CURRICULUM VITAE

KELLY EDWARD MAYO

Walter and Jennie Bayne Professor of Molecular Biosciences
Associate Dean for Research and Graduate Studies
Weinberg College of Arts and Sciences
Northwestern University

January 1, 2016

CONTACT INFORMATION:

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1922 Sheridan Road, Room #201
Northwestern University, Evanston, IL 60208
Phone: (847) 491-2223
E-mail: k-mayo@northwestern.edu

EDUCATION:

University of Wisconsin at Madison
B.S. (with honors) in Biochemistry, 1974-1978

University of Washington at Seattle
Ph.D. in Biochemistry, 1978-1982

AWARDS AND HONORS:

1981-1982	Achievement Rewards for College Scientists (ARCS) Foundation Fellow
1983-1984	Damon Runyon-Walter Winchell Foundation Fellow
1985-1987	Human Growth Foundation Career Starter Award
1986-1991	NSF Presidential Young Investigator Award
1987-1990	Searle Scholar Award
1988-1990	McKnight Neuroscience Development Award
1991-1995	NIH Research Career Development Award
1994	Ernst Oppenheimer Award of The Endocrine Society
1994-1995	Henry and Soretta Shapiro Research Professorship in Molecular Biology
1996	E. Leroy Hall Award for Teaching Excellence
1996	Outstanding Young Investigator Research Award from The Pituitary Society
2003	The Beacon Award, Frontiers in Reproduction
2004-2006	William Deering Chair in the Biological Sciences
2011	Elected Fellow of the American Association for the Advancement of Science

2013 Outstanding Mentor Award, Women in Endocrinology
2013- Walter and Jennie Bayne Professorship
2014 Dean's Service Award, The Graduate School of Northwestern University

RESEARCH EXPERIENCE AND ACADEMIC APPOINTMENTS:

1977-1978 Undergraduate honors thesis research
Department of Biochemistry, University of Wisconsin
"DNAse I Sensitivity of the Bovine Prolactin Gene in the Pituitary"
Professor Jack Gorski, advisor

1978-1982 Graduate thesis research
Department of Biochemistry, University of Washington
"Metal and Hormonal Regulation of the Mouse Metallothionein-I Gene"
Professor Richard Palmiter, advisor

1982-1985 Postdoctoral fellowship research
Gene Expression Laboratory, The Salk Institute
"Cloning and Expression of Rat Hypothalamic GRF and CRF Genes"
Professor Ronald Evans, advisor

1985-1990 Assistant Professor, Northwestern University
Department of Biochemistry, Molecular Biology & Cell Biology

1990-1995 Associate Professor, Northwestern University
Department of Biochemistry, Molecular Biology & Cell Biology
Joint Appointment in the Department of Neurobiology & Physiology

1995- Professor, Northwestern University
Department of Biochemistry, Molecular Biology & Cell Biology
(Currently the Department of Molecular Biosciences)
Joint Appointment in the Department of Neurobiology & Physiology (until 2010)

ADMINISTRATIVE APPOINTMENTS AT NORTHWESTERN UNIVERSITY:

1994-2002 Associate Director, Northwestern University Center for Reproductive Science

1995-1998 Director, Interdepartmental Biological Sciences (IBiS) Graduate Program

2000-2002 Chair, Weinberg College of Arts and Sciences Life Sciences Council

2000-2004 Director, NIH-NIGMS Cellular and Molecular Basis of Disease Training Program

2003-2015 Director, Northwestern University Center for Reproductive Science

2004-2011 Chair, Department of Biochemistry, Molecular Biology & Cell Biology
(Currently the Department of Molecular Biosciences)

2011- Associate Dean for Research and Graduate Studies
Weinberg College of Arts and Sciences

TEACHING EXPERIENCE:

1986-1987 Biological Sciences B03, Cell and Developmental Biology

1987-1988 Biological Sciences B03, Cell and Developmental Biology

1988-1989 Biological Sciences B03, Cell and Developmental Biology
Biological Sciences D55, Growth Regulation; joint with D. Linzer

1989-1990 Biological Sciences D22, Eukaryotic Molecular Biology
Biological Sciences D55, Signal Transduction; joint with D. Linzer
Neurosciences D05, Molecular Neurobiology; team-taught (2 lecture hours)

1990-1991 Biological Sciences D22, Eukaryotic Molecular Biology
Neurosciences D05, Molecular Neurobiology; team-taught (2 lecture hours)

1991-1992 Biological Sciences D22, Eukaryotic Molecular Biology
Neurosciences D05, Molecular Neurobiology; team-taught (2 lecture hours)

1992-1993 Biological Sciences D22, Eukaryotic Molecular Biology
Neurosciences D05, Molecular Neurobiology; team-taught (2 lecture hours)

1993-1994 Biological Sciences C92, Developmental Biology (lecture & lab)
Neurosciences D05, Molecular Neurobiology; team-taught (2 lecture hours)
Biological Sciences D02, Molecular & Developmental Biology; team-taught (3 lecture hours)

1994-1995 Biological Sciences C92, Developmental Biology (lecture & lab)
Neurosciences D05, Molecular Neurobiology; team-taught (2 lecture hours)
Biological Sciences D02, Molecular & Developmental Biology; team-taught (3 lecture hours)

1995-1996 Biological Sciences C92, Developmental Biology (lecture & lab)
Biological Sciences D55, cAMP-Mediated Cellular Signal Transduction
Neurosciences D05, Molecular Neurobiology; team-taught (2 lecture hours)
Biological Sciences D02, Molecular & Developmental Biology; team-taught (3 lecture hours)
Biological Sciences D03, Cell Biology; team-taught (3 lecture hours)

1996-1997 Biological Sciences C92, Developmental Biology (lecture & lab)
Neurosciences D05, Molecular Neurobiology; team-taught (2 lecture hours)
Biological Sciences D03, Cell Biology; team-taught (3 lecture hours)

1997-1998 Biological Sciences C92, Developmental Biology (lecture & lab)
Biological Sciences D03, Cell Biology; team-taught (3 lecture hours)

1998-1999 Biological Sciences 210-2, Molecular Biology
Biological Sciences D03, Cell Biology; team-taught (3 lecture hours)

1999-2000 Biological Sciences 210-2, Molecular Biology
Biological Sciences D03, Cell Biology; team-taught (3 lecture hours)
Neurosciences 401-3, Fundamentals of Neuroscience; team-taught (2 lecture hours)

2000-2001 Biological Sciences 210-2, Molecular Biology

Biological Sciences D03, Cell Biology; team-taught (3 lecture hours)
Neurosciences 401-3, Fundamentals of Neuroscience; team-taught (2 lecture hours)

2001-2002 Biological Sciences 210-2, Molecular Biology
Biological Sciences D03, Cell Biology; team-taught (3 lecture hours)
Neurosciences 401-3, Fundamentals of Neuroscience; team-taught (2 lecture hours)
Biological Sciences 455, TGFβ Family Proteins in Disease & Development; joint with T. Woodruff

2002-2003 Biological Sciences 410-2, Eukaryotic Molecular Biology
Neurosciences 401-3, Fundamentals of Neuroscience; team-taught (2 lecture hours)

2003-2004 Biological Sciences 410-2, Eukaryotic Molecular Biology
Neurosciences 401-3, Fundamentals of Neuroscience; team-taught (2 lecture hours)
Biological Sciences 423, Biological Ethics; team-taught (2 lecture hours)

2004-2005 Biological Sciences 455, Stem Cells; joint with T. Woodruff, A. Matouschek
Neurosciences 401-3, Fundamentals of Neuroscience; team-taught (2 lecture hours)
Biological Sciences 423, Biological Ethics; team-taught (2 lecture hours)

2005-2006 Neurosciences 401-3, Fundamentals of Neuroscience; team-taught (2 lecture hours)
Biological Sciences 423, Biological Ethics; team-taught (2 lecture hours)

2006-2007 Neurosciences 401-3, Fundamentals of Neuroscience; team-taught (2 lecture hours)

2007-2008 Neurosciences 401-3, Fundamentals of Neuroscience; team-taught (2 lecture hours)
Journalism 383, Reporting Science and Health; guest lecturer (2 lecture hours)

2012-2013 Biological Sciences 455, Specification and Differentiation of Mammalian Germ Cells
Biological Sciences 423, Biological Ethics; team-taught (2 lecture hours)

2013-2014 Biological Sciences 423, Biological Ethics; team-taught (2 lecture hours)

2014-2015 Biological Sciences 423, Biological Ethics; team-taught (2 lecture hours)

ACADEMIC AND RESEARCH ADVISING:

Postdoctoral Fellows:

Dr. Ok-Kyong Park (1989-1993)
Associate Professor, University of Kentucky
Dr. Nancy Krett (1990-1991)
Research Associate Professor, Northwestern University
Dr. Robin Dodson (1990-1991)
Professor, Parkland College
Dr. Byung-Nam Cho (1993-1995)
Professor, Catholic University, Seoul, Korea
Dr. Teresa Miller (1994-1999)
Homemaker
Dr. Jing Zheng (1995-1998)
Associate Professor, Northwestern University Medical School
Dr. Ali Ardekani (1996-1998)
Associate Professor, National Institute of Genetic Engineering and Biotechnology, Tehran, Iran

Dr. Jennifer Weck (1998-2005)
Scientific Program Specialist, National Institute of Child Health and Human Development, National Institutes of Health
Dr. Abir Mukherjee (1999-2000)
Assistant Professor, University of London, Royal Veterinary College
Dr. Angela Stoeckman (2003-2004)
Assistant Professor, Minneapolis Community College
Dr. Jingjing Lui Kipp (2003-2008)
Assistant Professor, DePaul University
Dr. Abha Chalpe (2012-2014)
Research Scientist, Lupin Pharma
Dr. Pamela Monahan (2011-present)

Ph.D. Students:

Teresa K. Woodruff (Ph.D. 1989)
Professor, Northwestern University
Lin Pei (Ph.D. 1991)
Senior Research Director, Celgene
Steven T. Suhr (Ph.D. 1992)
Research Professor, Michigan State University
Jon Kornhauser (Ph.D. 1995)
Scientist, Cell Signaling Technology
Nancy Schult (Ph.D. 1997)
Postdoctoral Research Specialist, Colgate University
Paul Godfrey (Ph.D. 1997)
Research Coordinator, The Broad Institute at MIT
Abir Mukherjee (Ph.D. 1999)
Assistant Professor, University of London, Royal Veterinary College
Wei Chen (Ph.D. 1999)
Research Scientist, BASF Corp.
Venita De Almeida (Ph.D. 2000)
Staff Scientist, Genentech, Inc.
Michelle McMullen (Ph.D. 2001)
Biotechnology Law, McDonnell, Boehnen, Hulbert & Berghoff
Shane Cunha (Ph.D. 2002)
Assistant Professor, University of Texas Medical School
Anna Burkart (Ph.D. 2005)
Staff Scientist, Omeros
Allison McElvaine (Ph.D. 2007)
Director of Research Communications, The American Diabetes Association
Daniel Trombly (Ph.D. 2010)
Postdoctoral Fellow, University of Massachusetts Medical School
Christina Matulis (Ph.D. 2010)
Homemaker
Kristen Meldi (Ph.D. 2013)
Staff Scientist, Castle Biosciences, Houston, TX
Dallas Vanorny (Ph.D. 2015)
Medical School, University of Ilinois
Rexxi Prasasya (Ph.D. candidate)
Nisan Hubbard (Ph.D. candidate)

M.S. Students:

Tamara Camp (M.S. 1991)
Joanna Dykema (M.S. 1996)
Sheri Dewan (M.S. 2001)
Jeana Yates (M.S. 2001)

Undergraduate Independent Study:
∗ = Completed an Honors Thesis

Henry Yang (1986-1987)
Anita Misra (1987-1988)
Kenneth Roulliard (1987-1988) ∗
Peter Kwon (1988-1989)
Robert Romanelli (1988-1990) ∗
James Riddel (1988-1990)
Sajiv Gugneja (1989-1990) ∗
Diana Burtea (1990)
Sandra Grimm (1990-1992) ∗
Michael Johnson (1992-1993)
Matthew Lickerman (1993-1994)
Nicholas Pitowski (1994-1995)
Holly Dluzniewski (1994-1995)
Harsh Sule (1993-1995) ∗
Danielle Grove (1994-1996) ∗
Eric Wong (1995-1996)
Ken Wu (1995-1997) ∗
I-Wei Hsu (1995-1997) ∗
Olin Silander (1996-1997) ∗
Jessica McClure (1998-1999)
Jaunita Hung (1999-2000)
Kirk Wangensteen (1999-2000) ∗
Elliot Lee (1999- 2001) ∗
Justin Vader (2000-2002) ∗
Amanda Matson (2000-2002) ∗
Annalise Nowrocki (2001-2002)
Kathryn Schmidt (2001-2003) ∗
Sarah Lesgold (2003-2004)
Muthu Vaduganathan (2006-2007)
Chazz Baker (2006-2007)
Jennifer Choi (2007-2008)
Lu Yao (2008-2009)
Christine Haselhorst (2008-2009)
Will Pearse (2008-2010) ∗
Kruti Parikh (2009-2010)
Emily Wertz (2010-2011)
Kathleen Leinweber (2011-2012)
Kathryn Thomas (2011-2014)
Calvin Dorsey (2014-2015)
Amman Bhasin (2015-)
Rebecca Fudge (2016-)

Summer Research Opportunity Students:

Ashley Brown (2001, Xavier University)
Bradford Paul (2003, Morehouse College)
Lisa Harris (2007, Prairie View A&M University)
Susan Thomas (2010, Columbia University)
Pearl Ugwu-Dike (2014, William Carey University)
Jayleen James (2015, Northwestern University Posner Program)

OUTREACH AND COMMUNITY ACTIVITIES:

1986-1987 Recombinant DNA Technology
Two lectures and discussion for the Northwestern Alumni Lifelong Learning course

2001-2002 Bioethics and Societal Issues: The Human Genome Project
Lecture and discussion for Northwestern Alumni Lifelong Learning course

2007-2012 CRS University/Oncofertility Saturday Academy
High school science academy in partnership with the Young Women's Leadership Charter School of Chicago
Lectured and directed the laboratory section on "Gene Expression and the Ovary"

2011-2012 One Book-One Northwestern
Led a community discussion of "The Immortal Life of Henrietta Lacks" by Rebecca Skloot as part of a CRS-based outreach series

2009-2010 Ovarian Development and Function
Lecture for the Bio-Breaks staff professional development series

2013- Northwestern University Biological Investigations in Reproduction and Development
Science academy in partnership with Evanston Township High School
Co-organized the course, lectured and directed the laboratory section on "Gene Expression and the Ovary" (offered Feb 2014 and Feb 2015)

2015 Mather Residence of Evanston
Organized and presented for 24 visiting seniors from the Mather Residence in Evanston, IL
Current research in the reproductive sciences

DEPARTMENTAL, COLLEGE AND UNIVERSITY SERVICE:

1986-1988 Neuroscience Institute Planning Committee
1986-1989 BMBCB Graduate Admissions Committee (1989 Chair)
1988 Searle-Parker Lectureship (Chair)
1989-1992 Neuroscience Institute Director Search Committee
1989-1993 BMBCB Faculty Search Committee (Chair)
1988-1994 Center for Reproductive Sciences Executive Committee
1989-1995 Neuroscience Institute Executive Committee
1991-1994 Institutional Animal Care and Use Committee
1992-1994 WCAS Freshman Advisor
1992-1993 Graduate School Task Force
1993-1994 ACUC Executive Committee
1993-1995 BMBCB/IBiS Graduate Affairs Committee (Chair)
1994-1995 Evanston Life Sciences Planning Committee
1994-1995 WCAS Promotion and Tenure Committee
1995-1998 WCAS Committee on Special Students and Honors
1995-1998 BMBCB Seminar Committee (Chair)
1996-1999 University Program Review Committee
1998-2004 BMBCB Space Committee
1998-2003 Life Sciences Building Committee
1999-2000 BMBCB Department Faculty Search Committee (Chair)

1999-2000	Program Review Third Cycle Planning Committee
1999-2001	Life Sciences Working Group
2000-2002	IBiS Graduate Program Student Advisory Committee
2000-2002	WCAS Life Sciences Council (Chair)
2001-2002	WCAS Dean Search Committee (Chair)
2000-2004	Graduate Life Sciences Minority Affairs Committee (Chair 2003-04)
2002- 2006	Research Council, Feinberg School of Medicine
2002-2003	Pancoe/ENH Pavilion Symposium Committee (Chair)
2003-2005	Transgenic Mouse and Targeted Mutagenesis Facility Committee
2003-2004	Committee on Interdisciplinarity in Graduate and Professional Education
2004-2006	Office of Research Roles and Responsibilities Advisory Committee
2004-2006	Chemistry of Life Processes Institute Building Planning Committee
2005-2007	Northwestern Roadmap for Research Committees I and II
2007-2008	Search Committee for Chair of Medicine, Feinberg School of Medicine
2007-2009	One Northwestern Financial Models Task Force
2007-2010	One Northwestern, Graduate Programs Task Force
2007-2011	Training Grant Advisory Board, The Graduate School
2007-2012	W.M. Keck Foundation- The Inorganic Signature of Life Center, Advisory Board
2009-	The Hugh Knowles Center for Hearing Research, Advisory Board, (Chair, 2013-)
2010-2011	Search Committee for Chair of Ob/Gyn, Feinberg School of Medicine
2010-	Chemistry of Life Processes Institute, Internal Advisory Board
2011-2014	Northwestern University Ventures in Biology Education, Advisory Board
2011-	School of Continuing Studies, Graduate Advisory Board
2011-	Initiative for Sustainability and Energy, Internal Advisory Board
2011-	Administrative Board of The Graduate School (*ad hoc*)
2011-	Building Interdisciplinary Careers in Women's Health (BIRCWH) Internal Advisory Board
2011-	Northwestern Specialized Center of Interdisciplinary Research (SCOR), Internal Advisory Board
2012-2013	Conflict of Interest Reorganization Committee
2013-	Conflict of Interest Central Committee
2013-	Center for Reproductive Health after Disease, Internal Advisory Board
2014-2015	University Task Force/Search Committee on Research Compliance
2014-2015	Molecular Bioscience Faculty Search Committee
2014-	Center for Integration of Research, Teaching and Learning, Internal Advisory Board
2015-	Executive Steering Committee for the Northwestern Researcher Portal
2015-	Northwestern Core Facilities Advisory Committee
2015	Search Committee, Vice President for Compliance
2015	Advisory Search Committee, The Graduate School Acting Dean
2015	Program Review Subcommittee, Chemical and Biological Engineering
2015	Task Force on Research Shops
2015-2016	Task Force on Fabrication Facilities

PROFESSIONAL SERVICE RESPONSIBILITIES:

Journals:

1991-1995	Appointment to the Editorial Board of *Endocrinology*
1995-1997	Appointment to the Editorial Board of *Molecular Endocrinology*
1997-2003	Appointment as Associate Editor of *Molecular Endocrinology*
2003-2006	Appointment to the Editorial Board of *Endocrine Reviews*
2007-2013	Appointment to the Editorial Board of *Molecular Endocrinology*

Review Panels:

1991	NIH Special Panel, Review of NIH Centers for Fertility and Infertility
1992	NIH Special Panel, Review of NIH Centers for Contraceptive Development
1993	NIH Study Section on Biochemical Endocrinology, Ad Hoc Reviewer
1993-1998	NIH Study Section on Biochemical Endocrinology, Permanent Member
1996-1998	NIH Study Section on Biochemical Endocrinology, Chair
2000	U.S. Army Biomedical Research Program, Ovarian Cancer Study Section
2003-2007	NIH Biomedical Research and Training-B Review Subcommittee
2007-2008	NIH Biomedical Research and Training-B Review Subcommittee, Chair
2009	NIH Director's New Innovator Awards Program, Review Panel
2010	NIEHS Board of Scientific Counselors, LRDT Review Consultant
2013	NIH NICHD Special Emphasis Review Panel, Chair
2014	Advisory Board for the Wichita State Program Project Center Grant
2014	NIEHS Board of Scientific Counselors, RDBL Review Consultant

Professional Society Service:

1995-2000	The Endocrine Society, Awards Committee
1996-2004	The International Endocrine Society, Central Committee Member
1999-2000	The Society for the Study of Reproduction, Program Committee
2000	The Endocrine Society, Awards Committee Chair
2000-2001	The Endocrine Society, Strategic Planning Committee
2001-2004	The Endocrine Society, Research Affairs Committee Chair
2002	The Society for the Study of Reproduction, Program Committee Chair
2002-2003	The Endocrine Society, Strategic Plan Implementation Committee Chair
2004-2007	The Endocrine Society, Governing Council
2006-2008	The Endocrine Society, Bridge Grant Task Force, Co-Chair
2007-2009	The Endocrine Society, Committee on Governance Affairs
2009	The Endocrine Society, President-elect
2010	The Endocrine Society, President
2011	The Endocrine Society, Immediate Past Present
2011-2012	The Endocrine Society, Annual Meeting Task Force (Co-Chair)
2011-2012	The Endocrine Society, Basic Science Task Force
2012- 2015	The Endocrine Society, Nominating Committee
2013	The Endocrine Society, CEO Search Committee, Chair
2013-2016	The Endocrine Society Committee on Governance Affairs
2015	The Endocrine Society, Leadership Development Task Force

Meetings and Education:

1996	Gordon Research Conference on Hormone Action, Vice Chair
1996-2000	Serono Symposium Ovarian Workshop, Board of Directors
1997	Gordon Research Conference on Hormone Action, Chair
1998-2001	Frontiers in Reproduction: Molecular and Cellular Concepts and Applications Course, Marine Biological Laboratories, Co-Director
2000	Ovarian Workshop XIIIth Meeting, Co-Chair
2002	Society for the Study of Reproduction 35th Meeting, Program Chair
2003-2008	Board of Scientific Counselors, Frontiers in Reproduction
2007-	Corporation Member, Marine Biological Laboratory
2008- 2011	Chair, Board of Scientific Counselors, Frontiers in Reproduction
2016	Chair, External Review Panel, Frontiers in Reproduction

INVITED RESEARCH SEMINARS AND LECTURES:

University of Virginia, Division of Endocrinology (10/86)
McGill University, Montreal Neurological Institute (1/87)
Eastman Kodak Company, Division of Life Sciences (3/87)
Northwestern University, Dept. of Neurobiology and Physiology (4/87)
University of Illinois-Chicago, Department of Biochemistry (1/88)
University of Illinois, Dept. of Biology (2/88)
University of Indiana Medical School (2/88)
Illinois Institute of Technology, Dept. of Biology (3/88)
University of Illinois-Urbana, Department of Biochemistry (10/88)
Northwestern University Medical School, Center for Endocrinology & Metabolism (10/88)
University of Chicago, Division of Endocrinology (3/89)
Eli Lilly Company, Biology Research Division (4/89)
University of Washington-Seattle, Center for Reproduction (1/90)
Rockefeller University, Population Council (2/90)
University of Iowa, Department of Physiology and Biophysics (2/90)
University of Cincinnati, Children's Hospital (5/90)
Harvard University, Massachusetts General Hospital (6/90)
Columbia University, Center for Reproduction (1/91)
Eli Lilly and Company, Greenfield Research Facility (1/91)
University of Illinois Medical School (2/91)
Loyola University Medical School, Biochemistry (2/92)
University of Michigan, Reproductive Sciences Center (3/92)
University of Wisconsin-Madison, Endocrinology Training Program (9/92)
Merck Pharmaceutical Company, Growth Biochemistry and Physiology (1/93)
Upjohn and Company Reproduction and Growth Physiology (1/93)
University of Chicago, Department of Cellular Physiology (1/93)
Northern Illinois University, Department of Chemistry (2/93)
University of Illinois School of Medicine, Department of Pharmacology (2/93)
University of Indiana Medical School, Department of Pediatric Endocrinology (3/93)
University of Illinois, Reproductive Endocrine Program (10/93)
Eli Lilly and Company, Greenfield Research Facility (10/93)
Northwestern University Medical School, Division of Endocrinology (5/94)
University of Virginia, Division of Endocrinology and Metabolism (5/94)
Miyazaki (Japan) Medical College, Division of Medicine (6/94)
University of Pittsburgh, Center for Reproductive Science (10/94)
Tulane University, Department of Cell and Molecular Biology (11/94)
Iowa State University, Department of Animal Sciences (2/95)
Vollum Institute for Biomedical Research (3/95)
Massachusetts General Hospital, Division of Reproductive Endocrinology (4/95)
Wisconsin Medical School, Department of Biochemistry (4/96)
University of Michigan, Department of Biochemistry (5/96)
University of Pennsylvania, Department of Medicine (6/96)
Oregon Regional Primate Research Center (4/97)
Harvard Medical School/MGH, Endocrine Grand Rounds (3/98)
Wyeth-Ayerst Pharmaceuticals, Women's Health Institute (4/98)
University of Kansas, Women's Research Institute (4/98)
Marine Biological Laboratories, FIR Course (6/99)
Texas Tech University, Department of Biochemistry and Cell Biology (9/99)
Northwestern University Medical School, Division of Endocrinology (10/99)
University of Iowa, Department of Physiology and Biophysics (11/99)
University of Kansas Medical Center, Department of Physiology (4/00)
UCLA-Cedars Sinai, Division of Endocrinology (4/00)

Marine Biological Laboratories, FIR Course (5/00)
NIEHS, Reproductive and Developmental Toxicology (5/00)
Marine Biological Laboratories, FIR Course (5/01)
Loyola University Medical School, Molecular Biology Program (10/01)
University of Maryland Medical School, Department of Physiology (10/01)
Marine Biological Laboratories, FIR Course (5/02)
Macalester College, Department of Biology (9/02)
Alcorn State University, Departments of Biology and Chemistry (1/03)
Morehouse Medical School, Department of Obstetrics & Gynecology (2/03)
Marine Biological Laboratories, FIR Course (5/03)
University of Illinois, Reproductive Sciences Programs (6/03)
University of Wisconsin, Reproductive Physiology Program (10/03)
Jackson State University, Department of Biology (1/04)
Tougaloo College, Department of Biology (1/04)
Lawrence University, Department of Biology (2/04)
University of Virginia, Division of Endocrinology (3/04)
Marine Biological Laboratories, FIR Course (5/04)
University of Chicago, Division of Endocrinology (5/04)
Eastern Virginia Medical School, Department of Physiology (1/05)
Northwestern University Medical School, Department of Pathology (2/05)
Marine Biological Laboratories, FIR Course (5/05)
Medical College of Georgia, Department of Obstetrics and Gynecology (5/05)
Benedictine College, Department of Biology (10/05)
University of Texas-Southwest Medical School, Division of Reproductive Endocrinology (2/06)
Washington State University, Division of Biomolecular Sciences (4/06)
Massachusetts General Hospital, Reproductive Endocrine Unit (5/06)
Marine Biological Laboratories, FIR Course (5/06)
Northwestern University Medical School, Division of Endocrinology (12/06)
NIEHS, Laboratory of Signal Transduction (4/07)
University of Illinois, Department of Molecular and Integrative Physiology (4/07)
Marine Biological Laboratories, FIR Course (5/07)
University of Kansas, Department of Molecular and Integrative Physiology, The Kathleen Osborn Lectureship (10/07)
Marine Biological Laboratories, FIR Course (5/08)
Yale University, Department of Obstetrics & Gynecology, The Hal Behrman Lectureship (12/08)
The Salk Institute, Gene Expression Laboratory (4/09)
University of Illinois-Chicago, Department of Physiology & Biophysics (2/10)
University of Michigan, Center for Reproductive Science, The Anita Payne Lectureship, (10/10)
Massachusetts General Hospital, Harvard Medical School, Reproductive Endocrinology (4/11)
Northwestern University Medical School, Division of Endocrinology (12/12)
Massachusetts General Hospital, Harvard Medical School, Reproductive Endocrinology (3/14)

SYMPOSIUM PRESENTATIONS AT NATIONAL AND INTERNATIONAL CONFERENCES:

68th Meeting of the Endocrine Society, Anaheim, CA (6/86)
30th Congress, International Physiology Society, Vancouver B.C. (7/86)
Advances in Growth Hormone and Growth Factors Research, Milan, Italy (9/87)
Eighth International Congress on Endocrinology, Kyoto, Japan (7/88)
NICHHD Center Directors Symposium on the HPG Axis, Chicago, IL (7/89)
Hormone Action Gordon Research Conference, Meriden, NH (8/89)
Eighth Serono Ovarian Workshop, Maryville TN (7/90)
Serono Symposium on FSH Action, Evanston IL (10/90)
NIH Symposium on Molecular Approaches in Reproductive Biology, Bethesda, MD (2/91)

Serono Symposium on GnRH Action, Scottsdale, AZ (2/91)
NIH Conference on Follicular Selection and Atresia, Bethesda, MD (3/92)
5th Chicago Signal Transduction Symposium, Chicago, IL (5/92)
75th Meeting of the Endocrine Society, Las Vegas Nevada (6/93)
3rd International Pituitary Congress, Marina del Rey, CA (6/93)
50th Laurentian Hormone Conference, Palmes del Mar, Puerto Rico (11/93)
Japanese Endocrine Society Meeting, Nagasaki, Japan (6/94)
Serono Symposium on Growth Hormone Secretagogues, St. Petersburg, FL (12/94)
Hormone Action Gordon Conference, Meriden, NH (8/95)
Coleman Foundation Symposium on Regulation of Cell Growth, Chicago, IL (9/95)
Second International Symposium on VIP, PACAP and Related Peptides. Keynote Address, New Orleans, LA (10/95)
Fourth International Pituitary Congress, San Diego, CA (6/96)
50th Meeting of the Korean Biological Sciences Society, Seoul, Korea (10/96)
30th Meeting of the Society for the Study of Reproduction, Portland, OR (8/97)
University of Kentucky Reproductive Sciences Symposium, Lexington, KY (5/98)
7th International Pituitary Pathology Congress, Tokyo, Japan (10/98)
Fourth International Congress on Neuroendocrinology, Kitakyushu, Japan (10/98)
The Endocrine Society Annual Meeting, San Diego, CA (6/99)
Recent Progress in Hormone Research Meeting, Stevenson, WA (8/99)
4th Eli Lilly HypoCCS Symposium and Investigators Meeting, Toronto, Canada (6/00)
International Symposium on Reproductive Endocrinology, Washington D.C. (3/01)
Molecular Endocrinology Symposium (2 lectures), Helsinki, Finland (12/01)
Frontiers in Reproductive Endocrinology (2 lectures), Savannah, Georgia (3/03)
86th Meeting of the Endocrine Society, New Orleans, Louisiana (6/04)
15th Serono Ovarian Workshop, Vancouver, British Columbia (7/04)
Frontiers in Reproductive Endocrinology (2 lectures), Washington, D.C. (3/05)
NIH-SCPRR Ovary Focus Group Meeting, Chicago, IL (11/05)
Frontiers in Reproductive Endocrinology (2 lectures), Washington, D.C. (3/07)
NIH-SCPRR Ovary Focus Group Meeting, Evanston, IL (3/08)
University of Kentucky 27th Symposium on Reproductive Biology & Women's Health (5/08)
International Congress of Endocrinology, Rio De Janeiro, Brazil (11/08)
Frontiers in Reproductive Endocrinology (2 lectures), Arlington, VA (3/09)
NIH-Specialized Cooperative Centers Program in Reproductive Research, Chicago, IL (5/09)
NIH-NICHD Reproductive Sciences Branch, Director's Meeting, Bethesda, MD (4/10)
Frontiers in Reproductive Endocrinology (2 lectures), Washington, D.C. (3/11)
Frontiers in Reproductive Endocrinology (2 lectures), Washington, D.C. (3/13)
International Congress of Endocrinology and The Endocrine Society's 96th Annual Meeting and Expo, Chicago, IL, Plenary Lecture (6/14)
Frontiers in Reproductive Endocrinology (2 lectures), Washington, D.C. (3/15)
Society for the Study of Reproduction, 48th Annual Meeting, San Juan, Puerto Rico (6/15)
Canadian Fertility and Andrology Society, 61st Annual Meeting, Halifax, Nova Scotia (10/15)

PAST RESEARCH SUPPORT:

American Cancer Society-Illinois Division #86-27
Isolation and Expression of Ovarian Folliculostatin Genes
1/1/86 to12/31/86, $35,580 annual direct costs

Human Growth Foundation
Expression of Human GRF Genes in Transgenic Mice
4/1/86 to 3/31/88, $20,000 annual direct costs

National Institutes of Health R01 NSGM24439
Regulation of Neuropeptide Genes in Rat Hypothalamus
1/1/87 to 6/30/90, $92,125 annual direct costs

National Science Foundation DCB-8552977
Gene Regulation in the Mammalian Neuroendocrine System (Presidential Young Investigator Award)
7/1/86 to 6/30/91 $25,000 annual direct costs

Chicago Community Trust- Searle Scholars Program #87-G-113
Biosynthesis of Peptides that Regulate Pituitary Function
7/1/87 to 6/30/90, $54,000 annual direct costs

National Institutes of Health P01 HD21921
FSH Control and Action Project IV: Genes Encoding FSH-Regulatory Hormones
7/1/88 to 6/30/93, annual direct costs $56,980

McKnight Foundation
Hormonal Control of Reproductive Behavior
1/1/88 to 12/31/90, annual direct costs $35,000

National Institutes of Health R01 HD27491
Regulation of Ovarian Inhibin and Activin Genes
1/1/91 to 5/31/94, annual direct costs $97,000

National Institutes of Health K01 HD00920
Molecular Biology of Reproductive Hormones (Research Career Development Award)
2/1/91 to 1/31/96, annual direct costs $59,600

National Institutes of Health P30 HD28048
Center for Research on Fertility and Infertility Core D: In Situ Hybridization Core
5/1/91 to 3/31/96, annual direct costs $42,000

Eli Lilly and Company
Characterization of Chicken GHRH
9/1/91 to 8/31/92, annual direct costs $36,400

Eli Lilly and Company
Growth Hormone Releasing Hormone Receptors
1/1/93 to 12/31/94, annual direct costs $34,000

National Institutes of Health P01 HD21921
FSH Control and Action Project IV: Inhibin and Activin Synthesis
7/1/93 to 6/30/98, annual direct costs $80,500

National Institutes of Health R01 DK48071
Molecular Analysis of the Pituitary GHRH Receptor
4/1/94 to 3/31/99, annual direct costs $125,000

National Institutes of Health P01 HD21921
FSH Control and Action Project IV: Regulation of Inhibin and Activin Biosynthesis
12/1/98 to 11/30/03, annual direct costs $125,750

National Institutes of Health P01 HD21921
FSH Control and Action Core B: Molecular Technology

12/1/98 to 11/30/03, annual direct costs $48,685

National Institutes of Health R01 DK48071
Molecular Analysis of the Pituitary GHRH Receptor
12/1/99 to 11/30/03, annual direct costs $180,822

National Institutes of Health U54 HD041857
Center for Reproductive Research Project 2: Transcription Factor Interactions in Reproductive Hormone Gene Expression
4/1/03 to 3/31/08, annual direct costs $179,488

National Institutes of Health T32 GM008061
Cellular and Molecular Basis of Disease Training Program
7/01/03 to 6/30/08, annual direct costs $861,644

National Institutes of Health P01 HD21921
Hormonal Signals that Regulate Ovarian Differentiation Project 1: Activin Regulation of Ovarian Follicular Development
12/03/03 to 11/30/08, annual direct costs $199,424

National Institutes of Health U54 HD041857
Center for Reproductive Research Project 2: Transcription Factor Interactions in Reproductive Hormone Gene Expression
4/1/08 to 3/31/13, annual direct costs $192,000

CURRENT RESEARCH SUPPORT:

National Institutes of Health P01 HD21921
Hormonal Signals that Regulate Ovarian Differentiation
Project 1: Signaling Pathways Regulating Ovarian Follicle Formation
Program P.I. Kelly E. Mayo, Project 1 P.I. Kelly E. Mayo
Annual direct cost $265,090
10/1/09 to 9/30/14 (no cost extension to 9/30/16)

National Institutes of Health P01 HD21921
Hormonal Signals that Regulate Ovarian Differentiation
Core A: Program Administration
Program P.I. Kelly E. Mayo, Core A P.I. Kelly E. Mayo
Annual direct cost $95,000
10/1/09 to 9/30/14 (no cost extension to 9/30/16)

Innovative Initiative Incubator Award (Northwestern)
New Imaging Approaches to Understanding Placental Development and Function
P.I. Kelly E. Mayo
Annual direct cost $60,000
12/1/15 to 11/30/17

SCIENTIFIC RESEARCH CONTRIBUTIONS:

1. *Identified the GHRH precursor gene and demonstrated through functional expression in transgenic mice that GHRH regulates somatic growth***.** Growth hormone produced in the pituitary

gland is a critical component of the control of somatic growth, and the hypothalamic peptide hormone GHRH (Growth Hormone Releasing Hormone) was identified as a positively acting counterpart to the suppressive effects of somatostatin in regulating growth hormone secretion. I used expression cloning to isolate a human GHRH cDNA from a pancreatic tumor ectopically producing GHRH, and subsequently cloned the cDNA and the gene from several species. This identified the precursor protein that is processed to give rise to several known GHRH isoforms. GHRH expression in transgenic mice was shown to cause pituitary hyperplasia, excessive growth hormone secretion, and enhanced somatic growth. I performed much of this work as a postdoctoral fellow in the laboratory of Dr. Ronald Evans, with collaboration from Drs. Geoffrey Rosenfeld and Wylie Vale (Salk Institute), Dr. Michael Thorner (Virginia), and Drs. Robert Hammer and Ralph Brinster (Penn). This work provided new insights into the neuroendocrine regulation of growth, explained the genesis of the multiple GHRH isoforms and allowed an exploration of GHRH gene regulation. GHRH is currently used for a number of clinical indications (see representative publications 7-9, 11, 17, 22).

2. *Established the expression and regulation of the inhibin and activin family of genes in the rodent ovary and showed their physiological roles in female reproduction.* Hormonal communication is critical to the regulation of the female reproductive cycle and fertility. Inhibin and activin are key gonadal hormones that regulate FSH synthesis and secretion in the pituitary gland and have additional diverse actions. Our group and others isolated cDNAs (and later genes) encoding these hormones and explored their dynamic regulation in the ovary, demonstrating that they are expressed predominantly in granulosa cells, are regulated throughout the estrous cycle, and are stimulated by FSH and repressed by LH. Insights into the physiological roles of inhibin, and its potential involvement in reproductive disease, were gained by expression of inhibin in transgenic mice, revealing local gonadal roles in addition to its endocrine functions. These experiments were performed in my laboratory, with studies on physiological regulation done in collaboration with Dr. Neena Schwartz (Northwestern). This work contributed to our understanding of the control of female reproduction, establishing the regulatory interactions between FSH and inhibin and revealing local paracrine functions of both inhibin and activin in the ovary. (See representative publications 15,16, 29, 31, 53, 77, 93, 94).

3. *Discovered and functionally characterized the GHRH receptor and found that a mutation in this gene is causative in a constitutive short stature syndrome in mice.* Using a degenerate PCR-based strategy to look for new G protein-coupled receptors expressed in the pituitary gland, we identified and cloned a candidate and showed that it bound GHRH with high affinity and specificity and activated cAMP second messenger systems when stimulated with hormone. Chimeric and truncated receptors were used to identify the key domains required for GHRH binding. We hypothesized that GHRH receptor mutations might be causative in some known syndromes of suppressed growth, and demonstrated that a single amino acid change found in the *little* mouse eliminates GHRH binding and is causative in the constitutive short stature observed in this animal model. We characterized the GHRH receptor gene and found that it is regulated by the pituitary-specific transcription factor Pit-1, and encodes splice variants with distinct signaling properties. I performed the receptor cloning, and the additional work was done largely in my laboratory. Mapping of the GHRH receptor gene was done with Drs. Nancy Jenkins and Neil Copeland (NCI-Frederick), and studies on Pit-1 regulation were performed with Drs. Andrew Korytko and Leona Cuttler (Case Western). These experiments revealed the mechanism of action of GHRH and led to the recognition that the GHRH receptor is necessary for somatic growth. Our findings led to the discovery by others of similar GHRH receptor mutation in human patients with short stature syndromes. (See representative publications, 41, 48, 71, 75, 81, 82, 98, 122).

4. *Uncovered the signaling pathways and transcription factors regulating expression of the inhibin and activin family of genes in granulosa cells of the ovary*. As key regulators of reproduction, understanding the tissue- and cell-specific expression and regulation of inhibin and activin is of importance. We characterized the genes and promoters of the α, βA and βB subunit genes,

investigating their activity in transfected granulosa cells. We showed that the cAMP-responsive transcription factors CREB and ICER mediate positive and negative regulation by FSH. The orphan nuclear receptors SF-1 and LRH1 are key for tissue-specific expression, and we showed that their occupancy on the α subunit promoter is regulated. We established the structure of the DNA-binding domain of SF-1 bound to the inhibin α promoter, revealing an unexpected requirement of a C-terminal α-helix for high affinity DNA binding, and identified the LIM domain protein FHL2 as a transcriptional coactivator that integrates the responses to CREB and SF-1/LRH1. These studies were performed in my laboratory with the exception of the NMR structure of SF-1, which was done in collaboration with Dr. Ishwar Radhakrishnan (Northwestern). These experiments revealed mechanisms underlying hormonal regulation of the inhibin/activin genes, identifying new structural features and interactions of the transcription factor/coactivator complex mediating this regulation. (See representative publications 64, 76, 84, 111, 106, 112, 115, 134, 135).

5. *Revealed interactions between endocrine, paracrine, and juxtacrine factors mediating germ cell-somatic cell communication during follicle formation in the mouse ovary.* Ovarian follicles are the niche in which the female germ cell is maintained, and their formation and growth requires bidirectional communication between the oocyte and somatic granulosa cells. We explored roles for activin in this communication, finding that activin treatment in neonatal mice enhances the initial formation of the primordial follicle pool. Estrogen is a know regulator of follicle formation in the mouse, and we showed that it strongly regulates activin expression and action. We also found that activin conversely regulates estrogen receptor gene expression, revealing an integration of these endocrine and paracrine pathways. We explored the potential roles of juxtacrine, or contact dependent, Notch signaling in the follicle. Using either pharmacologic inhibition or conditional gene knockout approaches, we demonstrated that Notch deficiency results in attenuated primordial follicle formation, reduced follicle growth, and subfertility. Our recent experiments demonstrate an interaction between activin and Notch signaling in granulosa cell proliferation and follicle growth. Many of these studies were performed in collaboration with the laboratory of Dr. Teresa Woodruff (Northwestern). These data establish that each of these signaling systems is important for follicle function, and they reveal unexpected interactions and cross-regulation among the pathways, providing new insights into a process critical to female fertility. (See representative publications 116, 117, 120, 123, 128, 132, 133, 137).

CURRENT RESEARCH INTERESTS:

My research laboratory investigates cell signaling and gene expression in the mammalian reproductive axis. Our current research program seeks to understand the development and function of the ovary, and how external and intrinsic signals bring about the changes in cell proliferation, cell differentiation and gene expression that will result in the growth, ovulation and subsequent luteinization of ovarian follicles during each reproductive cycle. We primarily utilize the mouse as a model system, although our studies range from the molecular level to the cellular level to the physiology of the whole organism.

The mammalian ovary is central to female reproductive function, secreting critical hormonal factors and serving to nurture the female germ cell through ovulation. As primordial germ cells migrate into the female genital ridge, they undergo mitotic proliferation in the absence of complete cytokinesis, leading to syncytia of germ cells connected by cytoplasmic bridges called germ cell 'nests'. Somatic pre-granulosa cells subsequently invade the nest and encapsulate individual germ cells to form primordial follicles. A small number of follicles are recruited to grow, mature, and ovulate throughout the reproductive lifespan. Ovarian follicles serve as a critical niche for maintaining the growth of the female germ cell and allowing its maturation, and bidirectional signaling between the germ cell and surrounding somatic granulosa cells is crucial to the establishment and maintenance of this niche. We have focused on a form of juxtacrine communication that requires direct contact between a sending and receiving cell, the Notch pathway. We demonstrated that multiple Notch receptors and

ligands are expressed in the neonatal ovary, and found that the receptor Notch 2 is expressed in the somatic granulosa cells while the ligand Jagged 1 is expressed in the oocyte. We are using imaging to localize active Notch signaling in the developing mouse ovary using mice that carry a Notch-responsive GFP reporter as well as a germ cell specific RFP reporter, allowing an examination of the interactions between the germ cells and the Notch-active somatic cells in real time during development. Various forms of microscopy are being applied to directly observe processes associated with germ cell nest breakdown and follicle formation. The imaging is being complemented by fluorescence-based cell sorting to identify and quantify the populations of Notch active cells in the developing ovary.

To test functional roles for Notch signaling, we developed an organotypic ovary culture system and used pharmacologic inhibitors to show that attenuation of Notch signaling caused a delay or block in the formation of primordial follicles from germ cell nests. We also generated conditional knockout mice that fail to express either Notch 2 or Jagged 1 in the ovary (in granulosa cells and germ cells, respectively). Our analysis indicates that these mice have defects in follicle formation, and accumulate multi-oocytic follicles that are a result of incomplete germ cell nest breakdown. The mice exhibit increased cell death and reduced cell proliferation in granulosa cells of developing follicles, and are subfertile. We are currently developing several additional conditional knockout mouse models, specifically to test roles for Notch signaling in the periovulatory period, where we have evidence that Notch signaling may modulate ovarian steroidogenesis. Additional experiments are exploring expression and function of Notch signaling in the mouse placenta.

Other aspects of our work explore relationships between Notch and Activin signaling. We demonstrated that that the TGFβ family protein Activin also modulates follicles formation in the ovary, and we found that Activin regulates numerous Notch pathway genes at a transcriptional level. In turn, in animals with attenuated Notch signaling, Activin gene expression is reduced, suggesting a reciprocal regulation. We are exploring how these pathways connect mechanistically, and how the interaction of these two signaling pathways impacts the proliferation of somatic granulosa cells during follicle growth and development. Our research focuses on molecular mechanisms regulating normal reproductive function, but is substantially informed by, and relevant to, reproductive disorders that impact fertility or result in infertility. Given the many conserved features of follicle function and ovarian regulation across mammalian species, these studies in mice are expected to have direct applicability to human reproductive health and disease.

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