liver tests.” Lecture to PA students, March 28, 2012.
40. "Cholestasis and cholestatic syndromes." Lecture to 2nd year medical students during the Digestive Diseases Module, April 2, 2012.
41. “Liver and pancreatic biology.” Lectures to MCDB grad. students, February 5 and 7, 2013.
42. “Interpretation of liver tests.” Lecture to PA students, March 27, 2013.
43. “Liver and pancreatic biology.” Lectures to MCDB graduate students, February 11 and 13, 2014.
44. “Interpretation of liver tests.” Lecture to PA students, February 14, 2014.
45. “Interpretation of liver tests.” Lecture to PA students, January 29, 2015.
46. “Liver and pancreatic biology.” Lectures to MCDB graduate students, February 10 and 12, 2015.
47. “Liver and pancreatic biology.” Lectures to MCDB graduate students, February 23 and 25, 2016.
48. “Cholestasis and cholestatic syndromes.” Lecture to 2nd year medical students during the Digestive Diseases Module, October 18, 2016.
49. “Reproducibility in research – a journal editor’s perspective.” Lecture to Digestive Diseases fellows, December 9, 2016.
50. “Liver and pancreatic biology.” Lectures to MCDB graduate students, February 21 and 23, 2017.

Seminars

1. "Role of Ca^{++} in the regulation of hepatocyte bile secretion." Yale Liver Center Research Seminar, March 26, 1991.
2. "Intercellular calcium signaling." Research Discussion Series, Division of Infectious Diseases, Dept. of Medicine, Yale, September 5, 1991.
3. "Confocal microscopy." Research Seminar, Dept. of Pediatrics, Yale, January 9, 1992.
4. "Confocal microscopy to detect subcellular calcium signals in hepatocytes." Yale Liver

Center Research Seminar, April 7, 1992.

5. "Confocal imaging of calcium signals." Image Analysis Seminar, Dept. of Obstetrics and Gynecology, Yale, July 8, 1992.

6. "Organization of Ca^{2+} waves in epithelium." Digestive Diseases Research Seminar, October 18, 1994.

7. "Intercellular calcium signaling mechanisms in hepatocytes." Internal Medicine Seminar in Biomedical Research, March 18, 1996.

8. "Endocrine and paracrine signaling in bile duct epithelia." James L. Boyer Symposium, May 9, 1997.

9. "Iron stores and Hepatitis C infection." CME Update on Hepatology, June 2, 1997.

10. "Calcium waves in secretory epithelia: a tale of two tissues." Digestive Diseases Research Seminar, October 6, 1998.

11. "Evaluating abnormal liver tests." Gastroenterology for the primary care provider, October 16, 1998.

12. "Calcium signaling mechanisms in polarized epithelia." Department of Cellular and Molecular Physiology Seminar, April 12, 1999.

13. "Calcium signaling in epithelia." CHRC Department of Pediatrics Research Seminar, October 21, 1999.

14. "Calcium signaling in the cytosol and nucleus." Digestive Diseases Research Seminar, September 19, 2000.

15. "63 year old man with cholestasis and sepsis." Bench-to-bedside House Staff Teaching Conference, January 29, 2003.

16. "Liver resection and regeneration – the calcium connection." Medical Grand Rounds, April 10, 2003.

17. "Confocal and two-photon imaging at Yale." Cell Biology Annual Retreat, October 28, 2004.

18. "Liver diseases." DDW Review, June 17, 2006.

19. "Calcium signaling in the nucleus vs. cytosol: Location, location, location." Digestive Diseases Research Seminar, September 12, 2006.

20. "Calcium signaling in the nucleus: the cell within a cell." Cell Biology Annual Retreat, September 28, 2007.

21. "Calcium signaling in polarized epithelia: what the eye can learn from the liver." Symposium

in honor of Marvin L. Sears, October 3, 2008.
22. "Hepatocellular carcinoma – from bench to bedside." Professor's rounds/house staff teaching conference, May 12, 2009.
23. "Basics of cellular imaging and confocal endomicroscopy". Yale/Cellvizio Confocal Endomicroscopy Training Workshop, July 22, 2009.
24. "Microscopic imaging in the GI tract: confocal endoscopy and beyond." Digestive Diseases Research Seminar, April 6, 2010.

Attending rotations

1. Hepatology consult service (Yale-New Haven Hospital), 12/90, 12/91, 12/92, 11/93, 3/94, 9/94, 12/94, 12/95, 3/96, 7/96, 12/96, 9/98, 12/98, 5/99, 8/99, 12/99, 7/00, 12/00, 2/01, 8/01, 9/01, 2/02, 9/02, 1/03, 12/03, 3/04, 7/04, 12/04, 12/05, 2/06, 7/06, 8/06, 7/07, 6/08, 6/09, 2/10, 8/10, 12/10, 7/11, 2/12, 6/12, 2/13, 3/14, 10/14, 2/15, 7/15, 5/16, 7/16, 11/16, 1/17, 6/17
2. Hepatology consult service (W. Haven VA Hospital), 5/95.
3. Gastroenterology consult service (Yale-New Haven Hospital), 1/92, 3/93, 6/97.
4. Internal medicine teaching attending (St. Mary's Hospital), 10/90, 7/91.
5. Internal medicine teaching attending (Bridgeport Hospital), 2/91, 3/92.
6. Internal medicine ward attending (Yale-New Haven Hospital), 2/92, 12/93, 9/95, 6/99, 3/01, 5/02, 12/02, 4/04, 1/05, 4/06, 7/06, 7/07, 6/08, 6/09, 2/10, 8/10, 3/11, 7/11, 2/12, 6/12, 2/13, 2/14, 4/14, 8/14, 4/15, 6/15, 7/15, 2/16, 7/16, 11/16, 1/17, 6/17
7. Gastrointestinal endoscopy clinic attending (West Haven VA Hospital), Friday mornings, 7/91-6/13.
8. Director, Bridgeport Hospital Liver Clinic, 7/13-present.

LOCAL COMMITTEES:

1. MD-PhD (MSTP) Admissions Committee, 1992-2006
2. Liver Center Executive Committee, 1996-
3. Department of Medicine House Staff Selection Committee, 1999-2011
4. Hellman Family Fellowship Selection Committee, 2000-01
5. Medical School Senior Appointments and Promotions Committee, 2002-05
6. Search Committee, Chief of Pediatric Gastroenterology and Hepatology, 2003-04

7. Search Committee, Chief of Medicine (West Haven VA), 2004

8. Yale-New Haven Hospital Transplant Steering Committee, 2004-05

9. Liaison Committee for the Chair of Medicine Search, 2004-06

10. Advisory Board, Yale Child Health Research Center, 2005-

11. Department of Medicine Appointments and Promotions Committee, 2006-2012

12. Yale Cancer Center Appointments and Promotions Committee, 2006-2012

13. Yale Medical School Bioimaging Awards Committee, 2007-2012

14. Yale Transplant Center Quality Assurance and Performance Improvement Committee, 2007-

15. Yale Transplant Operations Council, 2008-

16. Yale Center for Clinical Investigation/CTSA Career Oversight Committee, 2008-

17. Yale Transplant Center Research Advisory Committee, 2014-

DOCTORAL THESIS COMMITTEES:

1. Robert Hagar, Dept. of Physiology (Univ. of CT), 1999-2000
2. Brian Lee, Dept. of Experimental Pathology, 1999-2001
3. Kimberly Fowler, Dept. of Cell Biology, 2000-2005
4. Mateus T. Guerra, Dept. of Pharmacology (UFMG, Brazil), 2002-04
5. Scott Lichtenberger, Dept. of (Investigative) Medicine, 2003-04
6. Juliana Rengifo, Dept. of Cellular and Molecular Physiology, 2002-06
7. Craig Gibson, Dept. of Cellular and Molecular Physiology, 2003-08
8. William Grenawitzke, Dept. of Cellular and Molecular Physiology, 2005
9. Nicola Pierobon, Dept. of Physiology and Pharmacology (UMDNJ), 2006-08
10. Michael Fiedler, Dept. of Cell Biology, 2006-11
11. Jason Hanna, Dept. of Pathology, 2007-2012
12. Justin Fendos, Dept. of Cell Biology, 2008
13. Annie Widawsky-Le, Dept. of Pharmacology, 2009
14. Ruonan Yin, Dept. of Cell Biology, 2015-
15. Bichen Zhang, Dept. of Cellular and Molecular Physiology, 2017-

INVITED LECTURES AND MEETINGS:

1. "Effects of Calcium Agonists on Bile Secretion." Gastroenterology Research Seminar,

University of North Dakota School of Medicine, Fargo, ND, August 21, 1990.

2. "Newer Treatment Modalities in Gastric Acid-Related Disorders." Medical Grand Rounds, University of North Dakota School of Medicine, Fargo, ND, August 22, 1990.

3. "Medical Treatment Advances in Peptic Ulcer Disease." Medical Grand Rounds, Sinai Hospital (affiliated with Wayne State University), Detroit, MI, August 22, 1991.

4. "Hemochromatosis." Gastroenterology Basic Science Lecture, Sinai Hospital, Detroit, MI August 22, 1991.

5. "Subcellular calcium signals in the hepatocyte." Research Seminar, Weis Institute for Research, Danville, PA, December 6, 1991.

6. Gastroenterology Subspecialty Session Chairman, AFCR Eastern Section Meeting, October 9, 1992.

7. "Mechanisms of intra- and intercellular calcium wave propagation in epithelial cells." Liver Center Research Seminar, Albert Einstein College of Medicine, Bronx, NY, November 11, 1992.

8. "Mechanisms of calcium wave propagation in epithelial cells." Michigan Gut Peptide Research Center, University of Michigan School of Medicine, Ann Arbor, MI, February 23, 1993.

9. "Mechanisms of calcium wave propagation in epithelial cells." Digestive Disease Research Seminar, Mayo Clinic, Rochester, MN, March 1, 1993.

10. Acinar Cell Signaling Session Chairman, AGA Meeting, May 18, 1993.

11. Gastroenterology Subspecialty Session Chairman, AFCR Eastern Section Meeting, October 9, 1993.

12. "The use of confocal microscopy to examine calcium signals in living cells." Connecticut Microscopy Society, March 10, 1994.

13. "Calcium waves, gradients and oscillations." Ciba Foundation Symposium, London, England, April 26-28, 1994 (invited participant).

14. Gastroenterology Subspecialty Session Chairman, AFCR Eastern Section Meeting, October 7, 1994.

15. "Calcium waves in polarized epithelia." Invited presentation, Gastroenterology Session, AFCR Eastern Section Meeting, October 7, 1994.

16. "Calcium signaling in epithelia: non-neural communication." IEEE-EMBS Workshop on Chaos theory and complexity in physiological systems, November 2, 1994.

17. Combined Subspecialty Session Chairman, AFCR Eastern Section Meeting, October 28, 1995.

18. Bile Secretion Session Chairman, AASLD Meeting, November 7, 1995.

19. "Role of gap junctions in intercellular signaling in liver." International symposium on ion channels and cell-to-cell communication, Santiago, Chile, November 28-30, 1995.

20. "Confocal microscopy: Theory and practice." Short course on newer methods in microscopy, University of Chile, Santiago, Chile, November 30-December 1, 1995.

21. "Intercellular Ca^{2+} signaling mechanisms in normal liver and in cholestasis." Grand Rounds, Department of Pathology, Anatomy and Cell Biology, Thomas Jefferson University, Philadelphia, PA, January 31, 1996.

22. "Intercellular Ca^{2+} signaling mechanisms in normal and cholestatic liver." Research Seminar, Institute of Molecular Medicine, Medical College of Georgia, Augusta, GA, February 15, 1996.

23. "Intercellular Ca^{2+} signaling mechanisms in normal and cholestatic liver." Gastroenterology Grand Rounds, Department of Internal Medicine, Columbia College of Physicians and Surgeons, New York, NY, February 26, 1996.

24. Bile Secretion Session Chairman, DDW Meeting, May 19, 1996.

25. "Intercellular signaling in liver." Research seminar, Department of Cellular Physiology and Pharmacology, University of Paris-South, June 3, 1996.

26. Medical Subspecialty Session Chairman, AFCR Eastern Section Meeting, October 5, 1996.

27. "Cell-to-cell communication in liver." Research Seminar, Winthrop-University Hospital (SUNY), Mineola, NY, October 16, 1996.

28. "Cell-to-cell communication in liver." Workshop moderator, AASLD meeting, November 12, 1996.

29. "Modes of intercellular communication in liver." Research Seminar, Tufts University Department of Physiology, Boston, MA, April 14, 1997.

30. "Subcellular signaling and exocytosis in gastrointestinal epithelia." AASLD Single Topic Symposium, Arlie, VA, June 22, 1997.

31. "Paracrine signaling in liver by secretion of ATP." Inter-Urban Clinical Club, New Haven, CT, November 7, 1997.

32. "New concepts in the treatment of cholestasis." Department of Internal Medicine,

University of Padova, Italy, May 28, 1998.

33. "Calcium waves in secretory epithelia: a tale of two tissues." Research Seminar, Mount Desert Island Biological Laboratory, Salsbury Cove, ME, July 8, 1998.

34. "Mechanism of long-range Ca^{2+} signaling in the nucleus of isolated rat hepatocytes." EMBO Workshop on calcium signals in the cell nucleus, Strasbourg, France, August 20, 1998.

35. "Calcium signaling in polarized epithelia." Research Seminar, Department of Medicine, University of Florida, Gainsville, FL, February 22, 1999.

36. "Mechanisms of calcium wave propagation in polarized epithelia." Research Seminar, Department of Physiology and Pharmacology, University of Rochester, Rochester, NY, March 2, 1999.

37. "Quantitative Fluorescence Microscopy." Course faculty. Mount Desert Island Biological Laboratory, Salsbury Cove, ME, June 21-25, 1999.

38. "Examining epithelial Ca^{2+} waves by confocal microscopy." Pre-meeting congress on advances in optical microscopy, MSA annual meeting, Portland, OR, July 31, 1999.

39. "Molecular basis of calcium signaling in epithelia." Research Seminar, Department of Pharmacology, University of Vermont, Burlington, VT, September 30, 1999.

40. "Regulation of calcium signaling in epithelia." Research Seminar, Department of Physiology and Biophysics, UFMG, Belo Horizonte, Brazil, October 7, 1999.

41. "Molecular organization of calcium signaling in epithelia." Third International Conference on Vasoactive Peptides, Belo Horizonte, Brazil, October 9, 1999.

42. "Calcium signaling in the pancreatic acinar cell." Frank Brooks Memorial State of the Art Lecture, Annual Meeting of the American Pancreatic Association, Chicago, IL, November 5, 1999.

43. "Organization of calcium waves in epithelia: a tale of two tissues." Liver Center Research Seminar, Albert Einstein College of Medicine, Bronx, NY, May 3, 2000.

44. "Quantitative Fluorescence Microscopy." Course faculty. Mount Desert Island Biological Laboratory, Salsbury Cove, ME, June 19-24, 2000.

45. "Intracellular calcium release channels." Invited lecture, American Society of Nephrology Annual Meeting, Toronto, Canada, October 14, 2000.

46. Ion transport session chairman, AASLD Meeting, October 30, 2000.

47. "Subcellular organization of calcium signaling mechanisms in polarized epithelia." Research

Seminar, Department of Physiology and Cellular Biophysics, Columbia University, New York, NY, November 7, 2000.

48. “Two photon microscopy.” Invited lecture, Digestive Diseases Week, Atlanta, GA, May 21, 2001.

49. “Calcium-regulated biliary secretion.” Invited lecture, AASLD single topic conference on pathobiology of biliary epithelia, Airlie, VA, June 9, 2001.

50. “Quantitative Fluorescence Microscopy.” Course faculty. Mount Desert Island Biological Laboratory, Salsbury Cove, ME, June 17-22, 2001.

51. “Hemochromatosis.” Liver update for the community, American Liver Foundation (CT Chapter), Meriden, CT, September 21, 2001.

52. “Look at who’s talking now: novel types of intercellular communication in the liver.” Hepatology Research Seminar, Mount Sinai School of Medicine, New York, NY, January 23, 2002.

53. “Calcium signaling in biliary epithelia: Importance in health, disease, and recovery.” GI Research Forum, Texas Gulf Coast Digestive Diseases Center, Houston, TX, September 12, 2002.

54. Session chair, AASLD Postgraduate Course, November 1, 2002.

55. “Calcium signaling in biliary epithelia: Importance in health, disease, and recovery.” Department of Medicine, University Hospital, Berne, Switzerland, December 5, 2002.

56. “Calcium signaling in the nucleus.” Department of Clinical Pharmacology, University of Berne, Switzerland, December 6, 2002.

57. “Calcium signaling in the nucleus.” Medical Physiology Seminar, Texas A&M Medical School, Temple, TX, April 3, 2003.

58. Cholangiocyte Biology session chairman, DDW Meeting, May 18, 2003.

59. “Regulation of bile secretion by Ca^{2+} signals in cholangiocytes.” Invited lecture, 5^{th} International Malpighi Symposium, Rome, Italy, September 13, 2003.

60. “Liver resection and regeneration: the calcium connection.” Medical research seminar, West Roxbury VA/Harvard Medical School, Boston, MA, September 25, 2003.

61. Cholangiocyte Biology session chairman, AASLD Meeting, October 26, 2003.

62. "Signal transduction in the liver." Workshop moderator, AASLD meeting, October 26, 2003.

63. “Mechanisms of calcium signaling in the nucleus.” American Heart Association conference

on basic science, Stevenson, WA, July 17, 2004.

64. "Signal transduction in the liver." Workshop moderator, AASLD meeting, October 31, 2004.

65. “Liver resection and regeneration: the calcium connection.” Molecular medicine seminar, Georgetown University, Washington, DC, February 8, 2005.

66. "Signal transduction in the liver." Workshop moderator, AASLD meeting, November 13, 2005.

67. Cholangiocyte Biology session chairman, AASLD Meeting, November 13, 2005.

68. Regulation and function of calcium waves. Course faculty, Catholic University, Santiago, Chile, January 9-13, 2006.

69. “Calcium signaling in the nucleus.” Physiology seminar, UMDNJ/New Jersey Medical School, Newark, NJ, April 24, 2006.

70. Molecular Mechanisms and Treatment of Liver Disease session chairman, DDW Meeting, May 22, 2006.

71. “Calcium signaling in the cytosol vs. nucleus: Location, location, location.” PRISE lecture series, Harvard College, Cambridge, MA, August 23, 2006.

72. “Regulation of bile duct secretion by calcium signals in health and disease.” Research Seminar, Jichi Medical School, Jichi, Japan, August 29, 2006.

73. “Calcium signaling in the nucleus versus cytoplasm: Location is everything.” 16th International Symposium on Regulatory Peptides, Hakone, Japan, September 2, 2006.

74. "Cholangiocyte biology." Workshop moderator, AASLD meeting, October 30, 2006.

75. “The balance between liver regeneration and liver cancer: Bringing basic science to the bedside.” Patrick Calabrese Memorial Lecture, Bridgeport Hospital, November 16, 2006.

76. “Calcium signaling in the nucleus and cytoplasm: Location, location, location.” Liver Research Center Seminar, Albert Einstein College of Medicine, Bronx, NY, March 14, 2007.

77. “Calcium signaling in the nucleus and cytoplasm.” Biochemical Institute Research Seminar, University of Sao Paulo, Sao Paulo, Brazil, April 18, 2007.

78. “Calcium signaling in the nucleus: The cell within a cell.” Pharmacology Department Seminar, UFMG, Belo Horizonte, Brazil, April 20, 2007.

79. “Calcium signaling in the cytoplasm versus nucleus: Location is everything.” 14th congress of calcium binding proteins and calcium function in health and disease, La Palma, Spain, October 17, 2007.

80. Mechanisms of Cell Function and Injury session chairman, AASLD Meeting, November 4, 2007.
81. "Signal transduction in the liver." Workshop moderator, AASLD Meeting, November 5, 2007.
82. “Calcium signaling in the nucleus vs. cytoplasm: Location, location, location.” Kelsey Family Named Professor lecture, Division of Gastroenterology and Hepatology, Mayo Clinic, Rochester, MN, January 28, 2008.
83. “Regulation of secretion in cholangiocytes: a new twist to an old story.” Satellite symposium on cholestasis, EASL Meeting, Milan, Italy, April 22, 2008.
84. Co-chair of “Pathobiology of biliary epithelia and cholangiocarcinoma.” AASLD single topic conference, Atlanta, GA, June 6-8, 2008.
85. “Signaling mechanisms in cholangiocytes.” Lecture given during AASLD single topic conference, Atlanta, GA, June 7, 2008.
86. “Microscopic imaging in the GI tract: confocal endoscopy and beyond.” Center for Liver Research, Bergamo, Italy, January 29, 2009.
87. “The hows and whys of calcium signaling in the cell nucleus.” Department of Gastroenterology, University of Milan, January 30, 2009.
88. “Talking to yourself – regulation of epithelial secretion by autocrine ATP signals.” Gordon Research Conference on Salivary Glands and Exocrine Secretion, Galveston, TX, February 9, 2009.
89. “The hows and whys of calcium signaling in the nucleus.” Gordon Research Conference on Signal Transduction Within the Nucleus, Ventura, CA, April 1, 2009.
90. “The hows and whys of calcium signaling in the nucleus.” Keynote lecture, HHMI conference on current topics and methods in calcium signaling, Ouro Preto, Brazil, April 26, 2009.
91. “Calcium signaling in the nucleus: the cell within a cell.” Research Seminar, INSERM U757, University of Paris-South, Orsay, France, December 11, 2009.
92. “Know your neighbors: regulation of bile secretion and paracrine signalling in the liver” Research Seminar, Division of Gastroenterology and Hepatology, Medical University of Graz, Austria, December 15, 2009.
93. “Microscopic imaging in the GI tract: Confocal endomicroscopy and beyond.”

Gastroenterology and Hepatology Research Seminar, Academic Medical Center, Amsterdam, Netherlands, February 17, 2010.

94. "Calcium signaling in the liver." EASL Monothematic Conference on signaling in the liver, Amsterdam, Netherlands, February 20, 2010.

95. "Calcium signaling in the hepatocyte nucleus: bringing the bench to the bedside." 1st Annual William and Rebecca Balistreri Lecture on Hepatology Research, Digestive Health Center, Department of Pediatrics, University of Cincinnati, Cincinnati, OH, March 2, 2010.

96. "Microscopic imaging in the GI tract: confocal endoscopy and beyond." Division of Gastroenterology, Hepatology, and Nutrition Research Seminar, University of Cincinnati, Cincinnati, OH, March 3, 2010.

97. "Calcium signaling in the hepatocyte nucleus: the cell within a cell." Department of Gastroenterology and Hepatology Research Seminar, Medical University of Vienna, Vienna, Austria, October 14, 2010.

98. "Microscopic imaging in the GI tract: Confocal endomicroscopy and beyond." Department of Gastroenterology and Hepatology Clinical Lecture, Medical University of Vienna, Vienna, Austria, October 15, 2010.

99. "Signal transduction in the liver." Workshop moderator, AASLD Meeting, October 31, 2010.

100. "Regulation of cell growth in the liver: the good, the bad, and the calcium." GI Grand Rounds, Boston University, December 2, 2010.

101. "Regulation of cell growth by calcium signaling in the nucleus." 10th annual Swiss Hepatology Research Retreat, Vulpera, Switzerland, January 22, 2011.

102. "Signaling in the hepatocyte nucleus: the good, the bad, and the calcium." NIAAA Research Seminar, Bethesda, MD, February 16, 2011.

103. "Confocal imaging of the liver." Plenary lecture, 3rd Annual ICCU Meeting, Nice, France, April 9, 2011.

104. "What's new in endomicroscopy: confocal imaging and beyond." GI grand rounds, Albert Einstein College of Medicine, Bronx, NY, April 28, 2011.

105. "Cholangiocyte signaling and bile secretion." Symposium on cholestatic and metabolic liver diseases: from basic science to clinical practice. Vienna, Austria, June 10, 2011.

106. "Confocal laser endomicroscopy for the study of the liver." Basic Science Grand Rounds,

EASL Meeting, Barcelona, Spain, April 20, 2012.
107. "AASLD Research Highlights – the year in review." Session chair, DDW, San Diego, CA, May 19, 2012.
108. "Mitochondria, calcium, and apoptosis." AASLD Single Topic Conference on Mitochondria and Hepatotoxicity, Atlanta, GA, June 8, 2012.
109. "AASLD Research Highlights – the year in review." Session chair, DDW, Orlando, FL, May 18, 2013.
110. "Confocal hepatobiliary microscopy for malignancy." Session chair, DDW, Orlando, FL, May 19, 2013.
111. "Regulation of regenerative processes in the liver." Basic research workshop session chair, AASLD meeting, Washington, DC, November 3, 2013.
112. "Calcium signaling in liver regeneration." Basic research workshop, AASLD meeting, Washington, DC, November 3, 2013.
113. "AASLD Research Highlights – the year in review." Session chair, DDW, Chicago, IL, May 3, 2014.
114. "Calcium signaling in liver pathobiology." Keynote lecture, 6th biannual meeting of the European club for liver cell biology, Castelfranco Veneto, Italy, September 12, 2014.
115. "Liver cancer." Session chair, 6th biannual meeting of the European club for liver cell biology, Castelfranco Veneto, Italy, September 12, 2014.
116. "Alcohol, calcium signaling, and secretion in cholangiocytes." 9th international symposium on alcoholic liver and pancreatic diseases and cirrhosis, Szeged, Hungary, November 22, 2014.
117. "Cell growth and calcium signaling in the nucleus." Institute of Biological Sciences seminar, UFMG, Belo Horizonte, Brazil, December 9, 2014.
118. "What's so special about the Type 3 InsP3 Receptor?" Keynote lecture, Calcium signaling retreat, UFMG, Belo Horizonte, Brazil, December 10, 2014.
119. "Bile ducts from bench to bedside." Department of Liver Transplantation seminar, UFMG School of Medicine, Belo Horizonte, Brazil, December 11, 2014.
120. "AASLD Research Highlights – the year in review." Session chair, DDW, Washington, DC, May 16, 2015.
121. "Normal and Abnormal Regulation of Cell Growth in the Liver by Calcium Signaling in the Nucleus" Department of Pathology Research Seminar, University of Pittsburgh, Pittsburgh, PA

June 24th, 2015.

122. "Origins of Hepatobiliary and Gastrointestinal Physiology." Course faculty and director of the physiological imaging module, Mount Desert Island Biological Laboratory, Bar Harbor, ME, September 6-13, 2015.

123. "Diagnosis and treatment of alcoholic liver disease in 2015." Grand Rounds, Department of Medicine, University of Manitoba, Winnipeg, Manitoba, Canada, October 13, 2015.

124. "Normal and Abnormal Regulation of Cell Growth in the Liver." Research seminar, Hepatology Section, University of Manitoba, Winnipeg, Manitoba, Canada, October 13, 2015.

125. "Normal and Abnormal Regulation of Cell Growth in the Liver by Calcium Signaling in the Nucleus." Research seminar, Department of Medicine, University of Milan-Bicocca, Monza, Italy, October 30, 2015.

126. "AASLD Research Highlights – the year in review." Session chair, DDW, San Diego, CA, May 21, 2016.

127. "Cholangiocarcinoma" session moderator, 4th Biannual meeting of the International PSC Study Group, New Haven, CT, June 26, 2016.

128. "Origins of Hepatobiliary and Gastrointestinal Physiology." Course faculty and director of the physiological imaging module, Mount Desert Island Biological Laboratory, Bar Harbor, ME, September 10-16, 2016.

129. "Functional effects of nuclear calcium signals in liver." Invited talk, Annual meeting of the Asian-Pacific Association for the Study of the Liver (APASL), Shanghai, China, February 17, 2017.

130. "Liver cancer – treatment" session moderator, APASL meeting, Shanghai, China, February 17, 2017.

131. "Leadership niches in research". Invited talk, Symposium on "The Road to Leadership in Gastroenterology", Digestive Diseases Week, Chicago, IL, May 8, 2017.

132. "The type 2 IP3 receptor in hepatocytes: a calcium channel for all seasons." Research Seminar, Department of Physiology and Biophysics, UFMG, Belo Horizonte, Brazil, May 18, 2017.

POSTDOCTORAL TRAINEES:

1. Ulrich Beuers (1992; joint with J.L. Boyer). Current affiliation: Professor and Chief of

Hepatology, Academic Medical Center, Amsterdam, Netherlands.

2. Isabelle Tardieux (1993; joint with N.W. Andrews). Current affiliation: Pasteur Institute, France.

3. Stephan F. Schlosser (1995). Current affiliation: Department of Internal Medicine, University of Aachen, Germany.

4. Michael Trauner (1995-96; joint with J.L. Boyer). Current affiliation: Professor and Chief of Gastroenterology and Hepatology, University of Vienna, Austria.

5. M. Fatima Leite (1997). Current affiliation: Associate Professor, Department of Physiology and Biophysics, UFMG, Brazil.

6. Jonathan Dranoff (1997-99). Current affiliation: Professor and Chief of Gastroenterology, Department of Medicine, University of Arkansas.

7. Keiji Hirata (2000-01). Current affiliation: Department of Gastrointestinal Surgery, University of Occupational and Environmental Health Sciences, Fukuoko, Japan.

8. Wihelma Echevarria (2000-01). Current affiliation: Department of Pediatrics, University of Puerto Rico.

9. Thomas Pusl (2000-02). Current affiliation: Klinikum Grosshadern, University of Munich, Germany.

10. Kazunori Shibao (2001-03). Current affiliation: Department of Gastrointestinal Surgery, University of Occupational and Environmental Health Sciences, Fukuoko, Japan.

11. Erick Hernandez (2001-03). Current affiliation: Director of the Liver Center, Miami Children's Hospital.

12. Noritaka Minagawa (2003-05). Current affiliation: Department of Gastrointestinal Surgery, University of Occupational and Environmental Health Sciences, Fukuoko, Japan.

13. Sona Sehgal (2003-05). Current affiliation: Department of Pediatrics, Children's National Medical Center.

14. Paulo Correa (2004-05). Current affiliation: Department of Psychiatry, Yale University.

15. Jun Nagata (2005-2007). Current affiliation: Department of Gastrointestinal Surgery, University of Occupational and Environmental Health Sciences, Fukuoko, Japan.

16. Dawidson Gomes (2006-2007). Current affiliation: Assistant Professor, Federal University of Minas Gerais, Belo Horizonte, Brazil.

17. Anamika Reed (2008-11; joint with F.S. Gorelick). Current affiliation: Assistant Professor,

Section of Digestive Diseases, Department of Medicine, Yale University.

18. Michele Rodrigues (2010). Current affiliation: Federal University of Minas Gerais, Belo Horizonte, Brazil.
19. Maria Jimena Amaya Gutierrez (2010-15)
20. Mateus Guerra (2010-12). Current affiliation: Research Scientist, Department of Medicine, Yale University.
21. Fred Shieh (2010-12; joint with Priya Jamidar). Current affiliation: Geisinger Clinic.
22. Amy Kim (2011-13; joint with Mario Strazzabosco). Current affiliation: Assistant Professor of Medicine, Johns Hopkins.
23. Andre Oliviera (2014-15). Current affiliation: Assistant Professor, Federal University of Minas Gerais, Belo Horizonte, Brazil.

PREDOCTORAL TRAINEES:

1. Dawidson Gomes (2004-2006)
2. Michele Rodrigues (2004-2007)
3. Mayerson Thompson (2005-2006)
4. Elizabeth M. O'Brien (2005-2006)
5. Michael Fiedler (2006-2011)
6. Robson Sartorello (2007)
7. Kurt Schalper (2007)
8. Maria Jimena Amaya Gutierrez (2007-2009)
9. Laura Cruz (2008-2009)
10. Mateus Guerra (2009-2010)
11. Viviane Andrade (2009-10)
12. Ana Carolina De Angelis Campos (2012)
13. Jerusa Quintao (2013-2014)
14. Denisse Tafur (2010-2011)
15. Pedro Sousa (2014)
16. Marina Rodrigues Garcia da Silveira (2016)
17. Tanaporn Khamphaya (2013-)
18. David Trampert (2016-17)

ORIGINAL PUBLICATIONS:

1. Nathanson, M.H., Hillman, R.S., and Georgakis, C.: Towards an optimal drug regimen for methotrexate chemotherapy. Appl. Math. Comp. 12:99-117, 1983.

2. Nathanson, M.H., McLaren, G.D., and Saidel, G.M.: A model of intestinal iron absorption and plasma iron kinetics: Optimal parameter estimates for normal dogs. Comput. Biomed. Res. 17:55-70, 1984.

3. Nathanson, M.H., Saidel, G.M., and McLaren, G.D.: Analysis of iron kinetics: Identifiability, experiment design, and deterministic interpretations of a stochastic model. Math. Biosci. 68:1-21, 1984.

4. Nathanson, M.H. and Saidel, G.M.: Multiple objective criteria for optimal experiment design: Application to ferrokinetics. Amer. J. Physiol. 248:R378-R386, 1985.

5. Nathanson, M.H., Muir, W.A., and McLaren, G.D.: Regulation of iron absorption in normal and iron-deficient beagle dogs: Mucosal iron kinetics. Amer. J. Physiol. 249:G439-G448, 1985.

6. Nathanson, M.H. and McLaren, G.D.: Computer simulation of iron absorption: Regulation of mucosal and systemic iron kinetics in dogs. J. Nutr. 117:1067-1075, 1987.

7. Wisnieski, J.J., Nathanson, M.H., Anderson, J., Davis, A.E., Alper, C.A., and Naff, G.B.: Metabolism of C4 and linkage analysis in a kindred with hereditary incomplete C4 deficiency. Arthritis Rheum. 30:919-926, 1987.

8. Wisnieski, J.J. and Nathanson, M.H.: Plasma kinetics of the fourth component of complement (C4). J. Lab. Clin. Med. 113:196-203, 1989.

9. McLaren, G.D., Nathanson, M.H., Jacobs, A., Trevett, D., and Thomson, W.: Iron absorption and mucosal iron kinetics in normal subjects and patients with hemochromatosis. J. Lab. Clin. Med. 117:390-401, 1991.

10. Nathanson, M.H., and Burgstahler, A.D.: Hormone-induced coordination of cytosolic calcium signals in isolated rat hepatocyte couplets: Demonstration using confocal microscopy. Molec. Biol. Cell 3:113-121, 1992.

11. Nathanson, M.H., and Burgstahler, A.D.: Subcellular distribution of cytosolic Ca^{2+} in isolated rat hepatocyte couplets: Evaluation using confocal microscopy. Cell Calcium 13:89-98, 1992.

12. Nathanson, M.H., Bruck, R., Isales, C., Boyer, J.L.,and Gautam, A.: Effects of Ca^{2+}

agonists on cytosolic Ca^{2+} in isolated hepatocytes and on bile secretion in the isolated perfused rat liver. Hepatology 15:107-116, 1992.

13. Nathanson, M.H., Gautam, A., Ng, O.C., Bruck, R., and Boyer, J.L.: Hormonal regulation of paracellular permeability in isolated rat hepatocyte couplets. Amer. J. Physiol. 262:G1079-G1086, 1992.

14. Nathanson, M.H., Padfield, P.J., O'Sullivan, A.J., Burgstahler, A.D., and Jamieson, J.D.: Mechanism of Ca^{2+} wave propagation in pancreatic acinar cells. J. Biol. Chem. 267:18118-18121, 1992.

15. Nathanson, M.H., Moyer, M.S., Burgstahler, A.D., O'Carroll, A.-M., Brownstein, M.J., and Lolait, S.J.: Mechanisms of subcellular cytosolic Ca^{2+} signaling evoked by stimulation of the vasopressin V_{1a} receptor. J. Biol. Chem. 267:23282-23289, 1992.

16. Su, Y., Chakraborty, M., Nathanson, M.H., and Baron, R.: Differential effects of cAMP and PKC pathways on the response of isolated rat osteoclasts to calcitonin. Endocrinol. 131:1497-1502, 1992.

17. Rosales, O.R., Isales, C., Nathanson, M.H., and Sumpio, B.E.: Immunocytochemical expression and localization of protein kinase C in bovine aortic endothelial cells. Biochem. Biophys. Res. Commun. 189:40-46, 1992.

18. Beuers, U., Nathanson, M.H., and Boyer, J.L.: Tauroursodeoxycholic acid modulates signal transduction pathways that influence intracellular calcium. Gastroenterol. 104:604-612, 1993.

19. Montgomery, R.R., Nathanson, M.H., and Malawista, S.E.: Interaction of *Borrelia burgdorferi*, the Lyme spirochete, with mouse macrophages *in vitro*: Evidence for occasional intracellular persistence. J. Immunol. 150:909-915, 1993.

20. Isales, C.M., Nathanson, M.H., and Bruck, R.: Endothelin-1 induces cholestasis which is mediated by an increase in portal pressure. Biochem. Biophys. Res. Commun. 191:1244-1251, 1993.

21. Beuers, U., Nathanson, M.H., Isales, C.M., and Boyer, J.L.: Tauroursodeoxycholic acid stimulates hepatocellular exocytosis and mobilizes extracellular Ca^{++}: Associated mechanisms defective in cholestasis. J. Clin. Invest. 92:2984-2993, 1993.

22. Nathanson, M.H., Fallon, M.B., Padfield, P.J., and Maranto, A.J.: Localization of the type 3 inositol 1,4,5-trisphosphate receptor in the Ca^{2+} wave trigger zone of pancreatic acinar cells. J.

Biol. Chem. 269:4693-4696, 1994.

23. Tardieux, I., Nathanson, M.H., and Andrews, N.W.: *Trypanosoma Cruzi* induces Pertussis toxin-sensitive cytosolic Ca^{2+} transients necessary for invasion. J. Exp. Med. 179:1017-1022, 1994.

24. Nathanson, M.H., Burgstahler, A.D., Orloff, J.J., Mani, A., and Moyer, M.S.: Mechanisms of desensitization of the cloned vasopressin V_{1a} receptor expressed in *Xenopus* oocytes. Am. J. Physiol. 267:C94-C103, 1994.

25. Nathanson, M.H., Burgstahler, A.D., and Fallon, M.B.: Multi-step mechanism of polarized Ca^{2+} wave patterns in hepatocytes. Amer. J. Physiol. 267:G338-G349, 1994.

26. Bruck, R., Nathanson, M.H., Roelofsen, H., and Boyer, J.L.: Effects of protein kinase C and cytosolic Ca^{2+} on exocytosis in the isolated perfused rat liver. Hepatology 20:1032-1040, 1994.

27. Montgomery, R.R., Nathanson, M.H., and Malawista, S.E.: Fc and non-Fc mediated phagocytosis of *Borrelia burgdorferi* by macrophages. J. Infect. Dis. 170:890-893, 1994.

28. Zheng, T., Nathanson, M.H., and Elias, J.A.: Histamine augments cytokine-stimulated interleukin-11 production by human lung fibroblasts. J. Immunol. 153:4742-4752, 1994.

29. Fallon, M.B., Nathanson, M.H., Mennone, A., Saez, J.C., Burgstahler, A.D., and Anderson, J.M.: Altered expression and function of hepatocyte gap junctions following common bile duct ligation in the rat. Amer. J. Physiol. 268:C1186-C1194, 1995.

30. Fiarman, G.S., Nathanson, M.H., West, A.B., Deckelbaum, L.I., Kelly, L.J., and Kapadia, C.R.: Differences in subcellular autofluorescence between normal colonic mucosa and polyps. Dig. Dis. Sci. 40:1261-1268, 1995.

31. Nathanson, M.H., Burgstahler, A.D., Mennone, A., Fallon, M.B., Gonzalez, C.B., and Saez, J.C.: Ca^{2+} waves are organized among hepatocytes in the intact organ. Amer. J. Physiol. 269:G167-G171, 1995.

32. Burgstahler, A.D., and Nathanson, M.H.: Nitric oxide modulates the apicolateral cytoskeleton of isolated rat hepatocyte couplets by a protein kinase C-dependent, Ca^{2+}- and cGMP-independent mechanism. Amer. J. Physiol. 269:G789-G799, 1995.

33. Nathanson, M.H., Mariwalla, K., Ballatori, N., and Boyer, J.L.: Effects of Hg^{2+} on cytosolic Ca^{2+} in isolated skate hepatocytes. Cell Calcium 18:429-439, 1995.

34. Nathanson, M.H., and Mariwalla, K.: Characterization and function of ATP receptor on

hepatocytes from the little skate *Raja erinacea*. Amer. J. Physiol. 270:R561-R570, 1996.
35. Nathanson, M.H., Burgstahler, A.D., Mennone, A., and Boyer, J.L.: Characterization of cytosolic Ca^{2+} signaling in rat bile duct epithelia. Amer. J. Physiol. 271:G86-G96, 1996.
36. Schlosser, S.F., Burgstahler, A.D., and Nathanson, M.H.: Isolated rat hepatocytes can signal to other hepatocytes and bile duct cells by release of nucleotides. Proc. Natl. Acad. Sci. USA 93:9948-9953, 1996.
37. Orloff, J.J., Ganz, M.B., Nathanson, M.H., Moyer, M.S., Kats, Y., Mitnick, M.A., Behal, A., Gasalla-Herraiz, J., and Isales, C.M.: A phospholipase C-linked receptor for a mid-region parathyroid hormone-related peptide on a squamous carcinoma cell line. Endocrinol. 137:5376-5385, 1996.
38. Trauner, M., Nathanson, M.H., Mennone, A., Rydberg, S.A., and Boyer, J.L.: Nitric oxide donors stimulate bile flow and glutathione disulfide excretion independent of cyclic GMP in the isolated perfused rat liver. Hepatology 25:263-269, 1997.
39. Trauner, M., Nathanson, M.H., Rydberg, S.A., Gartung, C., Sessa, W.C., and Boyer, J.L.: Endotoxin impairs biliary glutathione and HCO_3^- excretion and blocks the choleretic effects of nitric oxide in rat liver. Hepatology 25:1184-1191, 1997.
40. Fox, J.L., Burgstahler, A.D., and Nathanson, M.H.: Novel mechanism of long-range Ca^{2+} signaling in the nucleus of isolated rat hepatocytes. Biochem. J. 326:491-495, 1997.
41. Schmid, S.W., Modlin, I.W., Stoch, A., Rhee, S., Nathanson, M.H., Scheele, G.A., and Gorelick, F.S.: Telenzepine-sensitive muscarinic receptors on the rat pancreatic acinar cell. Amer. J. Physiol. 274:G734-G741, 1998.
42. Hirata, K., Nathanson, M.H., and Sears, M.L.: Novel paracrine signaling mechanism in the ocular ciliary epithelium. Proc. Natl. Acad. Sci. USA 95:8381-8386, 1998.
43. Nathanson, M.H., Burgstahler, A.D., Mennone, A., Dranoff, J. A., and Rios-Velez, L.: Stimulation of bile duct epithelial secretion by glybenclamide in normal and cholestatic rat liver. J. Clin. Invest. 101:2665-2676, 1998.
44. Hagar, R.E., Burgstahler, A.D., Nathanson, M.H., and Ehrlich, B.E.: Type III InsP3 receptors stay open in the presence of elevated calcium. Nature 396:81-84, 1998.
45. Leite, M.F., Dranoff, J.A., and Nathanson, M.H.: Expression and subcellular distribution of the ryanodine receptor in pancreatic acinar cells. Biochem. J. 337:305-309, 1999.
46. Nathanson, M.H., Rios-Velez, L., Burgstahler, A.D., and Mennone, A.: Communication via

gap junctions modulates bile secretion in the isolated perfused rat liver. Gastroenterol. 116:1176-1183, 1999.

47. Dranoff, J.A., McClure, M., Burgstahler, A.D., Denson, L.A., Crawford, A.R., Crawford, J.M., Karpen, S.J., and Nathanson, M.H.: Short-term regulation of bile acid uptake by microfilament-dependent translocation of rat ntcp to the plasma membrane. Hepatology 30:223-229, 1999.

48. Hirata, K., Nathanson, M.H., Burgstahler, A.D., Okazaki, K., Mattei, E., and Sears, M.L.: Relationship between inositol 1,4,5-trisphosphate receptor isoforms and subcellular Ca^{2+} signaling patterns in nonpigmented ciliary epithelia. Invest. Ophthalmol. Vis. Sci. 40:2046-2053, 1999.

49. Nathanson, M.H., O'Neill, A.F., and Burgstahler, A.D.: Primitive organization of cytosolic Ca^{2+} signals in hepatocytes from the little skate *Raja erinacea*. J. Exp. Biol. 202:3049-3056, 1999.

50. Dranoff, J.A., O'Neill, A.F., Franco, A.M., Cai, S.Y., Connelly, G.C., Ballatori, N., Boyer, J.L., and Nathanson, M.H.: A primitive ATP receptor from the little skate *Raja erinacea*. J. Biol. Chem. 275:30701-30706, 2000.

51. Spirli, C., Nathanson, M.H., Fiorotto, R., Duner, E., Valvason, C., Casagrande, F., and Strazzabosco, M.: Pro-inflammatory cytokines inhibit secretion in rat bile duct epithelium. Gastroenterology 121:156-169, 2001.

52. Nathanson, M.H., Burgstahler, A.D., Masyuk, A.I., and LaRusso, N.F.: Pharmacologic stimulation of ATP secretion in the liver by therapeutic bile acids. Biochem. J. 358:1-5, 2001.

53. Hirata, K., and Nathanson, M.H.: Bile duct epithelia regulate biliary bicarbonate excretion in normal rat liver. Gastroenterology 121:396-406, 2001.

54. Dranoff, J.A., Masyuk, A.I., Kruglov, E.A., LaRusso, N.F., and Nathanson, M.H.: Polarized expression and function of P2Y ATP receptors in rat bile duct epithelia. Amer. J. Physiol. 281:G1059-G1067, 2001.

55. Leite, M.F., Burgstahler, A.D., and Nathanson, M.H.: Ca^{2+} waves require sequential activation of inositol 1,4,5-trisphosphate receptors, then ryanodine receptors in pancreatic acinar cells. Gastroenterology 122:415-427, 2002.

56. Hirata, K., Pusl, T., O'Neill, A.F., Dranoff, J.A., and Nathanson, M.H.: The type II inositol 1,4,5-trisphosphate receptor can trigger Ca^{2+} waves in hepatocytes. Gastroenterology 122:1088-

1100, 2002.
57. Leite, M.F., Hirata, K., Pusl, T., Okazaki, K., Burgstahler, A.D., Ortega, J.M., Goes, A.M., Prado, M.A.M., Spray, D.C., and Nathanson, M.H.: Molecular basis for pacemaker cells in epithelia. J. Biol. Chem. 277:16313-16323, 2002.
58. O'Neill, A.F., Hagar, R.E., Zipfel, W.R., Nathanson, M.H., and Ehrlich, B.E.: Regulation of the type III inositol 1,4,5-trisphosphate (InsP3) receptor by InsP3 and calcium. Biochem. Biophys. Res. Comm. 294:719-725, 2002.
59. Hirata, K., Dufour, J.-F., Shibao, K., Knickelbein, R., O'Neill, A.F., Bode, H.-P., Cassio, D., St-Pierre, M., LaRusso, N.F., Leite, M.F., and Nathanson, M.H.: Regulation of Ca^{2+} signaling in bile duct epithelia by inositol 1,4,5-trisphosphate isoforms. Hepatology 36:284-296, 2002.
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