2013 Research Annual Report

Section of Neonatology, Perinatal and Pulmonary Biology

Division Details

Division Data Summary

RESEARCH AND TRAINING DETAILS	
Number of Faculty	**54**
Number of Joint Appointment Faculty	**1**
Number of Research Fellows	**6**
Number of Research Students	**12**
Direct Annual Grant Support	**$8,157,006**
Direct Annual Industry Support	**$285,409**
Peer Reviewed Publications	**126**

CLINICAL ACTIVITIES AND TRAINING	
Number of Clinical Staff	**25**
Number of Clinical Fellows	**12**
Number of Other Students	**2**

Division Photo

Row 1: S Bhattacharyya, L Muglia, J Greenberg, S Wert, A Perl, A Nathan K Wedig
Row 2: H Kaplan, B Kamath-Rayne, T Le Cras, S Glasser, M Pavlicev, S Kallapur, T Kalin, J Whitsett, K Wikenheiser-Brokamp, K Melton
Row 3: L Nommsen-Rivers, T Weaver, E Hall, T Korfhagen, T Suzuki, Y Maeda, J Shannon, W Rice, D Sinner, A Jobe, A Morrow , V Kalinichenko, J Bridges
Row 4: L Ward, B Trapnell

Significant Accomplishments

March of Dimes Prematurity Research Center Ohio Collaboration

The March of Dimes Prematurity Research Center Ohio Collaborative comprises a new transdisciplinary group of investigators aimed at discovering the fundamental causes of preterm birth. It brings together investigators from 20 different disciplines to work together for healthier newborns. We believe this collaborative will become a world leader in research to discover the unknown causes of preterm birth and develop precise ways to prevent it. The March of Dimes has pledged $10 million over five years to fund this initiative. The project brings together Ohio's leading health research institutions – Cincinnati Children's Hospital Medical Center (the coordinating site; Dr. Louis Muglia, MD, PhD; Drs. James Greenberg, Jeffrey Whitsett, and SK Dey, Co-Directors) and the University of Cincinnati; the Ohio State University and Nationwide Children's Hospital; and Case Western Reserve University and University Hospitals / MetroHealth.

National Institutes of Health

New awards were obtained from the NHLBI, including the T32 training grant entitled "Pulmonary and Cardiac Development and Disease" Drs. Jeffrey Whitsett, Bruce Trapnell and Frank McCormack (Co-PIs), a new K12 "Omics of Lung Diseases" Dr. Jeffrey Whitsett (PI), a collaborative project with the Divisions of Biomedical Informatics and the College of Engineering at the University of Cincinnati College of Medicine; and the NHLBI

R01 “Transcriptional Programming of Asthma Related Pathology in Respiratory Epithelia” Dr. Jeffrey Whitsett (PI).

Collaborative for Infant Mortality Reduction

The Perinatal Institute facilitated the creation of a regional public/private/governmental collaborative to reduce the infant mortality rate. The collaborative brings together leaders from Hamilton County, the City of Cincinnati, the University of Cincinnati Colleges of Medicine and Nursing, Cincinnati Children’s, all regional hospital maternity providers, and local nonprofit agencies as a collective impact collaborative. The collaborative has a five year, $1.25 million funding commitment based upon an agreement between the Board of Hamilton County Commissioners, UC Health and Drake Center, LLC. Collaborative operations are based at CCHMC. Drs. James M. Greenberg and Elizabeth Kelly provide operational leadership of the Collaborative, along with a newly appointed Director, Mr. Ryan Adcock. County Commissioner Todd Portune and City of Cincinnati Councilmember Wendell Young Co-Chair the Advisory Board created through a memorandum of understanding signed by all parties on June 13, 2013.

Research Highlights

Suhas Kallapur and Alan Jobe

Suhas Kallapur and Alan Jobe in the Perinatal Institute, together with Claire Chougnet in the Division of Cellular and Molecular Immunology, have developed a novel non-human primate model for investigating the effects of intra-uterine inflammation on the developing fetus. Administration of the cytokine interleukin-1 beta to pregnant rhesus macaques resulted in chorioamnionitis and induction of robust lung inflammation in the fetus and preterm newborn. Their findings suggest that boosting regulatory T cells and/or controlling IL-17 may provide a means to prevent or limit the complications for preterm infants exposed to infection or inflammation prior to birth.

Louis Muglia

Louis Muglia and colleagues have identified genes in families with recurrent preterm birth as contributors to the risk of preterm birth in the general population. Whole-exome sequencing was performed on two mother-daughter pairs, and genes harboring rare variants were tested for association with preterm birth in the general population. The complement and coagulation cascade was one of the most enriched pathways in our two mother-daughter pairs, and was confirmed by analysis in six other mothers’ exomes and association analysis in over 500 nuclear families. These results demonstrated the importance of the complement and coagulation cascades in the pathophysiology of preterm birth, and suggest potential screening and intervention approaches to prevent prematurity that target this pathway.

Scott Wexelblatt, Laura Ward, Eric Hall, and James Greenberg

Scott Wexelblatt, Laura Ward, Eric Hall and James Greenberg in the Perinatal Institute, evaluated the value of a universal testing strategy in a community hospital setting to improve diagnostic accuracy and treatment for neonatal abstinence syndrome. They found that universal testing is feasible, cost effective, and does not generate an excessive burden upon social service providers or local government agencies. This strategy identifies newborns, exposed to in-utero narcotics, not identified through standard risk-based screening approaches, who would otherwise be at high risk to develop untreated neonatal abstinence syndrome.

Significant Publications

Balli, D., Ustiyan, V., Zhang, Y., Wang, I.-C., Masino, A.J., Ren, X., **Whitsett, J.A.**, **Kalinichenko, V.V.**, **Kalin, T.V.**, **Foxm1 transcription factor is required for lung fibrosis and epithelial-to-mesenchynmal transition.** *EMBO* 2013. J 32, 231-244.

This work was part of Dr. Balli's Ph.D. graduate thesis in the Molecular and Developmental Biology program. The work demonstrates a critical role of the Foxm1 transcription factor in the pathogenesis of pulmonary fibrosis. Epithelial-to-mesenchymal transition (EMT) was demonstrated during radiation-induced pulmonary fibrosis and the molecular targets of Foxm1 were identified. Inhibition of this pathway provides a novel, potential, therapeutic target for pulmonary fibrosis, a enigmatic disease that remains without effective therapy.

Kamath-Rayne, B.D., DeFranco, E.A., Chung, E., Chen, A., **Subtypes of preterm birth and the risk of postneonatal death**. *J Pediatr* 2013. 162, 28-34.

This work demonstrates increased morbidity and mortality in preterm birth, showing risks even at older gestational ages when many clinicians consider that the infants are mature enough to adapt normally after birth. The work emphasizes the risk of "late preterm" birth, and the need to minimize the "iatrogenic" prematurity. This paper examined the differences in post-neonatal death risk among the three most common clinical subtypes of preterm birth: preterm premature rupture of membranes (PROM), indicated preterm birth, and spontaneous preterm labor. The authors found that preterm PROM was associated with significantly higher risk of post-neonatal death compared with spontaneous preterm labor in infants born at 27 weeks gestation or later. Similarly, indicated preterm birth was associated with a significantly higher risk of post-neonatal death than spontaneous preterm labor in infants born at 25 weeks gestation or later. Thus, different etiologies for preterm birth carry different risks of post-neonatal mortality and suggest preventative measures may be different amongst these groups.

Kenny, A.P., A., R.S., Allbee, A.W., Prewitt, A.R., Zhang, Z., Tabangin, M.E., Shifley, E.T., Louza, M.P., Zorn, A.M., **Sizzled-tolloid interactions maintain foregut progenitors by regulating fibronectin-dependent BMP signaling.** *Dev Cell 2012.* 23, 292-304.

This work utilizes Xenopus (the frog) to identify the genes and processes involved in the induction of foregut from which critical organs, including thyroid, liver, lung, stomach, and pancreas are formed. The work identifies a new role for Sizzled and Tolloid in the formation of foregut organs relevant to common birth defects affecting newborn infants.

Korfhagen, T.R., Kitzmiller, J., Chen, G., Sridharan, A., Haitchi, H.M., Hegde, R.S., Divanovic, S., Karp, C.L., **Whitsett, J.A.**, **SAM-pointed domain ETS factor mediates epithelial cell-intrinsic innate immune signaling during airway mucous metaplasia**. *Proc Natl Acad Sci. 2012* 109, 16630-16635.

This work identifies a critical role of the transcription factor SPDEF in mucous metaplasia and host defense in the airway. SPDEF is induced in asthma, cystic fibrosis, and chronic obstructive lung diseases where it is required for mucus hyperproduction. SPDEF was shown to inhibit cellular responses to infection, providing a molecular mechanism by which patients with these disorders are susceptible to viral and bacterial infections. The work provides a potential therapeutic target for treatment of these diseases.

Ren, X., Shah, T.A., Ustiyan, V., Zhang, Y., Shinn, J., Chen, G., **Whitsett, J.A.**, **Kalin, T.V.**, **Kalinichenko, V.V.**, **FOXM1 Promotes Allergen-Induced Goblet Cell Metaplasia and Pulmonary Inflammation**. *Mol Cell Biol* 2013 33, 371-386.

This work demonstrates a novel role for Foxm1 in the pathogenesis of inflammation and mucus hyperproduction related to asthma. Foxm1 was shown to be induced during allergy and to enhance goblet cell differentiation by regulating a number of genes controlling mucus production. Inhibition of the Foxm1 pathway provides a potential therapeutic strategy for asthma and other common lung diseases complicated by mucus hyperproduction and

infection.

Division Publications

1. Albert RK, Jobe A. **Gas exchange in the respiratory distress syndromes**. *Compr Physiol*. 2012; 2:1585-617.
2. Althabe F, Belizán JM, Mazzoni A, Berrueta M, Hemingway-Foday J, Koso-Thomas M, McClure E, Chomba E, Garces A, Goudar S, Kodkany B, Saleem S, Pasha O, Patel A, Esamai F, Carlo WA, Krebs NF, Derman RJ, Goldenberg RL, Hibberd P, Liechty EA, Wright LL, Bergel EF, Jobe AH, Buekens P. **Antenatal corticosteroids trial in preterm births to increase neonatal survival in developing countries: study protocol**. *Reprod Health*. 2012; 9:22.
3. Ambalavanan N, Carlo WA, McDonald SA, Das A, Schendel DE, Thorsen P, Hougaard DM, Skogstrand K, Higgins RD, Cytokine, Generic Database Subcommittees of the Eunice Kennedy Shriver National Institute of Child Health Human Development Neonatal Research N. **Cytokines and posthemorrhagic ventricular dilation in premature infants**. *Am J Perinatol*. 2012; 29:731-40.
4. Ballard O, Morrow AL. **Human milk composition: nutrients and bioactive factors**. *Pediatr Clin North Am*. 2013; 60:49-74.
5. Balli D, Ren X, Chou FS, Cross E, Zhang Y, Kalinichenko VV, Kalin TV. **Foxm1 transcription factor is required for macrophage migration during lung inflammation and tumor formation**. *Oncogene*. 2012; 31:3875-88.
6. Balli D, Ustiyan V, Zhang Y, Wang IC, Masino AJ, Ren X, Whitsett JA, Kalinichenko VV, Kalin TV. **Foxm1 transcription factor is required for lung fibrosis and epithelial-to-mesenchymal transition**. *EMBO J*. 2013; 32:231-44.
7. Bancalari EH, Jobe AH. **Reply to Been et al**. *J Pediatr*. 2013; 162:657-8.
8. Bancalari EH, Jobe AH. **Reply to Hjalmarson and Sandberg**. *J Pediatr*. 2013; 162:656-7.
9. Bancalari EH, Jobe AH. **The respiratory course of extremely preterm infants: a dilemma for diagnosis and terminology**. *J Pediatr*. 2012; 161:585-8.
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11. Belizán JM, McClure EM, Goudar SS, Pasha O, Esamai F, Patel A, Chomba E, Garces A, Wright LL, Koso-Thomas M, Moore J, Althabe F, Kodkany BS, Sami N, Manasyan A, Derman RJ, Liechty EA, Hibberd P, Carlo WA, Hambidge KM, Buekens P, Jobe AH, Goldenberg RL. **Neonatal death in low- to middle-income countries: a global network study**. *Am J Perinatol*. 2012; 29:649-56.
12. Bell SM, Zhang L, Xu Y, Besnard V, Wert SE, Shroyer N, Whitsett JA. **Kruppel-like factor 5 controls villus formation and initiation of cytodifferentiation in the embryonic intestinal epithelium**. *Dev Biol*. 2013; 375:128-39.
13. Bhattacharya S, Go D, Krenitsky DL, Huyck HL, Solleti SK, Lunger VA, Metlay L, Srisuma S, Wert SE, Mariani TJ, Pryhuber GS. **Genome-wide transcriptional profiling reveals connective tissue mast cell accumulation in bronchopulmonary dysplasia**. *Am J Respir Crit Care Med*. 2012; 186:349-58.
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initiation of ventilation in preterm fetal sheep. *Pediatr Res*. 2012; 72:593-9.
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during airway mucous metaplasia. *Proc Natl Acad Sci U S A*. 2012; 109:16630-5.
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Faculty, Staff, and Trainees

Faculty Members

Jeffrey A. Whitsett, MD, Professor

Leadership Co-Director, Perinatal Institute; Chief, Section of Neonatology, Perinatal and Pulmonary Biology

Research Interests Lung Development; Surfactant

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Research Interests Neonatal Infections and Blood Transfusions

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Research Interests Inflammation Immunology, Signal Transduction

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Research Interests Implementation Science, International Health

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Research Interests Hypoxia Inducible Factors and Downstream Target Genes in Chronic Lung Disease

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Leadership Director, High Risk Infant Follow-Up Program

Research Interests Neonatal Abstinence Syndrome and High Risk Infant Follow-Up

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Research Interests Bioethics

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Research Interests Neonatal resuscitation, quality improvement

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Research Interests Gene Regulation in the Lung

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Leadership Co-Director, Perinatal Institute; Director, Division of Neonatology

Research Interests Preterm Birth, Community Health, Pulmonary Vascular Development

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Research Interests Infant Follow-up

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Research Interests Biomedical Informatics

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Research Interests Simulation and motility

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Research Interests Skin Development & Environmental Interactions

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Research Interests Transcriptional Regulation of Carcinogenesis and Radiation-Induced Lung Fibrosis

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Research Interests Neonatal Outcomes and Public Health; Fetal Lung Maturity; Global Health

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Research Interests Health Services Research; Improvement Science

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Research Interests Molecular Development of the Foregut Organs

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Research Interests Lung cancer, Asthma

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Research Interests Developmental Biology, Neural Crest Biology

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Research Interests Neonatal neuroimaging, infant follow up

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Research Interests Maternal/Infant nutrition and vitamin D in preterm infants

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Research Interests Molecular Epidemiology of Human Milk, Epidemiologic Methods, Prevention of Infectious Disease, Predictive Biomarkers of Neonatal Outcomes

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Research Interests Genetics of Birth Timing; Neurobiology of the Stress Response

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Leadership Medical Director, Univ. Hosp. NICU & Newborn Nursery; Medical Director, The Christ Hospital Nursery; Chair, Department of Pediatrics, the University Hospital

Research Interests C-PAP; Business Case for Quality Improvements; Preterm Infant Skin

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Research Interests Immunobiology

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Research Interests Human Lactation and Breastfeeding

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Research Interests Alveolar Regneration and Bronchiolar Injury/Repair

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Research Interests Outcomes and Etiology of Gastroschisis, Epidemiology of Late-Preterm Birth

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Research Interests Infant Follow-up

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Research Interests Rare Lung Diseases; GM-CSF, Gene Therapy

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Research Interests Maternal and Infant Nutrition to improve perinatal health

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Leadership Co-Medical Director, Mercy Anderson Hospital Nurseries

Research Interests Use of Human Milk in the NICU

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Leadership Associate Director, Division of Pulmonary Biology; Co-Director, Molecular and Developmental Biology Program

Research Interests Pathogenesis of Interstitial Lung Diseases

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Leadership Director, High Risk Clinic @ GSH; Medical Director, Mercy Hospital Fairfield

Research Interests Infant Follow-up, Neonatal Abstinence Syndrome

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Research Interests Lung Development, Molecular Morphology of the Lung, Ultrastructural Analysis of the Lung, Genetic Surfactant Disorders

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Research Interests Late Preterm Infant, Quality Improvement

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Research Interests Perinatal Ethics, Theological Studies

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Leadership Director, Bioinformatics Microarray Core, Division of Pulmonary Biology

Research Interests Bioinformatics, Systems Biology, Transcriptional Network

Joint Appointment Faculty Members

Kathryn A. Wikenheiser-Brokamp, MD, PhD, Associate Professor (Pathology)
Research Interests Pulmonary Pathology, Pediatric and Adult Lung Diseases

Clinical Staff Members

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Stephen Bird, MD
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Michelle French, MD
Angelique Gloster, MD
Girish Gowda, MD
Pamela Holmes, MD
Jill Klein, MD
Katie Loudermilk, MD
Alisa McGill, MD
John Morrison, MD
Miriam Peri, MD
Ajay Ponkshe, MD
Danna Premer, MD
John Robinson, MD
Deborah Rufner, MD
Kelley Shultz, MD
Jean Steichen, MD
Nicole Tocco, MD
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Kira Zimmerly, MD

Trainees

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Jennifer Goetz, MD, PL6, University of Louisville School of Medicine, Louisville, KY
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Jamie Havrilak, BS, Susquehanna University, Selinsgrove, PA
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Candice Lengyel, MD, PL4, University of Michigan, Ann Arbor, MI
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Priya Rajavelu, PhD, University of Madras, Chennai, Tamil Nadu, India
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Hongping Xia, MS, PhD, Fudan University, Shanghai, China

Division Collaboration

Reproductive Sciences; Developmental Biology; Pulmonary Medicine; Biomedical Informatics; Safety - The James A. Anderson Center; Infectious Disease; Human Genetics; Biostatistics and Epidemiology; Cellular and Molecular Immunology; General Pediatrics; Gastroenterology; Radiology; Fetal Care Center; Rheumatology/CAGE; Cancer and Blood Disease Institute » SK Dey, Takiko Daikoku, Christopher Wylie, James Wells, Noah Schroyer, Aaron Zorn, Richard Lang, William Hardie, Imre Solti, Steven Muething, Margaret Hostetter, Ge Zhang, and Maurizio Macaluso

> The causes of preterm birth, complications of prematurity and birth defects span the spectrum of divisional interests and approaches at Cincinnati Children’s. To make substantial progress in reducing infant mortality from these causes requires collaborative efforts across many programs. The Perinatal Institute at Cincinnati Children’s provides an organizing center, and driver, for efforts to improve outcomes for infants born prematurely, prevent prematurity, and reduce the incidence of birth defects to synergistically reduce infant mortality in our region. As such, our Institute’s faculty have close collaborations with investigators in multiple divisions within Cincinnati Children’s, the University of Cincinnati, the other leading research institutions in Ohio, and globally in Japan, Germany, Mexico, Argentina, Finland, China, and Australia. For the past three years, the Division has offered a day-long educational seminar series addressing new approaches to patient care and clinical research for visiting faculty neonatologists from China Taiwan, and Southeast Asia.

Grants, Contracts, and Industry Agreements

Grant and Contract Awards		Annual Direct

BRIDGES, J

The Role of HIF2a in Airway Smooth Muscle Remodeling
American Lung Association
07/01/11-06/30/13 $40,000

CHEN, G

The Role of Foxa3 in the Regulation of Mucus Metaplasia and Innate Immunity in the Lung
American Lung Association
07/01/12-02/28/13 $21,323

GLASSER, S

Role of Surfactant Protein-C and Innate Lung Defense
National Institutes of Health
R01 HL 050046 08/01/09-07/31/13 $247,500

HILLMAN, N

Lung Injury with Resuscitation in the Preterm
National Institutes of Health
K08 HL 097085 08/01/09-02/28/13 $63,589

JOBE, A / CHOUGNET, C (MPI)

Biomarkers of Immunologic Function and Preterm Respiratory Outcomes
National Institutes of Health
U01 HL 101800 05/01/10-04/30/14 $364,354

Jobe, A	Core	$171,178
Chougnet, C	Project	$80,237
Chougent, C	Project	$31,216
Kingma, P	Project	$20,228
Hardie, W	Project	$55,739
Morrow, A	Project	$14,011

Data Coordinating Center for the Prematurity and Respiratory Outcomes Program
National Institutes of Health(University of Pennsylvania)
U01 HL 101794 09/20/10-04/30/15 $28,079

Jobe, A	Capitation	$80,542

Initiation and Progression of Preterm Lung Injury with Ventilation

National Institutes of Health

R01 DH 072842	08/01/12-05/31/17	$202,274

JOBE, A / KALLAPUR, S

Late Preterm Birth, Ureaplasma Species and Childhood Lung Disease

National Institutes of Health

R01 HL 097064	09/24/09-07/31/13	$347,743

KALIN, T

Role of Foxm1 in Lung Cancer Microenvironment

National Institutes of Health

R01 CA 142724	07/01/10-06/30/15	$201,275

KALINICHENKO, V

Foxf1 Transcription Factor in Development of Pulmonary Capillaries

National Institutes of Health

R01 HL 084151	05/01/11-04/30/15	$238,000

KALLAPUR, S

Mechanisms of Fetal Inflammatory Response Syndrome Induced by Chorioamnionitis

National Institutes of Health

R01 HD 057869	02/03/09-01/31/14	$237,900

KAMATH, B

Novel Amniotic Fluid Biomarkers to Predict Fetal Lung Maturity

National Institutes of Health(University of Cincinnati)

K12 HD 051953	07/01/11-06/30/13	$100,000

KENNY, A

Secreted BMP Antagonists in Foregut Organ Development

National Institutes of Health

K08 HL 105661	12/08/10-11/30/15	$121,300

KINGMA, P

Surfactant Protein D in Pulmonary and Systemic Host Defense

National Institutes of Health

K08 HL 089505	07/01/08-06/30/13	$121,600

LECRAS, T / HERSHEY, G

Impact of Early Life Diesel Exposure on Immune Patterning and Lung Structure/Function

National Institutes of Health

R01 HL 097135	09/01/09-07/31/14	$332,402
LeCras		$131,186
Hershey		$201,548

MERHAR, S

Functional MRI to Predict Visual, Auditory, and Motor Outcomes in Infants with Brain Injury

Thrasher Research Fund

	08/01/12-07/31/14	$9,450

Protein Supplementation in Infants with Brain Injury

The Gerber Foundation

	06/01/12-05/31/15	$6,664

MORROW, A

Novel Genetic and Salivary Glycan Biomarkers for Risk of NEC in ELBW Infants

National Institutes of Health

R01 HD 059140	01/15/09-12/31/13	$537,158

The Role of Human Milk in Infant Nutrition and Health

National Institutes of Health

P01 HD 013021		08/01/09-07/31/14	$957,390
Morrow	Core A, C & Project 1, 3	$504,629	
Morrow	Core B	$177,233	
Jiang	Project 2	$115,600	
Jiang	Core D	$85,577	

MUGLIA, L

Genetic Analysis of Human Preterm Birth

March of Dimes National

21-FY11-583	01/01/12-02/28/14	$177,044

Amygdala Glucocorticoid Receptor Function in Stress

National Institutes of Health

R01 MH 079010	01/01/12-12/31/13	$236,027

PERL, A

FGF and PDGF Regulate Myofibroblast Differentiation in Alveolar Regeneration

National Institutes of Health

R01 HL 104003	07/01/10-06/30/14	$247,500

SCHIBLER,K

NICHD Cooperative Multicenter Neonatal Research Network

National Institutes of Health

U10 HD 027853	04/01/11-03/31/16	$186,953
Schibler, K	Capitation	$84,882

SHANNON, J

LPCAT1 is Essential for Perinatal Lung Function and Survival

National Institutes of Health

R01 HL 098319	07/01/10-06/30/14	$313,566

SINNER, D

Molecular Mechanisms Underlying Lung Growth and Hypoplasia: Role of Wntless

March of Dimes

	02/01/12-01/31/14	$68,182

Molecular Mechanisms Underlying Upper Airway Patterning and Tracheomalacia

National Institutes of Health

K01 HL 115447	08/01/12-07/31/17	$104,071

TRAPNELL, B

Role of GM-CSF in Myeloid Cell Function and Innate Immunity

National Institutes of Health

R01 HL 085453	04/01/11-03/31/16	$238,000

Cincinnati Center for Clinical and Translational Sciences and Training (Pilot/Collaborative Studies)

National Institutes of Health(University of Cincinnati)

UL1 TR 000077	04/03/09-03/31/14	$23,181

VALENTINE, C

DHA Attenuates Inflammatory Responses through Altering Rage Signaling

National Institutes of Health(The Research Institute at Nationwise Hospital)

R01 AT 006880	09/30/11-06/30/15	$17,787

WEAVER, T

Role of SFTPC in Pathogenesis of Interstitial Lung Disease

National Institutes of Health

R01 HL 086492	12/01/08-11/30/13	$292,260

The Role of Autophagy in the Pathogenesis of interstitial Lung Disease

National Institutes of Health

R01 HL 103923	08/01/11-06/30/15	$333,612

WEXELBLATT, S

Neonatal Abstinence Syndrome (NAS) Project
University Hospitals Case Medical Center(Nationwide Children's Hospital)

G1213070561	07/01/12-06/30/13	$35,970

Wexelblatt, S	Capitation	$1,402

WHITSETT, J

Airway Progenitor Cell Proliferation and Differentiation During Lung Repair
National Institutes of Health

U01 HL 110964	01/01/12-12/31/16	$520,096

Pulmonary and Cardiovascular Development Training Grant
National Institutes of Health

T32 HL 007752	07/01/09-06/30/14	$258,283

Transcriptional Control of Submucosal Gland Formation and Function
National Institutes of Health

R01 HL 108907	07/01/11-04/30/15	$246,546

Transcriptional Programming of Asthma Related Pathology in Respiratory Epithelia
National Institutes of Health

R01 HL 095580	4/15/13-03/31/18	$328,882

Cystic Fibrosis Foundation Research Development Program (Core 1)
Cystic Fibrosis Foundation

	03/01/12-06/30/15	$50,000

XU, Y

Role of SREBP Network in Surfactant Lipid Homeostasis and Lung Maturation
National Institutes of Health

R01 HL 105433	07/01/11-06/30/15	$301,045

Current Year Direct **$8,157,006**

Industry Contracts

KALLAPUR, S

Merck & Company, Inc	$19,250

KINGMA, P

Airway Therapeutics	$13,000

MORROW, A

Glycosyn LLC	$8,983

Mead Johnson & Company		$116,502
VALENTINE, C		
Mead Johnson & Company		$81,045
Nestle Infant Nutrition, USA		$46,629
	Current Year Direct Receipts	**$285,409**
	Total	**$8,442,415**