

Curriculum Vitae
Jonathan D. Gitlin, M.D.

Present Position Senior Scientist & Director of Research, Emeritus
Marine Biological Laboratory

Education

1974 B.S. University of Pittsburgh
1978 M.D. University of Pittsburgh School of Medicine

Postdoctoral Education

1979-1981 Intern, Junior & Senior Resident Boston Children's Hospital
1981-1984 Fellow in Newborn Medicine Harvard Medical School Joint Program in Neonatology

Academic Appointments

1984-1986 Instructor in Pediatrics, Harvard Medical School
1986-1992 Assistant Professor of Pediatrics, Washington University School of Medicine
1992-1997 Associate Professor of Pediatrics, Washington University School of Medicine
1997-2000 Professor of Pediatrics, Washington University School of Medicine
1997-2008 Professor of Pathology, Washington University School of Medicine
2000-2008 Helene B. Roberson Professor of Pediatrics, Washington University School of Medicine
2004-2008 Professor of Genetics, Washington University School of Medicine
2008-2011 James C. Overall Professor & Chair of Pediatrics, Vanderbilt University School of Medicine
2011-2012 Cornelius Vanderbilt Professor of Pediatrics, Vanderbilt University School of Medicine
2012-2017 Senior Scientist, Marine Biological Laboratory
2017- Senior Scientist Emeritus, Marine Biological Laboratory

Hospital & University Appointments

1984-1986 Assistant in Medicine, Boston Children's Hospital
1986-1992 Assistant Pediatrician, St. Louis Children's Hospital
1986-1992 Director, Newborn Medicine Fellowship Program, St. Louis Children's Hospital
1992-1997 Associate Pediatrician, St. Louis Children's Hospital
1992-2004 Director, Division of Pediatric Immunology & Rheumatology, St. Louis Children's Hospital
1992-2004 Chief of Service, Pediatric Rheumatology, Shriner's Hospital, St. Louis, Missouri
1995-2006 Director, NICHD Child Health Research Center, Washington University School of Medicine
1997-2008 Pediatrician, St. Louis Children's Hospital
2000-2008 Director, Developmental Biology & Genetics Unit, St. Louis Children's Hospital
2004-2008 Director, Division of Pediatric Genetics & Genomic Medicine, St. Louis Children's Hospital
2004-2008 Founding Scientific Director, Children's Discovery Institute, Washington University
2008-2011 Physician-in-Chief, Vanderbilt Children's Hospital
2009-2011 Associate Dean for Clinical Affairs, Vanderbilt University School of Medicine
2009-2011 Assistant Vice Chancellor for Maternal & Child Health Affairs, Vanderbilt University
2009-2011 Chief Medical Officer, Pediatric and Maternal Services, Vanderbilt Medical Group
2013 -2017 Director, Bell Center for Regenerative Biology, Marine Biological Laboratory
2013 -2017 Director, Division of Research, Marine Biological Laboratory

Major Academic Activities (selected)

2003-2015	Member, External Advisory Board, University of Pittsburgh School of Medicine
2003-2007	Member, Integrative Nutrition & Metabolic Processes Study Section, NIH
2005-2006	Member, NIDDK Liver Disease Research Planning Panel in Genetic Diseases, NIH
2005-2008	Member, Pfizer/Washington University Biomedical Board
2006-2007	Member, Scientific Review Panel, Child Health Research Center, University of Michigan
2006-2007	Member, NICHD Intramural Cell & Molecular Biology Research Review Panel, NIH
2006-2008	Chair, Basic Sciences Review Committee, Washington University School of Medicine
2006-2008	Member, BioMed21 Review Committee, Washington University School of Medicine
2006-2008	Member, Biomedical & Biological Sciences Admissions Committee, Washington University
2007	Chair, Gordon Research Conference, Cell Biology of Metals
2007-2008	Member, Research Strategic Planning Committee, Washington University School of Medicine
2007-2010	Chair, Study Section A, March of Dimes Birth Defects Foundation
2008-2011	Member, Executive Committee, Vanderbilt Children's Hospital Board
2008	Member, Search Committee, Chair Orthopaedic Surgery, Vanderbilt University School Medicine
2008	Member, Search Committee, Dean of Vanderbilt University School of Medicine
2009	Member, Scientific Review Panel, Child Health Research Center, University of Utah
2007-2010	Member, Scientific Advisory Board, March of Dimes Birth Defects Foundation
2007-2010	Member, National Advisory Council, National Institute of Child Health & Human Development
2010-2011	Chair, NICHD Vision Theme Workshop on Developmental Biology, NIH
2010	Member, Search Committee, Chair of Cell Biology, Vanderbilt University School of Medicine
2010	Chair, Search Committee, Chair of Medicine, Vanderbilt University School of Medicine
2010-2012	Member, Chancellor's Advisory Committee for Faculty Development, Vanderbilt University
2012	Chair, 8 th International Copper in Biology Meeting, Alghero, Italy
2013	Co-Chair, MBL-University of Chicago Affiliation Committee

Honors

1974	McElroy Award in Biochemistry, University of Pittsburgh School of Medicine
1977	Heard Award in Internal Medicine, University of Pittsburgh School of Medicine
1978	Richard L. Day Award in Pediatrics, University of Pittsburgh School of Medicine
1978	Alpha Omega Alpha Honor Society, University of Pittsburgh School of Medicine
1978	I. Arthur Mirsky Award for Student Research, University of Pittsburgh School of Medicine
1986	Pfizer New Faculty Scholars Award in Rheumatology
1987	Regina Loeb Award of National Arthritis Foundation
1992	Distinguished Teaching Service Award, Washington University School of Medicine
1996	Burroughs-Wellcome Scholar Award in Experimental Therapeutics
1998	E. Mead Johnson Award for Research, Society for Pediatric Research
1999	Clinical Teacher of the Year Award, Washington University School of Medicine
2000	Samuel Rosenthal Foundation Award for Excellence in Academic Pediatrics
2001	George Eastman Cartwright Award, University of Utah School of Medicine
2002	Howard Rappaport Memorial Lecture, Mt. Sinai School of Medicine
2003	University Lecture, University of Texas Southwestern Medical School
2005	Chancellor's Hartwell Prize for Innovative Research, Washington University
2006	MERIT Award, National Institutes of Health, NIDDK
2007	Griffith Visiting Professorship, Indiana University School of Medicine
2007	Mary Shorb Medal in Nutrition, University of Maryland, College Park
2007	Elected Fellow, American Association for the Advancement of Science
2011	Elected Member, National Academy of Medicine, National Academies
2013	Recipient, University of Pittsburgh 225 th Anniversary Medallion

Editorial Responsibilities

1990-1992	Associate Editor, American Journal of Physiology
1991-1992	Associate Editor, Pediatric Research
2002-2006	Associate Editor, Rudolph's Textbook of Pediatrics
2005-2008	Member, Editorial Advisory Panel, Biochemical Journal
2006-2008	Associate Editor, American Journal of Clinical Nutrition
2009-2012	Member, Editorial Board, Current Opinion in Pediatrics

Professional Societies

1984	American Society for Cell Biology
1986	American Association for the Advancement of Science
1988	Society for Pediatric Research
1995	American Society for Biochemistry & Molecular Biology
1995	American Society for Clinical Investigation
1996	American Pediatric Society
1999	Association of American Physicians
2011	National Academy of Medicine

Major Invited Lectures (selected)

2006	Plenary Speaker, AASLD Conference on Protein Folding, Emory University
2006	Visiting Professor, Nutritional Sciences, University Wisconsin, Madison
2006	Visiting Professor, Eccles Institute of Human Genetics, University of Utah
2006	Plenary Keynote Lecture, FASEB Conference on Trace Elements, Colorado
2006	Visiting Professor, Department of Genetics, Baylor College of Medicine, Houston
2007	Visiting Professor, Department of Pediatrics, University of Indiana School of Medicine
2007	Visiting Professor, Department Nutrition, University of Maryland, College Park
2007	Plenary Speaker, Pediatric Research Retreat, Hospital for Sick Children, Toronto
2007	Visiting Professor, Center for Blood Research, University of British Columbia
2008	Plenary Speaker, 14 th Annual Society Biomolecular Sciences, St. Louis
2008	Plenary Speaker, NICHD Structural Birth Defects Meeting, NIH
2009	Visiting Professor, Developmental Biology Program, University of Utah
2010	Plenary Speaker, Human Genetics Graduate Program, University of Texas
2011	Plenary Speaker, Zebrafish Symposium, Washington University School of Medicine
2012	Plenary Speaker, 8 th International Copper in Biology Meeting, Alghero, Italy
2012	Visiting Professor, Department of Molecular Biology, Cell Biology & Biochemistry, Brown
2012	Visiting Professor, Medical Sciences & Human Genetics, Rockefeller University
2013	Plenary Speaker, Copper & Human Disease Meeting, Johns Hopkins University
2013	Visiting Professor, Department of Chemistry, Worcester Polytechnical Institute
2013	Visiting Professor, Department of Neuroscience, University of Connecticut
2013	Visiting Professor, Department of Cancer Biology, Duke University
2013	Plenary Speaker, Pathobiology Program Retreat, Brown University
2013	Visiting Professor, Department Molecular & Cell Biology, Boston University
2013	Visiting Professor, Telethon Institute Genetics & Medicine, Naples, Italy
2013	Visiting Professor, Institute for Plant Biology, Braunschweig, Germany
2014	Visiting Professor, Department of Molecular Genetics & Cell Biology, University of Chicago
2014	Plenary Speaker, BioMetals 2014, Duke University
2015	Plenary Speaker, Marine Biological Laboratory, Friday Evening Lecture Series
2015	Plenary Keynote Lecture, Gordon Research Conference, Cell Biology of Metals, Vermont

Teaching

1982-1984	Lecturer, Anatomy & Cell Biology	Harvard Medical School
1988-1994	Lecturer, Biology & Genetics	Washington University
2006-2008	Course Director, Human Genetics	Washington University
1986- 2008	Lecturer, Cell Biology & Human Genetics	Washington University School of Medicine
1986-2008	Attending Physician, Pediatrics	Washington University School of Medicine
1992-1997	Course Director, Introduction to Pediatrics	Washington University School of Medicine
2008-2011	Attending Physician, Pediatrics	Vanderbilt University School of Medicine

Graduate Students

Thesis Advisor

1992	Jennifer Jaeger, M.D., M.S.	Washington University School of Medicine
1993	Martin Hildebrandt, M.D., M.S.	Humboldt University
1997	Irene Hung, M.D., M.S.	Washington University School of Medicine
1998	Aimee Payne, M.D., Ph.D.	Washington University School of Medicine
2001	Joseph Chen, M.D., M.S.	Washington University School of Medicine
2003	Nathan Hellman, M.D., Ph.D.	Washington University School of Medicine
2004	Thomas B. Bartnikas, M.D., Ph.D.	Washington University School of Medicine
2005	Michelle Schlieff, Ph.D.	Washington University School of Medicine
2006	Amy L. Caruano, Ph.D.	Washington University School of Medicine
2007	Ting Tao, M.D., Ph.D.	Washington University School of Medicine
2008	Bryce A. Mendelsohn, M.D., Ph.D.	Washington University School of Medicine
2008	John Gansner, M.D., Ph.D.	Washington University School of Medicine
2008	Tamika K. Samuels, Ph.D.	Washington University School of Medicine
2008	Erik. C. Madsen, M.D., Ph.D.	Washington University School of Medicine

Thesis Committee

1998	Kathy Eggleston, Ph.D.	Microbiology, Washington University School of Medicine
1999	Krista Moulder, Ph.D.	Molecular Cell Biology, Washington University School of Medicine
2000	Judson Brewer, M.D., Ph.D.	Immunology, Washington University School of Medicine
2000	Dianna Klomp, Ph.D.	Genetics, University of Utrecht
2001	Heidi Rayala, M.D., Ph.D.	Molecular Cell Biology, Washington University School of Medicine
2001 (Chair)	Joseph Gaut, M.D., Ph.D.	Neuroscience, Washington University School of Medicine
2001	Adriana Donovan, Ph.D.	Pathology, Harvard Medical School
2003	Andrew Boswell, Ph.D.	Chemical Biology, Washington University School of Medicine
2004	Robert Pace, Ph.D.	Genetics, University of Melbourne
2005	Keith Hultman, Ph.D.	Molecular Genetics, Washington University School of Medicine
2006	Jiyeon Lee, Ph.D.	Molecular Cell Biology, Washington University School of Medicine
2006	Robert Ogami, M.D., Ph.D.	Pathology, Harvard Medical School
2006	Chao Tsung-Yang, Ph.D.	Molecular Genetics, Washington University School of Medicine
2006 (Chair)	Diana Lamendola, Ph.D.	Molecular Cell Biology, Washington University School of Medicine
2006 (Chair)	Craig Press, M.D., Ph.D.	Neuroscience, Washington University School of Medicine
2006	Christopher Lim, Ph.D.	Genetics, Deakin University
2006	Franklin Huang, M.D., Ph.D.	Cell Biology, Harvard Medical School
2008	Ashley Farlow, Ph.D.	Genetics, University of Melbourne
2013	Brandon Logeman, Ph.D.	Cancer Biology, Duke University
2013	Virginia Ginocchio, Ph.D.	Genetics, Federico II University of Naples

Postdoctoral Fellows & Visiting Scientists

1988-1991	Robert E. Fleming, M.D. Current Position:	Postdoctoral Fellow Professor of Pediatrics, St. Louis University School of Medicine
1989-1991	Les Lang, M.D., Ph.D. Current Position:	Postdoctoral Fellow Newborn Medicine Practice Salt lake City, Utah
1989-1991	Mitsuru Sato, Ph.D. Current Position:	Postdoctoral Fellow Professor of Biochemistry, Akita University School of Medicine
1990-1991	Edward Harris, Ph.D. Current Position:	Visiting Scientist Professor of Biochemistry, Texas A&M University
1989-1991	Norikazu Shimizu, M.D. Current Position:	Postdoctoral Fellow Professor of Pediatrics, Toho University School of Medicine
1991-1992	Kari Raivio, M.D., Ph.D. Current Position:	Visiting Scientist Rector (<i>Emeritus</i>), University of Helsinki, Finland
1991-1994	Brian Hackett, Ph.D., M.D. Current Position:	Postdoctoral Fellow Professor of Pediatrics, Vanderbilt University School of Medicine
1991-1993	Colin D. Bingle, Ph.D. Current Position:	Postdoctoral Fellow Professor of Cell Biology, University of Sheffield Medical School
1992-1994	Yukitoshi Yamaguchi, M.D. Current Position:	Postdoctoral Fellow Professor of Pediatrics, Toho University School of Medicine
1994-1997	Z. Leah Harris, M.D. Current Position:	Postdoctoral Fellow Professor & Chair of Pediatrics, Dell Medical School
1994-1996	Steven L. Brody, M.D. Current Position	Postdoctoral Fellow Professor of Medicine, Washington University School of Medicine
1994-1996	Mariko Suzuki, M.D., Ph.D. Current position:	Postdoctoral Fellow Professor of Pediatrics Toho University School of Medicine
1996-1997	Yukitoshi Takahashi, M.D. Current Position:	Postdoctoral Fellow Professor of Neurology, Hamamatsu School of Medicine
1996	Mauricio Gonzalez, Ph.D. Current Position:	Visiting Scientist Professor of Cell Biology, University of Chile
1995-1997	Leo W. Klomp, Ph.D. Current Position:	Postdoctoral Fellow Metabolic Lab Director, Amsterdam University Medical Center
1995-1997	Mark Schaefer, M.D. Current Position:	Postdoctoral Fellow Professor of Medicine, University of Heidelberg
1996-1997	Thomas Mann, Ph.D. Current position:	Postdoctoral Fellow Staff Scientist, University of Houston

1996-1998	Ruby Casareno, Ph.D. Current position:	Postdoctoral Fellow Staff Scientist BioRad Laboratories, San Francisco
1996-1998	Darrel Waggoner, M.D. Current Position:	Postdoctoral Fellow Professor of Genetics, University of Chicago School of Medicine
1998-2000	Deepa Saxeena, Ph.D. Current Position:	Postdoctoral Fellow Staff Scientist, Harvard Medical School
1998-2000	Kathy Crowley, Ph.D. Current Position:	Postdoctoral Fellow Staff Scientist, Monsanto Corporation
1999-2002	Iqbal Hamza, Ph.D. Current Position:	Postdoctoral Fellow Professor of Cell Biology, University of Maryland
2000-2002	Fengli Lui, Ph.D. Current Position:	Postdoctoral Fellow Associate Research Scientist, University of Illinois
2002-2003	Claire Pecqueur, Ph.D. Current Position:	Postdoctoral Fellow Associate Professor, University of Nantes
2002-2004	Satoshi Kono, M.D. Current Position:	Postdoctoral Fellow Professor & Chair of Neurology, Hamamatsu University
2003-2005	Tina Rees, Ph.D. Current Position:	Postdoctoral Fellow Associate Director, Regeneron
2003-2005	Thalia Nittis, Ph.D. Current Position:	Postdoctoral Fellow Adjunct Professor of Biology, Florida SW College
2005-2007	Penny Jensen, Ph.D. Current Position:	Postdoctoral Fellow Research Scientist, Thermo Fisher Pierce
2005-2007	Andrew Maxfield, Ph.D. Current Position:	Postdoctoral Fellow Associate Research Scientist, Utah University
2008-2010	Thijs Van Boxtel, Ph.D. Current Position:	Postdoctoral Fellow Assistant professor Cell Biology, University of Amsterdam'
2011-2015	Andrew Latimer, Ph.D. Current Position:	Postdoctoral Fellow Staff Scientist, University of Virginia
2013-2015	Rebecca Thomason, Ph.D. Current Position:	Postdoctoral Fellow Staff Scientist, University of Virginia

Grant Funding (Principal Investigator)

March of Dimes Birth Defects Foundation
 New Investigator Award 1987-1989
 Copper Metabolism in Wilson Disease

Arthritis Foundation
 Regina Loeb New Investigator Award 1987-1989
 Ceruloplasmin Gene Expression in Rheumatoid Arthritis

Pfizer
 New Faculty Scholars Award 1987-989
 Regulation of Ceruloplasmin Gene Expression in Inflammation and Tissue Injury

R01-HL41536
 NIH/NICHD 12/90-11/02
 Developmental Regulation of Fetal Antioxidant Expression

R01-DK44464
 NIH/NIDDK 9/92-11/16
 Biological Roles of Copper in Human Nutrition

P30-HD33688 (Program Director)
 NIH/NICHD 12/95-11/05
 Child Health Research Center of Excellence

Burroughs Wellcome Fund
 Scholars Award in Experimental Therapeutics 1997-2002
 Mechanisms of Cellular Copper Homeostasis

T32-HD07507
 NIH/NICHD 5/98-4/02
 Mechanisms of Childhood Infection and Immunity

Samuel Rosenthal Foundation
 Investigator Research Award 2001-2004
 Role of Nutrition in Early Vertebrate Development

P01-HD39952
 NIH/NICHD 5/01-4/06
 Mechanisms of Growth and the Overgrowth Syndromes

T32-HD43010 (Program Director)
 NIH/NICHD 7/02-6/07
 Pediatric Physician-Scientist Training Grant

R01-DK61763
 NIH/NIDDK 12/05-11/09
 Role of Copper in Pediatric Liver Disease

T32-HD60554
 NIH/NICHD 4/09-4/14
 Conducting Child Health Research in Vulnerable Populations

Scholarship

Major Contributions to Science

1. Identification and Functional Characterization of the Human Copper Transport ATPases

Our work demonstrated that Wilson disease and Menkes disease result from loss-of-function mutations in genes encoding homologous copper-transporting ATPases present in the *trans*-Golgi network of cells. Elucidation of the genetic basis of these diseases revealed the evolutionarily conserved mechanisms of cellular copper homeostasis and provided new approaches to the diagnosis and treatment of affected patients.

Yamaguchi Y, Heiny ME, Suzuki M, Gitlin JD. Biochemical characterization and intracellular localization of the Menkes disease protein. ***Proc Natl Acad Sci USA*** 1996; 93:14030-14035.

Hung IH, Suzuki M, Yamaguchi Y, Yuan DS, Klausner RD, Gitlin JD. Biochemical characterization of the Wilson disease protein and functional expression in the yeast *Saccharomyces cerevisiae*. ***J Biol Chem*** 1997; 272:21461-21466.

Payne AS, Gitlin JD. Functional expression of the Menkes disease protein reveals common biochemical mechanisms among the copper-transporting P-type ATPases. ***J Biol Chem*** 1998; 273: 3765-3770.

Payne AS, Kelley EJ, Gitlin JD. Functional expression of the Wilson disease protein reveals mislocalization and impaired copper-dependent trafficking of the common H1069Q mutation. ***Proc Natl Acad Sci USA*** 1998; 95:10854-10859.

2. Identification and Functional Characterization of Aceruloplasminemia

Our studies identified aceruloplasminemia as an autosomal-recessive disease characterized by absent serum ceruloplasmin and progressive neurodegeneration of the basal ganglia due to loss-of-function mutations in the ceruloplasmin gene. Recognition of this disease revealed the essential physiologic role of ceruloplasmin as a ferroxidase critical to iron homeostasis and neuronal survival in the central nervous system.

Harris ZL, Takahashi Y, Miyajima H, Serizawa M, MacGillivray RTA, Gitlin JD. Aceruloplasminemia: Molecular characterization of this disorder of iron metabolism. ***Proc Natl Acad Sci USA*** 1995; 92:2539-2543.

Klomp LWJ, Farhangrazi ZS, Dugan LL, Gitlin JD. Ceruloplasmin gene expression in the murine central nervous system. ***J Clin Invest*** 1996; 98:207-215.

Klomp LWJ, Gitlin JD. Expression of the ceruloplasmin gene in the human retina and brain: Implications for a pathogenic model in aceruloplasminemia. ***Hum Mol Gen*** 1996; 5:1989-1996.

Harris ZL, Durley AP, Man TK, Gitlin JD. Targeted gene disruption reveals an essential role for ceruloplasmin in cellular iron efflux. ***Proc Natl Acad Sci USA*** 1999; 96:10812-10817.

3. Identification and Functional Characterization of the Human Copper Chaperones

Our work contributed to the discovery that the trafficking and compartmentalization of copper within cells is mediated by copper chaperones, functioning to facilitate copper insertion into specific cuproproteins. Elucidation of the function of these chaperones revealed a large capacity for intracellular copper chelation and resulted in the development of a unique and evolutionary conserved model of intracellular copper metabolism.

Culotta VC, Klomp LWJ, Strain J, Casareno RLB, Krems B, Gitlin JD. The copper chaperone for superoxide dismutase. ***J Biol Chem*** 1997; 272:23469-23472.

Wong PC, Waggoner D, Subramaniam J, Tessarollo L, Bartnikas TB, Culotta VC, Price DL, Rothstein J, Gitlin JD. Copper chaperone for superoxide dismutase is essential to activate mammalian Cu/Zn superoxide dismutase. ***Proc Natl Acad Sci USA*** 2000; 97:2886-2891.

Hamza I, Faisst A, Prohaska J, Chen J, Gruss P, Gitlin JD. The metallochaperone atox1 plays a critical role in perinatal copper homeostasis. ***Proc Natl Acad Sci USA*** 2001; 98:6848-6852.

Hamza I, Prohaska J, Gitlin JD. Essential role for Atox1 in the copper-mediated intracellular trafficking of the Menkes ATPase. ***Proc Natl Acad Sci USA*** 2003; 100:1215-1220.

4. Characterization of Unique Functional Roles for Copper in the Nervous System

In collaboration with Sol Snyder, we identified a splice variant of the Wilson disease gene critical to pineal and retinal circadian copper homeostasis. In collaboration with Phil Wong, we demonstrated that copper-mediated oxidative damage plays no role in the pathogenesis of familial amyotrophic lateral sclerosis. In collaboration with Ann Marie Craig and David Holtzman (Washington University), we elucidated a critical role for Menkes disease gene in the availability of an NMDA receptor-dependent, releasable pool of copper that is of broad relevance to the processes of synaptic plasticity and excitotoxic cell death.

Borjigin J, Payne AS, Deng, J, Li X, Wang MW, Ovodenko B, Gitlin JD, Snyder SH. A novel pineal night-specific ATPase encoded by the Wilson disease gene. ***J Neurosci*** 1999; 19:1018-1026.

Subramaniam JR, Lyons WE, Liu J, Bartnikas TB, Rothstein J, Price DL, Cleveland DW, Gitlin JD, Wong PC. Mutant SOD1 causes motor neuron disease independent of CCS-mediated copper loading. ***Nature Neurosci*** 2002; 5:301-307.

Schlieff ML, Craig AM, Gitlin JD. NMDA receptor activation mediates copper homeostasis in hippocampal neurons. ***J Neurosci*** 2005; 25:239-246.

Schlieff ML, West T, Craig AM, Holtzman DM, Gitlin JD. Role of the Menkes copper transporting atpase in NMDA receptor-mediated neuronal toxicity. ***Proc Natl Acad Sci USA*** 2006; 103:14919-14924.

5. Elucidation of the Unique Mechanisms that Define the Role of Copper in Early Development

In collaboration with the Steve Johnson and Lila Solnica Krezel, we identified *calamity*, a mutant defective in the zebrafish ortholog of the Menkes disease gene that has permitted novel therapeutic approaches in affected patients. Further studies revealed an evolutionarily conserved developmental hierarchy of copper metabolism that is informed by specific genetic factors providing a new paradigm for the role of suboptimal nutrition in the pathogenesis of human birth defects.

Mendelsohn BA, Yin C, Johnson SL, Wilm T, Solnica-Krezel L, Gitlin JD. Atp7a determines a hierarchy of copper metabolism essential for notochord development. ***Cell Metabolism*** 2006; 4:155-162

Gansner JM, Mendelsohn BA, Hultman KA, Johnson SL, Gitlin JD. Essential role of lysyl oxidases in notochord development. ***Dev Biol*** 2007; 307:202-213.

Madsen EC, Morcos PA, Mendelsohn BA, Gitlin JD. In vivo correction of a Menkes disease model using antisense oligonucleotides. ***Proc Natl Acad Sci*** 2008; 105; 3909-3914.

Madsen EC, Gitlin JD. Zebrafish mutants calamity and catastrophe define critical pathways of gene-nutrient interactions in developmental copper metabolism. ***PLoS Genetics*** 2008; 4:261-267.

Publications

1. Gitlin D, Pericelli A, Gitlin JD. Multiple immunoglobulin classes among sharks and their evolution. ***Comp Biochem Physiol*** 1973; 44:225-239.
2. Gitlin D, Pericelli A, Gitlin JD. Immunoglobulin synthesis in fetal sharks. ***Comp Biochem Physiol*** 1973; 45:247-256.
3. Gitlin D, Pericelli A, Gitlin JD. The presence of serum alpha-fetoprotein in sharks and its synthesis by fetal gastrointestinal tract and liver. ***Comp Biochem Physiol*** 1973; 46:207-215.
4. Gitlin JD, Gitlin D. Protein binding by specific receptors on human placenta, murine placenta and suckling murine intestine in relation to protein transport across these tissues. ***J Clin Invest*** 1974; 54:1155-1166.
5. Gitlin JD, Rosen FS, Lachmann PJ. The mechanisms of action of the C3b inactivator (conglutinin-activating factor) on its naturally occurring substrate, the major fragment of the third component of complement (C3b). ***J Exp Med*** 1975; 141:1221-1226.
6. Gitlin D, Gitlin JD. Fetal and neonatal development of the plasma proteins. In: The Plasma Proteins: Structure, Function and Genetic Control, Putnam FW (Ed), Academic Press, 1975 pp 263-207.
7. Gitlin D, Gitlin JD. Genetic alterations in the plasma proteins of man. In: The Plasma Proteins: Structure, Function and Genetic Control, Putnam FW (Ed), Academic Press, 1975 pp 321-369.
8. Stossel TP, Field RJ, Gitlin JD, Alper CA, Rosen FS. The opsonic fragment of the third component of human complement (C3). ***J Exp Med*** 1975; 141:1329-1347.
9. Gitlin JD, Gitlin JI, Gitlin D. Selective transfer of plasma proteins across mammary gland in lactating mouse. ***Amer J Physiol*** 1976; 230:1594-1602.
10. Gitlin JD, Gitlin D. Protein binding by cell membranes and the selective transfer of proteins from mother to young across tissue barriers. In: Maternofetal Transmission of Immunoglobulins, Hemmings WA (Ed), Cambridge University Press, 1976 pp 113-121.
11. Gitlin JD, Gitlin JI, Gitlin D. Localization of C-reactive protein in synovium of patients with rheumatoid arthritis. ***Arthritis Rheum*** 1977; 20:1491-1499.
12. Holmes SD, Gitlin JD, Titus G, Field JB. Effect of increased circulating thyroid stimulating hormone on in vitro thyroid stimulating hormone stimulation of thyroid and adipose tissue. ***Endocrinology*** 1980; 106:1892-1899.
13. Gitlin JD, D'Amore P. Culture of retinal capillary cells using selective growth media. ***Microvasc Res*** 1983; 26:74-80.
14. Pober JS, Collins T, Gimbrone MA, Cotran RS, Gitlin JD, Fiers W, Clayberger C, Krensky AM, Burakoff SF, Reiss CS. Lymphocytes recognize human vascular endothelial and dermal fibroblast Ia antigens induced by recombinant immune interferon. ***Nature*** 1983; 305:726-729.
15. Gitlin JD, Parad R, Tausch HW Jr. Exogenous surfactant therapy in hyaline membrane disease. ***Semin Perinatol*** 1984; 8:272-282.

16. Gitlin JD. Necrotizing enterocolitis. In: Manual of Neonatal Care. Cloherty JP, Stark AR (Eds), Little Brown & Co., 1985.
17. Gitlin JD, Soll RF, Parad RB, Horbar JD, Feldman HA, Lucey JF, Taeusch HW. Randomized controlled trial of exogenous surfactant for the treatment of hyaline membrane disease. *Pediatrics* 1987; 79:31-37.
18. Gitlin JD, Colten HR. Molecular biology of the acute phase plasma proteins. *Lymphokines* 1987; 14:123-153.
19. Falus A, Wakeland EK, McConnell TJ, Gitlin JD, Whitehead AS, Colten HR. DNA polymorphism of MHC III genes in inbred and wild mouse strains. *Immunogenetics* 1987; 25:290-298.
20. Gitlin JD. Transcriptional regulation of ceruloplasmin gene expression during inflammation. *J Biol Chem* 1988; 263:6281-6287.
21. Nonaka M, Gitlin JD, Colten HR. Regulation of human and murine complement. Comparison of 5' structural and functional elements regulating human and murine complement factor B gene expression. *Mol Cell Biochem* 1989; 89:1-14.
22. Colten HR, Gitlin JD. Molecular regulation of the acute phase complement proteins. In: Acute Phase Proteins and the Acute Phase Response, Pepys M (Ed), Springer Verlag, 1989 pp 123-153.
23. Fleming R, Gitlin JD. Primary structure of rat ceruloplasmin and analysis of tissue-specific gene expression during development. *J Biol Chem* 1990; 265:7701-7707.
24. Nikkila H, Gitlin JD, Mueller-Eberhard U. Rat hemopexin. Molecular cloning, primary structural characterization and analysis of gene expression. *Biochemistry* 1991; 30:823-829.
25. Fleming R, Whitman I, Gitlin JD. Induction of ceruloplasmin gene expression in the rat lung during inflammation and hyperoxia. *Amer J Physiol* 1991; 260:L68-74.
26. Sato M, Gitlin JD. Mechanisms of copper incorporation during the biosynthesis of human ceruloplasmin. *J Biol Chem* 1991; 266:5128-5134.
27. Lang L, Beyer EC, Schwartz AL, Gitlin JD. Molecular cloning of a rat uterine gap junction protein and analysis of gene expression during gestation. *Amer J Physiol* 1991; 260:E787-793.
28. Bingle C, Epstein O, Srai S, Gitlin JD. Hepatic caeruloplasmin-gene expression during development in the guinea-pig. Correlation with changes in hepatic copper metabolism. *Biochem J* 1991; 276:771-775.
29. Hildebrandt M, Reutter W, Gitlin JD. Tissue-specific regulation of dipeptidyl peptidase IV expression during development. *Biochem J* 1991; 277:331-334.
30. Jaeger JL, Shimizu NA, Gitlin JD. Tissue-specific ceruloplasmin gene expression in the mammary gland. *Biochem J* 1991; 280:671-677.
31. Fleming R, Gitlin JD. Structural and functional analysis of the 5'-flanking region of the rat ceruloplasmin gene. *J Biol Chem* 1992; 267:479-486.
32. Gitlin JD, Schroeder JJ, Lee-Ambrose LM, Cousins RJ. Mechanisms of caeruloplasmin biosynthesis in normal and copper-deficient rats. *Biochem J* 1992; 282:835-839.

33. Hackett BP, Shimizu NS, Gitlin JD: Clara cell secretory protein gene expression in the bronchiolar epithelium. *Amer J Physiol* 1992; 262:L399-404.
34. Hackett BP, Gitlin JD. Cell-specific expression of a Clara cell secretory protein-human growth hormone gene in the bronchiolar epithelium of transgenic mice. *Proc Natl Acad Sci USA* 1992; 89:9079-9083.
35. Bingle CD, Fleming RE, Gitlin JD. Interaction of CCAAT/enhancer-binding protein alpha and beta with the rat caeruloplasmin gene promoter. *Biochem J* 1993; 294:473-479.
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