Division of Developmental Biology

DIVISION PROFILE	
Number of Faculty	20
Number of Joint Appointment Faculty	7
Number of Fellows	
Clinical Fellows	4
Research Fellows	45
Number of Graduate Students	26
Number of Other Students (full and part-time)	23
Number of Support Personnel	45
Annual Total Grant Support (direct)	$4,988,758
Number of Peer Reviewed Publications	67

FACULTY LISTING

Christopher C. Wylie, PhD, Professor of Pediatrics, Associate Chair for Basic Science; Director of the Molecular and Developmental Biology Graduate Program
Nadean L. Brown, PhD, Assistant Professor of Pediatrics
Kenneth J. Campbell, PhD, Associate Professor of Pediatrics, Director of Graduate Studies, Molecular and Developmental Biology Graduate Program
Jay L. Degen, PhD, Professor of Pediatrics
Sandra J.F. Degen, PhD, Professor of Pediatrics, Associate Chair for Academic Affairs
Brian Gebelein, PhD, Assistant Professor of Pediatrics
Janet Heasman, PhD, Professor of Pediatrics
Rashmi Hegde, PhD, Associate Professor of Pediatrics
Harold Kalter, PhD, Professor of Pediatrics Emeritus
Chia-Yi Kuan, MD, PhD, Assistant Professor of Pediatrics
James L. Lessard, PhD, Professor of Pediatrics, Associate Director
Hung-Chi Liang, PhD, Research Instructor of Pediatrics
Xinhua Lin, PhD, Associate Professor of Pediatrics
Jun Ma, PhD, Associate Professor of Pediatrics
Masato Nakafuku, MD, PhD, Professor of Pediatrics
S. Steven Potter, PhD, Professor of Pediatrics, Director of the Affymetrix Core Facility
William J. Scott, PhD, DVM, Professor of Pediatrics Emeritus
James M. Wells, PhD, Assistant Professor of Pediatrics
Dan A. Wiginton, PhD, Associate Professor of Pediatrics
Aaron M. Zorn, PhD, Assistant Professor of Pediatrics

FACULTY JOINT APPOINTMENT LISTING

Bruce Aronow, PhD, Associate Professor of Pediatrics, Pediatric Bioinformatics
Thomas Bartman, MD, PhD, Assistant Professor of Pediatrics, Pulmonary Biology
Michael D. Bates, MD, PhD, Assistant Professor of Pediatrics, Gastroenterology, Hepatology, and Nutrition
Tiffany Cook, PhD, Assistant Professor of Pediatrics, Pediatric Ophthalmology
Prasad Devarajan, MD, Professor of Pediatrics, Director, Div. of Nephrology and Hypertension
Richard A. Lang, PhD, Professor of Pediatrics, Director, Transgenic Core Facility; Pediatric Ophthalmology
Jeffrey A. Whitsett, MD, Professor of Pediatrics, Chief, Section of Neonatology, Perinatal and Pulmonary Biology

OVERVIEW

The division is a center for basic research at CCHMC. The development of the fertilized egg, into a child requires the expression of some 30,000 genes, in complex temporal and spatial patterns, which generate both form and function as the organ systems of the embryo develop. This complex process requires cell growth, cell division, cell movements, differential cell adhesions, and the production of specialized structures that allow cells to perform different functions. Congenital disorders result from mistakes in this intricate process. 3-4% of babies born in this country have major organ system defects caused by mistakes in embryonic development.

Left to Right: (1st row) A. Kuan, S. Degen, N. Brown, X. Lin, J. Heasman, J. Degen, W. Scott, (2nd row) B. Aronow, J. Ma, T. Cook, J. Lessard, R. Hegde, C. Wylie, (3rd row) M. Bates, J. Wells, B. Gebelein, T. Bartman, D. Wiginton, (4th row) M. Nakafuku, K. Campbell, S. Potter, R. Lang, A. Zorn, P. Devarajan

Scientists in the division study the basic cellular and molecular processes that control development, with the aim of uncovering the causes of human birth defects. Different model organisms are used for this research, including mice, fish, frogs, chickens, and fruit flies. Many different technologies are used, including molecular genetics, genomics, structural analysis, experimental embryology, cell culture, high resolution cellular and molecular imaging, and biochemistry. A major part of the division's activities involves establishing research groups who will use novel insights into basic mechanisms to identify the basis of congenital disorders. This is being done in three ways. First, the DB division is becoming more of an interdivisional "matrix" structure. Several physician/scientists from clinical divisions, including two clinical division directors, hold joint appointments in the division. This allows cross-fertilization of ideas and technologies between clinicians and basic scientists. It also allows training in basic science for young physician/scientists recruited into clinical divisions. Second, several focus groups of faculty have been established, each of which focuses on a major organ system. The Visual Systems Group (Organizer: Richard Lang), the Endoderm Club (Organizers: Jim Wells, Mike Bates and Aaron Zorn), and the Developmental Neurobiology Center (Organizers: Masato Nakafuku and Kenny Campbell), are good examples in which faculty from DB and from the clinical divisions meet regularly to plan collaborative projects and grant applications. Third, individual projects are being started, in which specific birth defects are targeted by basic scientist and clinician collaborators.

The division is also a major center for training in basic science to clinical faculty, fellows, postdoctoral fellows, and graduate students. It is the home of the University of Cincinnati Molecular and Developmental Biology Graduate Program (see separate entry). Our faculty play key roles in this program. Chris Wylie is currently Co-Director of the program. Janet Heasman is Curriculum Director. Kenny Campbell is Director for Student Affairs. Steve Potter and Masato Nakafuku direct the Introduction to Development course, whilst Richard Lang and Jim Wells direct the Advanced Developmental Biology course.

HIGHLIGHTS

Last year saw the recruitment of two young faculty to our Developmental Neurobiology program, Chiou-Fen Chuang and Chieh Chang. Chiou-Fen was trained at Caltech and Rockefeller, and Chieh at Caltech and Stanford. Both use the small nematode Caenorhabditis elegans to study the developing nervous system. This is an ideal model organism for identifying novel genes required for organ formation. One of the projects they will carry out is a genetic screen for genes affecting the regeneration of neurons after injury. This is likely to yield results of wide general interest.

The division now has 168 personnel, including 18 faculty members with primary appointments, 2 emeritus faculty, and 7 who hold primary appointments in other divisions. There are 49 postdoctoral fellows, 26 graduate students, and 38 research assistants. Members of the division published 67 papers in the year, and research in the division was supported by 31 external grants, totaling $4,988,758.

Both senior and junior faculty made significant contributions to their research fields last year. Amongst the seniors; Chris Wylie joined the Advisory Council of the Rikken Institute in Cell and Developmental Biology in Kobe, Japan. Jay Degen was awarded the Wyeth-ISFP Prize, from the International Society for Fibrinolysis and Proteolysis. Amongst our younger faculty members, Tiffany Cook, gave an invited lecture at the Gordon Research Conference on Visual Development, held in Italy, and Brian Gebelein, was awarded a highly competitive Basil O'Connor Scholarship from the March of Dimes. Nadean Brown was co-organizer of the Gordon Conference on Visual Systems Development in Italy. Jim Wells was invited by the graduate students at SUNY Stony Brook to give the keynote address at their Annual Symposium. Faculty members gave 22 invited platform presentations at national or international meetings, 35 invited seminars to universities and research institutions, and served on eight study sections. In addition, three faculty members taught in the Developmental Biology Course at Cold Spring Harbor.

Our trainees also gained success. Sarah Goodwin (Cook lab) was awarded the best poster prize at the Capstone Summer Research Program Symposium of the University of Cincinnati. Dong Yan (Lin lab) was awarded a Ryan Fellowship, the top-ranking award at the University of Cincinnati.

TRAINING

Faculty

Carol Choi, MD	University of Cincinnati, Asst. Professor, UC OB/Gyn
Gail Deutsch, MD	Brown University, Asst. Professor, Pathology
Larry Patterson, MD	College of Medicine of Pennsylvania State University, Res. Asst. Professor, Nephrology
Joseph Palumbo, MD	Penn State University College of Medicine, Res. Asst. Professor, Hematology/Oncology
Pramod Reddy, MBBS	Guntur Medical College and Siddhartha Medical College, University of Health Sciences, Vijayawada, India, Asst. Professor, Urology

Research Associates

Tatyana Belenkaya, PhD	Russian Academy of Science
Sheila Bell, PhD	University of Cincinnati (end 7/22/05)
Eric Brunskill, PhD	University of Maryland
Bharesh Chauhan, PhD*	Oxford University, United Kingdom
Lisa Ehrman, PhD	University of Cincinnati
Matthew Flick, PhD	Purdue University
J. Matthew Kofron, PhD	University of Minnesota
Ajit Kumar, PhD	Madurai University, India
Hung-Chi Liang, PhD	University of Cincinnati
Guang Hong Liao, MD	Medical Center of Fudan University (end 4/28/06)
Michael Spencer, PhD	University of Kentucky

John Szucsik, PhD	University of Cincinnati
Qinghua Tao, PhD	Chinese Academy of Sciences
Bei Wang, MD	Yuzhou University
Jody White, PhD	California Inst of Technology

Research Fellows

Michael Bennett, PhD	University of Cincinnati
Korie Counts, PhD	University of Kentucky
Chitra Dahia, PhD*	Indian Institute of Science
Ying Fang, PhD	University of Cincinnati
Malgorzata Jungerman, PhD	Institute of Human Genetics, Poznan, Poland (end 9/30/05)
Chandra Mohan Kattamuri, PhD	Osmania University, Hyderabad, India (end 8/30/05)
Avedis Kazanjian, PhD*	University of Louisville
Savita Kurup, PhD*	University of Pune, India
Yan Li, PhD	Shandong University, China
Suh-Chin Lin, PhD	University of Texas Health Sciences, San Antonio
Junbo Liu, PhD	Fudan University
Mayur Madhavan, PhD	Miami University
Aygun Mamedova, PhD	Moscow State University
Leigh-Anne Miller, PhD*	University of Cincinnati
Billie Moore-Scott, PhD	Medical College of Georgia
Motoshi Nagao, PhD	Tokyo Institute of Technology
Jennifer Ondr, PhD*	Washington University
Xiufang Pan, MD*	Beijing Medical University
Virgilio Ponferrada, PhD*	Wright State University
Sugadev Ragumani, PhD	Maras University, India (end 10/5/05)
Sujata Rao, PhD*	Cornell University
Debora Sinner, PhD	University of Buenos Aires, Argentina
Emmanuel Tadjuidje, PhD	University of Goettengen
Ilya Vilinsky, PhD	Cornell University
Ronald Waclaw, PhD	University of Cincinnati
Wenhu Wang, PhD	Fudan University (end 5/15/06)
Stephanie Whitaker, PhD*	SUNY Upstate Medical University
Baotong Xie, PhD*	Chinese Academy of Sciences
Yukiyo Yamamoto, PhD	Hokkaido University, Japan
Ichiro Yonekura, PhD	Nagasaki University School of Medicine (end 3/17/06)

Clinical Fellows

Alan Kenny, MD, PhD	University of Rochester, School of Medicine and Dentistry
David Kitchens, MD	University of Cincinnati
Eric Mullins, MD	University of Missouri - Columbia

Bang Bao Scholar

Danielle Yu, MD	West China Second University Hospital

Graduate Students from other programs

(see separate listing for students in the Molecular and Developmental Biology Program)

Alessandro Cancelliere	Neuroscience – Univ of Cincinnati
Longqui Cheng	Jinan University
Ricardo Costa	Developmental Biology-Univ of Cambridge, U.K.

Feng He	Institute of Biophysics, Chinese Academy of Sciences
Robert Hufnagel	Neuroscience, Univ. of Cincinnati
Yasuo Ohori	Dept of Orthopedic Surgery-Univ of Tokyo (end 12/30/05)
Ken Somekawa	Dept of Neurosurgery, Univ of Tokyo
Michiya Sugimori	Dept of Neuropathology, Univ of Tokyo
Kyoko Sumiyoshi	Dept of Neuropathology, Univ of Tokyo (end 3/17/06)
Gengqiang Xie	Institute of Biophysics, Chinese Academy of Sciences

MD/PhD Rotating Students

None

Undergraduate Students

Jeeyeon Cha	University of Cincinnati
Sarah Ehrman	Miami University
Michael Fusakio	DePauw University
Uma Goyal	University of Arizona
Emily Greenberg	Washington University
Mansour Haque	University of Cincinnati
Kimberly Hermann	Xavier University
Robert Holtgraves	Xavier University
Amanda Kay Kolb	Harvard University
Michael Northcutt	Kenyon College
Andrew Potter	University of Cincinnati
Kaitlin Sanzone	Carleton College
Bo Yang	University of Cincinnati

High School Students:

Laura Colman	Seven Hills High School
Michael Fusakio	Loveland High School
Emily Huschart	Mother of Mercy High School
Nan Lin	Indian Hill High School
Ashley Riesenberg	Roger Bacon High School

** Trainees of Faculty with Joint Appointment*

GRANTS, CONTRACTS AND INDUSTRY AGREEMENTS

Grant and Contract Awards		Annual Direct/Project Period Direct
Brown, N		
Investigation of Mammalian Retinal Neuron Development		
National Institutes of Health		
R01 EY 013612	08/01/04 – 7/31/08	$225,000/$925,000
Burns, K		
Regeneration by White-matter Progenitors after Stroke		
National Institutes of Health		
F31 NS 054496	01/01/06– 12/31/08	$31,701/$95,846

Campbell, K

The Roles of GSH1 and GSH2 Genes in Telencephalic Neurogenesis

National Institutes of Health

R01 NS 044080 07/01/02 – 04/30/07 $208,727/$1,068,750

Regional Control of Telencephalic Neuronal Diversity

National Institutes of Health

R01 MH 069643 01/01/05 – 12/31/09 $219,731/$1,125,000

Degen, J

Mechanisms Linking Hemostatic Factors and Malignancy

National Institutes of Health

R01 HL 071555 08/01/02 – 07/31/06 $300,434/$1,069,207

Arthritic Disease and the Hemostatic System

National Institutes of Health

R01 AR 049822 02/01/04 – 01/31/09 $222,154/$1,137,500

Gebelein, B

Role of HOX Transcription Factor Complexes in Anterior-Posterior Patterning of the Embryo

March of Dimes - National

5-FY05-1220 02/01/06 – 01/31/08 $68,182/$136,364

Heasman, J

Maternal Control of Tissue Formation in Xenopus

National Institutes of Health

R01 HD 038272 04/01/04 – 03/31/09 $219,713/$1,125,000

Hegde, R

Mechanism of Action of Retinal Determination Proteins

National Institutes of Health

R01 EY 014648 09/01/04 – 08/31/09 $225,000/$1,125,000

Kuan, C

Jun Kinase Signaling and Apoptosis in Ischemic Stroke

National Institutes of Health

R01 NS 044315 02/01/03 – 01/31/07 $208,727/$855,000

Apoptosis and Renewal of Neural Progenitor Cells

National Institutes of Health (Yale University subcontract)

R01 NS 038296 02/01/06 – 01/31/11 $42,430/$255,353

Lessard, J

Murine Atlas of Genitourinary Smooth Muscle Development

National Institutes of Health

U01 DK 070219 04/01/05 – 03/31/10 $325,085/$1,715,972

Lin, S

Role of KLF5 in Endoderm Specification and Differentiation of ES Cells

Juvenile Diabetes Research Foundation

02/01/05 – 01/31/07 $52,492/$103,040

Lin, X

Regulation of Wingless (Wg) Signaling and Morphogen Gradient Formation

National Institutes of Health

R01 GM 063891 04/01/02 – 03/31/07 $164,052/$840,000

Regulation of DPP Morphogen Gradient Formation in Drosophilia

March of Dimes – National

06/01/05 – 05/31/08 $73,152/$219,456

Ma, J

Mechanisms of Transcriptional Activation in Drosophilia Embryos
National Science Foundation
MCB 0323957 09/15/03 – 08/31/06 $93,960/$281,880

Activities of the Bicoid Gradient in Drosophilia Embryos
National Institutes of Health
R01 GM 072812 07/01/05 – 06/30/09 $190,000/$760,000

Nakafuku, M

Development of Novel Strategies for Regeneration of New Neurons Following Ischemic Brain Injury
Japan Science & Technology
10/01/03 – 03/31/07 $136,752/$835,893

Potter, S

Development of Metanephric Mesenchyme
National Institutes of Health
R01 DK 061916 04/01/06 – 03/31/10 $205,000/$820,000

Global Gene Expression Atlas of the Developing Kidney
National Institutes of Health
U01 DK 070251 09/30/04 – 07/31/09 $241,782/$1,256,457

Vilinsky, I

The Role of SP8 in Olfactory System Development
National Institutes of Health
F32 DC 075787 04/01/05 – 08/31/06 $20,915/$64,891

Wells, J

Promoting Endodermal and Pancreatic Differentiation of Embryonic Stem Cells
Juvenile Diabetes Research Foundation
11/01/03 – 10/31/08 $100,000/$500,000

Promoting the Differentiation of Human Embryonic Stem Cells into Endoderm and Pancreas
Juvenile Diabetes Research Foundation (Vanderbilt University subcontract)
11/01/04 – 10/31/06 $75,000/$150,000

Mechanisms of Endoderm Specification Along the A-P Axis
National Institutes of Health
R01 GM 072915 05/01/06 – 04/30/11 $190,000/$950,000

Wiginton, D

Regulation of Adenosine Deaminase in Small Intestine
National Institutes of Health
R01 DK 052343 01/01/02 – 11/30/06 $205,065/$1,050,000

Wylie, C

Maternal Control of Actin Assembly in Xenopus Embryos
National Institutes of Health
R01 HD 044764 02/01/04 - 1/31/09 $197,741/$1,012,500

Ectoderm Formation in the Early Xenopus Embryo
National Institutes of Health
R01 HD 045737 02/12/04 - 12/31/08 $253,464/$1,298,955

Training Program in Organogenesis
National Institutes of Health
T32 HD 046387 05/01/06 – 04/30/11 $193,499/$1,007,001

Yan, D

Regulation of Hh Distribution by Proteoglycan Dally-Like
American Heart Association – Ohio
07/01/05 – 06/30/07 $19,000/$38,000

Zorn, A

Molecular Basis of Endoderm Development
National Institutes of Health
R01 HD 042572 07/01/02 – 06/30/07 $180,000/$922,500

Molecular Basis of Endoderm Development - Supplement
National Institutes of Health
R01 HD 042572 07/01/04 – 06/30/07 $100,000/$300,000

Current Year Direct $4,988,758

Industry Contracts

Current Year Direct Receipts $0

TOTAL $4,988,758

Funded Collaborative Efforts

Hegde, R

Norway-lie Viruses and Their Receptors
National Institutes of Health
PI: Jiang, J 01/01/05 – 01/31/10 10%

Kuan, A

Implications of the ASK1/JNK Pathway in ARF
National Institutes of Health
PI: Devarajan, P 04/01/05 – 03/31/10 5%

Lin, X

Chrondroitin Sulfate Proteoglycans in Lung Development
National Institutes of Health
PI: Shannon, J 01/03/03-11/30/06 20%

Potter, S

SCOR in Pathology and Lung Development
National Institutes of Health
PI: Whitsett, J 09/01/01-07/31/06 4%

Cincinnati DDRDC: Center for Growth and Development
National Institutes of Health
PI: Cohen, M 04/01/03-03/31/08 10%

Wells, J

Molecular Basis of Endoderm Development – Supplement
National Institutes of Health
PI: Zorn, A 12/01/04-06/30/07 10%

Zorn, A

Ectoderm Formation in Early Xenopus Embryos
National Institutes of Health
PI: Wylie, C 02/12/04-12/31/08 5%

PUBLICATIONS

1. Barnes M, Freudenberg J, Thompson S, Aronow BJ, Pavlidis P. Experimental comparison and cross-validation of the Affymetrix and Illumina gene expression analysis platforms. Nucleic Acids Res 2005;33(18):5914-23.
2. Blanchard C, Wang N, Stringer KF, Mishra A, Fulkerson PC, Abonia JP, Jameson SC, Kirby C, Konikoff MR, Collins MH, Cohen MB, Akers R, Hogan SP, Assa'ad AH, Putnam PE, Aronow BJ, Rothenberg ME. Eotaxin-3 and a uniquely conserved gene-expression profile in eosinophilic esophagitis. J Clin Invest 2006;116(2):536-47.
3. Carvalho E, Liu C, Shivakumar P, Sabla G, Aronow BJ, Bezerra JA. Analysis of the biliary transcriptome in experimental biliary atresia. Gastroenterology 2005;129(2):713-7.
4. Jegga AG, Gupta A, Gowrisankar S, Deshmukh MA, Connolly S, Finley K, Aronow BJ. CisMols Analyzer: identification of compositionally similar cis-element clusters in ortholog conserved regions of coordinately expressed genes. Nucleic Acids Res 2005;33(Web Server issue):W408-11.
5. Kong S, Aronow BJ, Handwerger S. Gene expression microarray data analysis of decidual and placental cell differentiation. Methods Mol Med 2006;121:425-38.
6. Lowy AM, Clements WM, Bishop J, Kong L, Bonney T, Sisco K, Aronow BJ, Fenoglio-Preiser C, Groden J. Beta-Catenin/Wnt signaling regulates expression of the membrane type 3 matrix metalloproteinase in gastric cancer. Cancer Res 2006;66(9):4734-41.
7. Mallakin A, Kutcher LW, McDowell SA, Kong S, Schuster R, Lentsch AB, Aronow BJ, Leikauf GD, Waltz SE. Gene expression profiles of Mst1r-deficient mice during nickel-induced acute lung injury. Am J Respir Cell Mol Biol 2006;34(1):15-27.
8. Miller SJ, Rangwala F, Williams J, Ackerman P, Kong S, Jegga AG, Kaiser S, Aronow BJ, Frahm S, Kluwe L, Mautner V, Upadhyaya M, Muir D, Wallace M, Hagen J, Quelle DE, Watson MA, Perry A, Gutmann DH, Ratner N. Large-scale molecular comparison of human schwann cells to malignant peripheral nerve sheath tumor cell lines and tissues. Cancer Res 2006;66(5):2584-91.
9. Oka T, Maillet M, Watt AJ, Schwartz RJ, Aronow BJ, Duncan SA, Molkentin JD. Cardiac-specific deletion of Gata4 reveals its requirement for hypertrophy, compensation, and myocyte viability. Circ Res 2006;98(6):837-45.
10. Robins JC, Akeno N, Mukherjee A, Dalal RR, Aronow BJ, Koopman P, Clemens TL. Hypoxia induces chondrocyte-specific gene expression in mesenchymal cells in association with transcriptional activation of Sox9. Bone 2005;37(3):313-22.
11. Smiley AK, Klingenberg JM, Aronow BJ, Boyce ST, Kitzmiller WJ, Supp DM. Microarray analysis of gene expression in cultured skin substitutes compared with native human skin. J Invest Dermatol 2005;125(6):1286-301.
12. Xu J, Gong NL, Bodi I, Aronow BJ, Backx PH, Molkentin JD. Myocyte enhancer factors 2A and 2C induce dilated cardiomyopathy in transgenic mice. J Biol Chem 2006;281(14):9152-62.
13. Beis D, Bartman T, Jin SW, Scott IC, D'Amico LA, Ober EA, Verkade H, Frantsve J, Field HA, Wehman A, Baier H, Tallafuss A, Bally-Cuif L, Chen JN, Stainier DY, Jungblut B. Genetic and cellular analyses of zebrafish atrioventricular cushion and valve development. Development 2005;132(18):4193-204.
14. Mikhalkevich N, Becknell B, Caligiuri MA, Bates MD, Harvey R, Zheng WP. Responsiveness of naive CD4 T cells to polarizing cytokine determines the ratio of Th1 and Th2 cell differentiation. J Immunol 2006;176(3):1553-60.
15. Erwin CR, Jarboe MD, Sartor MA, Medvedovic M, Stringer KF, Warner BW, Bates MD. Developmental characteristics of adapting mouse small intestine crypt cells. Gastroenterology 2006;130(4):1324-32.
16. Lee HY, Wroblewski E, Philips GT, Stair CN, Conley K, Reedy M, Mastick GS, Brown NL. Multiple requirements for Hes 1 during early eye formation. Dev Biol 2005;284(2):464-78.
17. Degen JL, Massari JV, Talmage KE, La Jeunesse CM, Kombrinck KW, Flick MJ, Palumbo PS. Hemostatic factors support metastasis by impeding NK cell-mediated elimination of embolic tumor cells. Haematol Rep 2005;1(9):21-23.

18. Shanmukhappa K, Mourya R, Sabla GE, Degen JL, Bezerra JA. Hepatic to pancreatic switch defines a role for hemostatic factors in cellular plasticity in mice. Proc Natl Acad Sci U S A 2005;102(29):10182-7.

19. Cho J, Degen JL, Coller BS, Mosher DF. Fibrin but not adsorbed fibrinogen supports fibronectin assembly by spread platelets. Effects of the interaction of alphaIIb beta3 with the C terminus of the fibrinogen gamma-chain. J Biol Chem 2005;280(42):35490-8.

20. Kahn JA, Degen SJ, Mansour ME, Goodman E, Zeller MH, Laor T, Lanphear NE, Boat TF. Pediatric faculty members' attitudes about part-time faculty positions and policies to support part-time faculty: a study at one medical center. Acad Med 2005;80(10):931-9.

21. Devarajan P. Update on mechanisms of ischemic acute kidney injury. J Am Soc Nephrol 2006;17(6):1503-1520.

22. Eichler T, Ma Q, Kelly C, Mishra J, Parikh S, Ransom RF, Devarajan P, Smoyer WE. Single and combination toxic metal exposures induce apoptosis in cultured murine podocytes exclusively via the extrinsic caspase 8 pathway. Toxicol Sci 2006;90(2):392-9.

23. Mishra J, Ma Q, Kelly C, Mitsnefes M, Mori K, Barasch J, Devarajan P. Kidney NGAL is a novel early marker of acute injury following transplantation. Pediatr Nephrol 2006;21(6):856-63.

24. Nguyen MT, Ross GF, Dent CL, Devarajan P. Early prediction of acute renal injury using urinary proteomics. Am J Nephrol 2005;25(4):318-26.

25. Tarabishi R, Zahedi K, Mishra J, Ma Q, Kelly C, Tehrani K, Devarajan P. Induction of Zf9 in the kidney following early ischemia/reperfusion. Kidney Int 2005;68(4):1511-9.

26. Sinner D, Kirilenko P, Rankin S, Wei E, Howard L, Kofron M, Heasman J, Woodland HR, Zorn AM. Global analysis of the transcriptional network controlling Xenopus endoderm formation. Development 2006;133(10):1955-66.

27. Heasman J. Patterning the early Xenopus embryo. Development 2006;133(7):1205-17.

28. Heasman J. Maternal determinants of embryonic cell fate. Semin Cell Dev Biol 2006;17(1):93-8.

29. Liou B, Kazimierczuk A, Zhang M, Scott CR, Hegde RS, Grabowski GA. Analyses of variant acid beta-glucosidases: effects of Gaucher disease mutations. J Biol Chem 2006;281(7):4242-53.

30. Chu Z, Sun Y, Kuan CY, Grabowski GA, Qi X. Saposin C: neuronal effect and CNS delivery by liposomes. Ann N Y Acad Sci 2005;1053:237-46.

31. Wang L, Yang L, Burns K, Kuan CY, Zheng Y. Cdc42GAP regulates c-Jun N-terminal kinase (JNK)-mediated apoptosis and cell number during mammalian perinatal growth. Proc Natl Acad Sci U S A 2005;102(38):13484-9.

32. Lobov IB, Rao S, Carroll TJ, Vallance JE, Ito M, Ondr JK, Kurup S, Glass DA, Patel MS, Shu W, Morrisey EE, McMahon AP, Karsenty G, Lang RA. WNT7b mediates macrophage-induced programmed cell death in patterning of the vasculature. Nature 2005;437(7057):417-21.

33. Miller LA, Smith AN, Taketo MM, Lang RA. Optic cup and facial patterning defects in ocular ectoderm beta-catenin gain-of-function mice. BMC Dev Biol 2006;6:14.

34. Smith AN, Miller LA, Song N, Taketo MM, Lang RA. The duality of beta-catenin function: a requirement in lens morphogenesis and signaling suppression of lens fate in periocular ectoderm. Dev Biol 2005;285(2):477-89.

35. Schwab K, Hartman HA, Liang HC, Aronow BJ, Patterson LT, Potter SS. Comprehensive microarray analysis of Hoxa11/Hoxd11 mutant kidney development. Dev Biol 2006;293(2):540-54.

36. Ma J. Transcriptional activators and activation mechanisms. In: Ma J, editor. Gene expression and regulation. Berlin, New York: Springer; 2006. p. 147-158.

37. Ma J, editor. Gene expression and regulation. Berlin, New York: Springer; 2006.

38. Baird-Titus JM, Clark-Baldwin K, Dave V, Caperelli CA, Ma J, Rance M. The solution structure of the native K50 Bicoid homeodomain bound to the consensus TAATCC DNA-binding site. J Mol Biol 2006;356(5):1137-51.

39. Fu D, Ma J. Interplay between positive and negative activities that influence the role of Bicoid in transcription. Nucleic Acids Res 2005;33(13):3985-93.

40. Kriks S, Lanuza GM, Mizuguchi R, Nakafuku M, Goulding M. Gsh2 is required for the repression of Ngn1 and specification of dorsal interneuron fate in the spinal cord. Development 2005;132(13):2991-3002.

41. Patten BA, Sardi SP, Koirala S, Nakafuku M, Corfas G. Notch1 signaling regulates radial glia differentiation through multiple transcriptional mechanisms. J Neurosci 2006;26(12):3102-8.

42. Waclaw RR, Allen ZJ, 2nd, Bell SM, Erdelyi F, Szabo G, Potter SS, Campbell K. The zinc finger transcription factor Sp8 regulates the generation and diversity of olfactory bulb interneurons. Neuron 2006;49(4):503-16.

43. Brunskill EW, Ehrman LA, Williams MT, Klanke J, Hammer D, Schaefer TL, Sah R, Dorn GW, 2nd, Potter SS, Vorhees CV. Abnormal neurodevelopment, neurosignaling and behaviour in Npas3-deficient mice. Eur J Neurosci 2005;22(6):1265-76.

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60. Whitsett JA. Genetic disorders of surfactant homeostasis. Paediatr Respir Rev 2006;7 Suppl 1:S240-2.

61. Xu Y, Liu C, Clark JC, Whitsett JA. Functional genomic responses to cystic fibrosis transmembrane conductance regulator (CFTR) and CFTR(delta508) in the lung. J Biol Chem 2006;281(16):11279-91.

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64. Houston DW, Wylie C. Maternal Xenopus Zic2 negatively regulates Nodal-related gene expression during anteroposterior patterning. Development 2005;132(21):4845-55.

65. Takeuchi Y, Molyneaux K, Runyan C, Schaible K, Wylie C. The roles of FGF signaling in germ cell migration in the mouse. Development 2005;132(24):5399-409.

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MOLECULAR AND DEVELOPMENTAL BIOLOGY GRADUATE PROGRAM

The Graduate Program in Molecular and Developmental Biology is an interdepartmental program within the University of Cincinnati that offers the PhD degree. It has been based in the Department of Pediatrics for over 30 years. Drs. Christopher Wylie and Katherine Yutzey served as Directors of the Program with co-directors Drs. David Williams - marketing, Jeffrey Whitsett - finance, Janet Heasman - academics, Tim LeCras and Tim Weaver, recruitment and admissions, Jeff Robbins faculty membership, and Kenneth Campbell graduate studies.

There are 64 faculty members in the program. During the past year, there were 54 predoctoral students in the program, 8 of whom are pursuing MD/PhD degrees. Students and faculty continue to be productive as measured by their numbers of publications, presentations at meetings, honors and awards received. Grant support to faculty remains high.

During the past year, the University of Cincinnati continued to support the program by providing University Graduate Assistantships and funds appropriated from the Dean's office to support eight first year students. The remaining students are supported through a variety of sources including University Distinguished Dissertation Fellowship (1), University Distinguished Graduate Fellowships (2), Ryan Fellowships (2), American Heart Fellowships (3), OBR Functional Genomics (4), NIH training grants (9), external grants to their advisors (20), CCRF Special Purpose Funds to their advisors (6) and funds from the Cincinnati Children's Research Foundation to the Graduate Program (1).

In addition, the program gained an NIH Training Grant in “Organogenesis” during the past year, which funds the stipends of three postdoctoral and two graduate trainees.

The MDB Program provides an excellent research educational experience for students and has an excellent record in the placement of its graduates in scientific careers.

Molecular and Developmental Biology Graduate Program Students, 2005-2006

Student	Faculty Mentor	Admission
Luis Acero	David Hildeman	2002
Faisal Adhami**	Chia-Yi Kuan	2003
Zegary Allen**	Kenneth Campbell	2004
James Bridges	Timothy Weaver	2000

Kevin Burns	Chia-Yi Kuan	2002
Gang Chen	Jeffrey Whitsett	2004
Lei Chen	Yi Zheng	2001
Michelle Combs	Katherine Yutzey	2004
Senad Divanovic	Christopher Karp	2000
Katherine (Russell) Eaton	Randy Sallee	2002
Gabriel Ghiaur	David Williams	2001
Curtis Grace	Charles Vorhees	2003
Yuanyuan Gu	Rotation	2005
Marnie Hall	Timothy Weaver	1999
Chun Han	Xinhua Lin	1999
Shawna (Blaney) Hottinger	Jeffrey Robbins	2004
Elizabeth (Haque) Kramer**	Timothy Le Cras	2005
Manish Kumar	Rotation	2005
Alexander Lange	Katherine Yutzey	2000
Wei Liu	Rotation	2005
Kristen Lipscomb	Woodrow Benson	2004
Robert Brett Lloyd**	Christopher Wylie	2002
Rajat Madan	Christopher Karp	2001
Yoni Mahller**	Timothy Cripe	2002
Arturo Maldonado	Timothy Crombleholme	2004
Karunyakanth Mandapaka	Rotation	2005
Elizabeth McDonald	Tiffany Cook	2004
David Metzger	John Shannon	2002
Adnan Mir**	Christopher Wylie	2003
Monique Morrison	Rotation	2005
Sumeda Nandadasa	Rotation	2005
Wenjun Ni	Yi Zheng	2003
Kwon-Sik Park	Jeffrey Whitsett	2000
Zhenglei Pei	Kenneth Campbell	2004
Jennifer Peters	Randy Sallee	2002
Timothy Plageman	Katherine Yutzey	2000
Om Prakash	Rotation	2005
Shams Quazi	Mitchell Cohen	2004
Christopher Runyan**	Christopher Wylie	2003
Tori Schaefer	Michael Williams	2004
Kris Schwab	Steve Potter	2001
Kathy Shair	Gurjit Hershey	2004
Elaine (Howells) Shelton	Katherine Yutzey	2003
Emily Sites	Rotation	2005
Matthew Skelton	Charles Vorhees	2000
Ni Song	Richard Lang	2001
Bilge Tunca	Janet Heasman	2001
Matthew Turner**	Robert Colbert	2001
Shiv Kumar Viswanathan	Woodrow Benson	2003
Ronald Waclaw	Kenneth Campbell	1999
Lei Wang	Yi Zheng	2001
Dong Yan	Xinhua Lin	2002
Li Yang	Yi Zheng	2002
Hongyan Zhu	Marc Rothenberg	2004
*Left Program	**M.D./Ph.D. Students	

Students completing their Masters work

Luis Acero “T-cell homeostasis and the role of the pro-apoptotic Bc1-2 family member Bim,” September 26, 2005.

Shams Quazi “The role of uroguanylin in regulation of rennin angiotensin aldosterone system,” June 16, 2006.

Students completing their PhD work

James Bridges “Disease-linked mutations in surfactant progein C (SP-C) induce ER stress and increase susceptibility to viral-induced cytotoxicity,” August 31, 2005.

Senad Diavanovic “Negative regulation of TLR_4/MD-$_2$ signaling by RP_{105}/MD-$_1$,” August 4, 2005.

Marnie Hall “Surfactant protein B (SP-B) mediated membrane remodeling is essential for its function,” August 5, 2005.

Chun Han “Morphogen gradient formation controlled by heparan sulfate proteoglycans in Drosophila,” April 24, 2006.

Alexander Lange “Calcineurin/NFATc1/DSCR1 pathway function in cardiac valvuloseptal development and Down syndrome-related phenotypes,” December 8, 2005.

Brett Lloyd “Distinct and overlapping roles for lysophosphatidic acid signaling during early Xenopus laevis development,” June 5, 2006.

Kwon-sik Park "Transcriptional Regulation in the Respiratory Epithelium during Development and Repair,” December 29, 2005.

Timothy Plageman “Functional characterization of the Holt-Oram Syndrome associated transcription factor Tbx5 during embryonic heart development,” May 4, 2006.

Matthew Skelton “Effects of neonatal 3,4-methylenedioxymethamphetamine on hippocampal gene expression, spatial learning and long-term potentiation,” May 18, 2006.

Bilge Tunca “The function of XPACE4 and Vg1 during early Xenopus embryogenesis,” January 17, 2006.

Ronald Waclaw “Molecular control of neuronal diversity in lateral ganglionic eminence progenitors of the embryonic mouse telecephalon,” August 26, 2005.

Lei Wang ”Molecular mechanism of Rho GTPase-activating protein function and application,” July 12, 2005.

Student publications

During the past year, students from the Program authored or co-authored 28 articles.

68. Bridges JP, Weaver TE. (2006). "Use of transgenic mice to study lung morphogenesis and function." ILAR J. 47(1): 22-31.

69. Bridges JP, Xu Y, Na CL, Wong HR, Weaver TE (2006). "Adaptation and increased susceptibility to infection associated with constitutive expression of misfolded SP-C." J Cell Biol. 172(3): 395-407.

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71. Atabani SF, Thio CL, Divanovic S, Trompette A, Belkaid Y, Thomas DL, Karp CL (2005). "Association of CTLA4 polymorphism with regulatory T cell frequency." Eur J Immunol. 35(7): 2157-62.

72. Divanovic S, Trompette A., Atabani SF, Madan R, Golenbock DT, Visintin A, Finberg RW, Tarakhovsky A, Vogel SN, Belkaid Y, Kurt-Jones EA, Karp CL. (2005). "Inhibition of TLR-4/MD-2 signaling by RP105/MD-1." J Endotoxin Res. 11(6): 363-8.

73. Ghiaur G, Lee A, Bailey J, Cancelas J, Zheng Y, Williams DA. (2006). "Inhibition of RhoA GTPase activity enhances hematopoietic stem and progenitor cell proliferation and engraftment in vivo." Blood. *Published online ahead of print*.

74. Will E, Speidel D, Wang Z, Ghiaur G, Rimek A, Schiedlmeier B, Williams DA, Baum C, Ostertag W, Klump H. (2006). "HOXB4 inhibits cell growth in a dose-dependent manner and sensitizes cells towards extrinsic cues." Cell Cycle. 5(1): 14-22.

75. Seeley SL, Bossco EE, Kramer E, Parysek LM, Knudsen ES. (2006). "Distinct roles for RB loss on cell cycle control, cisplatin response, and immortalization in Schwann cells." Cancer Lett. *Published online ahead of print*.

76. Lange AW, Rothermel BA, Yutzey KE (2005). "Restoration of DSCR1 to disomy in the trisomy 16 mouse model of Down syndrome does not correct cardiac or craniofacial development anomalies." Dev Dyn. 233(3): 954-63.

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81. Mahller YY, Rangwala F, Ratner N, Cripe TP. (2006). "Malignant peripheral nerve sheath tumors with high and low Ras-GTP are permissive for oncolytic herpes simplex virus mutants." Pediatr Blood Cancer. 46(7): 745-54.

82. Matsuzaki Y, Xu Y, Ikegami M, Besnard V, Park KS, Hull WM, Wert SE, Whitsett JA. (2006). "Stat3 Is Required for Cytoprotection of the Respiratory Epithelium during Adenoviral Infection." J immunol 177(1): 527-537.

83. Park KS, Wells JM, Zorn AM, Wert SE, Whitsett JA. (2006). "Sox17 influences the differentiation of respiratory epithelial cells." Dev Biol. 294(1): 192-202.

84. Park KS, Wells JM, Zorn AM, Wert SE, Laubach VE, Fernandez LG, Whitsett JA. (2006). "Transdifferentiation of ciliated cells during repair of the respiratory epithelium." Am J Respir Cell Mol Biol. 34(2): 151-7.

85. Takeuchi, Y., Molyneaux, K., Runyan, C., Schaible, K., and Wylie, C. (2005) The roles of FGF signaling in germ cell migration in the mouse. Development 132: 5399-5409.

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87. Xing Z, Ryan MA, Daria D, Nattamai KJ, Van Zant G, Wang L, Zheng Y, Geiger H. (2006). "Increased hematopoietic stem cell mobilization in aged mice." Blood. *Published online ahead of print*.

88. Brunskill EW, Ehrman LA, Williams MT, Klanke J, Hammer D, Schaefer TL, Sah R, Dorn GW 2nd, Potter SS, Vorhees CV. (2005). "Abnormal neurodevelopment, neurosignaling and behaviour in Npas3-deficient mice." Eur J Neurosci. 22(6): 1265-76.

89. Schwab, K, Hartman HA, Liang HC, Aronow BJ, Patterson LT, Potter SS. (2006). “Comprehensive microarray analysis of Hoxa11/Hoxd11 Mutant Kidney Development.” Dev Biol 293(2): 540-54.

90. Cohen MA, Skelton MR, Schaefer TL, Gudelsky GA, Vorhees CV, Williams MT. (2005). "Learning and memory after neonatal exposure to 3,4-methylenedioxymethamphetamine (ecstasy) in rats: interaction with exposure in adulthood." Synapse 57(3): 148-59.

91. Smith AN, Miller LA, Song N, Taketo MM, Lang RA. (2005). "The duality of beta-catenin function: a requirement in lens morphogenesis and signaling suppression of lens fate in periocular ectoderm." Dev Biol. 285(2): 477-89.

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93. Wang L, Yang L, Burns K, Kuan CY, Zheng Y. (2005). "Cdc42GAP regulates c-Jun N-terminal kinase (JNK)-mediated apoptosis and cell number during mammalian perinatal growth." Proc Natl Acad Sci U S A. 102(38): 13484-9.

94. Wang L, Yang L, Filippi MD, Williams DA, Zheng Y. (2006). "Genetic deletion of Cdc42GAP reveals a role of Cdc42 in erythropoiesis and hematopoietic stem/progenitor cell survival, adhesion, and engraftment." Blood 107(1): 98-105.

95. Fulkerson PC, Zhu H, Williams DA, Zimmermann N, Rothenberg ME. (2005). "CXCL9 inhibits eosinophil responses by a CCR3- and Rac2-dependent mechanism." Blood 106(2): 436-43.

Student Honors

Adhami F Supported by State of Ohio Doctoral Investment Award
Allen Z Supported by NIH Training Grant (Teratology)
Burns K Supported by University Distinguished Graduate Fellowship
Combs M Supported by NIH Training Grant (Pulmonary and Cardiovascular Biology)
Divanovic S Supported by NIH Training Grant (Biologic Threat Agents)
Grace C Supported by NIH Training Grant (Teratology)
Han, Chun Graduate Student Award for Exemplary Scholarship in Life Sciences, 2006
Kramer E Supported by University Distinguished Graduate Fellowship
Lipscomb, K Supported by State of Ohio Doctoral Investment Award
Eaton K and **Combs M** Student Representatives for Committee on Graduate Education
Lloyd B Supported by University Distinguished Dissertation Fellowship
Metzger D Supported by NIH Training Grant (Pulmonary and Cardiovascular Biology)
Mir A Supported by State of Ohio Doctoral Investment Award
Plageman T Supported by NIH Training Grant (Pulmonary and Cardiovascular Biology)
Runyan C Supported by State of Ohio Doctoral Investment Award
Schaefer T Supported by NIH Training Grant (Teratology)
Schwab K Supported by NIH Training Grant (Teratology)
Shelton E Supported by American Heart Association Fellowship
Skelton M Supported by NIH Training Grant (Teratology)
Viswanathan S Supported by American Heart Association Fellowship
Wang L Supported by Ryan Fellowship
Yan D Supported by American Heart Association Fellowship and Ryan Fellowship

Richard A. Akeson Fellowship Fund

The Richard A. Akeson Fellowship and Memorial Lectureship Fund continues to support the Annual Richard Akeson Memorial Lectureship and travel by students in our graduate program to relevant courses and meetings in which they are presenting results of their research. Dr. Robert Krumlauf presented the Twelfth Annual Richard Akeson Memorial Lectureship in conjunction with the annual Molecular and Developmental Biology Graduate Student Symposium in 2005.

The following students received funding from the Richard A. Akeson Fellowship and Memorial Fund for travel in FY06:

Student	Meeting	Presentation	Date
Brett Lloyd	Society for Developmental Biology 65th Annual Meeting (Ann Arbor)	Poster	June 13-17, 2006
Elizabeth McDonald	Society for Developmental Biology 65th Annual Meeting (Ann Arbor)	Poster	June 13-17, 2006
Yoni Mahller	American Society for Gene Therapy (Houston)	Poster	May 31-June 7, 2006
Elizabeth Kramer	American Thoracic Society International Conference (San Diego)	Oral	May 19-24, 2006
David Metzger	American Thoracic Society International Conference (San Diego)	Poster	May 19-24, 2006
Kristin Lipscomb	Weinstein Cardiovascular Conference (St. Petersburg)	Poster	May 11-13, 2006
Elaine Shelton	Weinstein Cardiovascular Conference (St. Petersburg)	Poster	May 11-13, 2006
Shiv Viswanathan	Weinstein Cardiovascular Conference (St. Petersburg)	Poster	May 11-13, 2006
Chun Han	47th Annual Drosophila Research Conference (Houston)	Poser	March 28-April 3, 2006
Dong Yan	47th Annual Drosophila Research Conference (Houston)	Poser	March 28-April 3, 2006
Li Yang	American Society of Hematology	Oral	December 10-13, 2005

	47th Annual Meeting (Atlanta)		
Faisal Adhami	Society for Neuroscience 35th Annual Meeting (Washington)	Poster	November 12-16, 2005
Kevin Burns	Society for Neuroscience 35th Annual Meeting (Washington)	Poster	November 12-16, 2005
Lei Chen	Society for Neuroscience 35th Annual Meeting (Washington)	Poster	November 12-16, 2005
Curtis Grace	Society for Neuroscience 35th Annual Meeting (Washington)	Poster	November 12-16, 2005
Tori Schaefer	Society for Neuroscience 35th Annual Meeting (Washington)	Poster	November 12-16, 2005
Matthew Skelton	Society for Neuroscience 35th Annual Meeting (Washington)	Poster	November 12-16, 2005
Kristopher Schwab	American Society of Nephrology 38th Annual Renal Week (Philadelphia)	Oral	November 9-13, 2005
Wenjun Ni	Bio Ohio 2005 Meeting (Columbus)	Poster	October 31-Nov 1, 2005
Rajat Madan	Annual Meeting of the Society for Leukocyte Biology (Oxford)	Poster	September 21-26, 2005
Ni Song	Society for Developmental Biology 64th Annual Meeting (San Francisco)	Poster	July 27-Aug 1, 2005