

## Division Details

### Division Data Summary

#### Research and Training Details

|                                     |             |
|-------------------------------------|-------------|
| Number of Faculty                   | 11          |
| Number of Joint Appointment Faculty | 8           |
| Number of Research Fellows          | 8           |
| Number of Research Students         | 19          |
| Number of Support Personnel         | 90          |
| Direct Annual Grant Support         | \$4,617,527 |
| Peer Reviewed Publications          | 27          |

### Division Photo



Row 1: J Meller, J Dexheimer, A Jegga  
Row 2: J Ma, J Hutton, K Marsolo, M Kouril, E Hall  
Row 3: M Wagner, A Spooner

## Significant Accomplishments

### Data Warehousing

The data warehousing group, headed by Keith Marsolo, PhD, has continued its work to add more data from the enterprise Epic electronic health record (EHR) into the de-identified i2b2 warehouse and continues to provide investigators with more than 100 research datasets each year. The i2b2 group is participating in a national demonstration project to create a federated network of data warehouses from seven academic health centers (including the five Harvard teaching hospitals) using the Shared Health Research Information Network (SHRINE). The aims of this project are to prove the feasibility of creating such data sharing networks and to examine co-morbidities in patients with diabetes mellitus II or autism spectrum disorder. The warehouse group also has been active in supporting the institution's efforts to create a research biorepository. They successfully deployed an application that allows biorepository staff to scan a clinical sample and determine whether it can be reused for research purposes. They are working to interface biosample processing instruments with the institutional biorepository and to interface the biorepository with the i2b2 data warehouse, allowing investigators to include sample criteria in their cohort search. Work in the coming year will enable investigators to send a request for samples to the biorepository using the i2b2 interface.

### Software Development

The software development group continues to provide investigators with web-based tools to support research studies, learning networks and other collaborations. The group has developed the data infrastructure used by

the three multi-center quality improvement networks supported by the Ohio Best Evidence for Advancing Child health in Ohio Now (BEACON). These groups are focused in improving outcomes in childhood obesity, children's mental health and in reducing preterm births in Ohio. They are developing patient-facing registries for patients with eosinophilic esophagitis or a bone marrow transplant and research registries for the intestinal rehab team. The software development group is developing the data collection and reporting infrastructure for the nationwide Solutions for Patient Safety collaborative and is working with investigators in pharmacology and kidney transplant to create a "drug dashboard" that will pull together adherence data (from electronic pill bottles), clinical data and pharmacogenomics information and provide care recommendations, allowing investigators to perform pre-clinic planning.

## Division Highlights

### Hutton/Marsolo

In collaboration with ImproveCareNow, a 37-center network of gastroenterologists that provide care to children with inflammatory bowel disease, the Division of Biomedical Informatics (BMI) is finishing the second year of a 3-year, \$12 million grant from AHRQ that aims to create distributed registry that can be populated with data directly from electronic health records (EHR) to support comparative effectiveness and quality improvement research. The registry is built on the open-source SHRINE and i2b2 platforms and will allow users to upload data that was captured in the EHR, removing the need for staff to perform double data entry. Developers in BMI are creating quality and population reports on top of the registry that will allow users to generate them on demand. Also included will be pre-visit planning reports and "status reports" that will be sent directly to patients to provide them with a view of their registry record and questions they may ask their clinician during their next visit. The team is also working to make the registry geographically distributed, making it possible for sites to keep their registry data at their own institution, but still share aggregate numbers across institutions for reporting purposes. The registry data is also being used to compare the effectiveness of alternative treatment strategies for pediatric inflammatory disease patients, with a special focus on the timing of biologic agents. The aim is to improve outcomes of treatment of children with this disease.

### Solti

Dr. Imre Solti is building a clinical Natural Language Processing (NLP) infrastructure at CCHMC. The NLP pipeline is based on the Mayo-Harvard developed and i2b2-integrated open source clinical Text Analysis and Knowledge Extraction System (cTAKES). The ultimate goal of this project is to facilitate the extraction of clinically relevant information from narrative notes of the electronic health record for patient safety, health care quality improvement, and clinical research purposes. The early version of the NLP pipeline is already deployed in the most recent NIH funded eMERGE (PI Harley) and clinical trial eligibility screening automation (PI Solti) and internal Place Outcome Award grants.

## Significant Publications

**Pestian, J. P.**, Matykiewicz, P.; et al. "**Sentiment Analysis of Suicide Notes: A Shared Task.**" *Biomed Inform Insights* 5(Suppl 1): 3-16. 2012.

This paper reports on a shared task involving the assignment of emotions to suicide notes. Two features distinguished this task from previous shared tasks in the biomedical domain. One is that it resulted in the corpus of fully anonymized clinical text and annotated suicide notes. This resource is permanently available and will

(we hope) facilitate future research. The other key feature of the task is that it required categorization with respect to a large set of labels. The number of participants was larger than in any previous biomedical challenge task. We describe the data production process and the evaluation measures, and give a preliminary analysis of the results. Many systems performed at levels approaching the inter-coder agreement, suggesting that human-like performance on this task is within the reach of currently available technologies.

Ren J, **Jegga AG**, Zhang M, Deng J, Liu J, Gordon CB, **Aronow BJ**, **Lu LJ**, Zhang B, **Ma J**. **A Drosophila model of the neurodegenerative disease SCA17 reveals a role of RBP-J/Su(H) in modulating the pathological outcome.** *Hum Mol Genet.* 20(17):3424-36. Sep 1 2011.

Dr. Jun Ma's group developed a fly model of a human neurodegenerative disorder called spinocerebellar ataxia type 17 (SCA17). This is an autosomal dominant disorder caused by pathological expansion of a stretch of glutamine amino acids in a protein called TBP. When a pathological human TBP protein is introduced into flies, it led to defects characteristic of SCA17 pathology, including progressive retinal degeneration, late-onset locomotor impairment and early mortality. In collaboration with other teams within the Division of Bioinformatics, including those of Drs. Bruce Aronow, Jason Lu and Anil Jegga, they used a gene chip analysis to identify changes in gene expression accompanying pathological progression in flies. They found that a protein called Suppressor of Hairless, which has an important role in many normal developmental processes, also has a role in SCA17 pathogenesis. Their studies were reported in the journal Human Molecular Genetics in 2011.

## Division Publications

1. Brunskill EW, Sequeira-Lopez ML, Pentz ES, Lin E, Yu J, Aronow BJ, Potter SS, Gomez RA. **Genes that confer the identity of the renin cell.** *J Am Soc Nephrol.* 2011; 22:2213-25.
2. Cheung D, Miles C, Kreitman M, Ma J. **Scaling of the Bicoid morphogen gradient by a volume-dependent production rate.** *Development.* 2011; 138:2741-9.
3. Davies JA, Little MH, Aronow B, Armstrong J, Brennan J, Lloyd-Macgilp S, Armit C, Harding S, Piu X, Roochun Y, Haggarty B, Houghton D, Davidson D, Baldock R. **Access and Use of the GUDMAP Database of Genitourinary Development.** *Methods Mol Biol.* 2012; 886:185-201.
4. Deng J, Tan L, Lin X, Lu Y, Lu LJ. **Exploring the optimal strategy to predict essential genes in microbes.** *Biomolecules.* 2012; 2:1-22.
5. Feng X, Krishnan K, Richie DL, Aimanianda V, Hartl L, Grahl N, Powers-Fletcher MV, Zhang M, Fuller KK, Nierman WC, Lu LJ, Latge JP, Woollett L, Newman SL, Cramer RA, Jr., Rhodes JC, Askew DS. **HacA-independent functions of the ER stress sensor IreA synergize with the canonical UPR to influence virulence traits in Aspergillus fumigatus.** *PLoS Pathog.* 2011; 7:e1002330.
6. Halgrim SR, Xia F, Solti I, Cadag E, Uzuner O. **A cascade of classifiers for extracting medication information from discharge summaries.** *J Biomed Semantics.* 2011; 2 Suppl 3:S2.
7. He F, Ren J, Wang W, Ma J. **Evaluating the Drosophila Bicoid morphogen gradient system through dissecting the noise in transcriptional bursts.** *Bioinformatics.* 2012; 28:970-5.
8. Huang SH, Mo D, Meller J, Wagner M. **Identifying a small set of marker genes using minimum expected cost of misclassification.** *Artif Intell Med.* 2012; 55:51-9.
9. Johnson KB, Lee CK, Spooner SA, Davison CL, Helmke JS, Weinberg ST. **Automated dose-rounding recommendations for pediatric medications.** *Pediatrics.* 2011; 128:e422-8.
10. Liu J, He F, Ma J. **Morphogen gradient formation and action: insights from studying Bicoid protein degradation.** *Fly (Austin).* 2011; 5:242-6.
11. Lu TX, Hartner J, Lim EJ, Fabry V, Mingler MK, Cole ET, Orkin SH, Aronow BJ, Rothenberg ME. **MicroRNA-21 limits in vivo immune response-mediated activation of the IL-12/IFN-gamma pathway, Th1 polarization,**

- and the severity of delayed-type hypersensitivity.** *J Immunol.* 2011; 187:3362-73.
12. Lu TX, Sherrill JD, Wen T, Plassard AJ, Besse JA, Abonia JP, Franciosi JP, Putnam PE, Eby M, Martin LJ, Aronow BJ, Rothenberg ME. **MicroRNA signature in patients with eosinophilic esophagitis, reversibility with glucocorticoids, and assessment as disease biomarkers.** *J Allergy Clin Immunol.* 2012; 129:1064-75 e9.
  13. Lynch JM, Maillet M, Vanhoutte D, Schloemer A, Sargent MA, Blair NS, Lynch KA, Okada T, Aronow BJ, Osinska H, Prywes R, Lorenz JN, Mori K, Lawler J, Robbins J, Molkentin JD. **A Thrombospondin-Dependent Pathway for a Protective ER Stress Response.** *Cell.* 2012; 149:1257-68.
  14. Ma J. **Transcriptional activators and activation mechanisms.** *Protein Cell.* 2011; 2:879-88.
  15. Ma X, Gao F, Rusie A, Hemingway J, Ostmann AB, Sroga JM, Jegga AG, Das SK. **Decidual cell polyploidization necessitates mitochondrial activity.** *PLoS One.* 2011; 6:e26774.
  16. Pai AL, Rausch J, Tackett A, Marsolo K, Drotar D, Goebel J. **System for integrated adherence monitoring: real-time non-adherence risk assessment in pediatric kidney transplantation.** *Pediatr Transplant.* 2012; 16:329-34.
  17. Pestian JP, Matykiewicz P, Linn-Gust M, South B, Uzuner O, Wiebe J, Cohen KB, Hurdle J, Brew C. **Sentiment Analysis of Suicide Notes: A Shared Task.** *Biomed Inform Insights.* 2012; 5:3-16.
  18. Phatak M, Adamczak R, Cao B, Wagner M, Meller J. **Solvent and lipid accessibility prediction as a basis for model quality assessment in soluble and membrane proteins.** *Curr Protein Pept Sci.* 2011; 12:563-73.
  19. Powell AE, Wang Y, Li Y, Poulin EJ, Means AL, Washington MK, Higginbotham JN, Juchheim A, Prasad N, Levy SE, Guo Y, Shyr Y, Aronow BJ, Haigis KM, Franklin JL, Coffey RJ. **The pan-ErbB negative regulator Lrig1 is an intestinal stem cell marker that functions as a tumor suppressor.** *Cell.* 2012; 149:146-58.
  20. Ren J, Jegga AG, Zhang M, Deng J, Liu J, Gordon CB, Aronow BJ, Lu LJ, Zhang B, Ma J. **A Drosophila model of the neurodegenerative disease SCA17 reveals a role of RBP-J/Su(H) in modulating the pathological outcome.** *Hum Mol Genet.* 2011; 20:3424-36.
  21. Sardana D, Zhu C, Zhang M, Gudivada RC, Yang L, Jegga AG. **Drug repositioning for orphan diseases.** *Brief Bioinform.* 2011; 12:346-56.
  22. Spellman Kennebeck S, Timm N, Farrell MK, Spooner SA. **Impact of electronic health record implementation on patient flow metrics in a pediatric emergency department.** *J Am Med Inform Assoc.* 2012; 19:443-7.
  23. Srinivasan R, Ozhegov E, van den Berg YW, Aronow BJ, Franco RS, Palascak MB, Fallon JT, Ruf W, Versteeg HH, Bogdanov VY. **Splice variants of tissue factor promote monocyte-endothelial interactions by triggering the expression of cell adhesion molecules via integrin-mediated signaling.** *J Thromb Haemost.* 2011; 9:2087-96.
  24. Thomas HE, Mercer CA, Carnevalli LS, Park J, Andersen JB, Conner EA, Tanaka K, Matsutani T, Iwanami A, Aronow BJ, Manway L, Maira SM, Thorgeirsson SS, Mischel PS, Thomas G, Kozma SC. **mTOR Inhibitors Synergize on Regression, Reversal of Gene Expression, and Autophagy in Hepatocellular Carcinoma.** *Sci Transl Med.* 2012; 4:139ra84.
  25. van Berlo JH, Elrod JW, Aronow BJ, Pu WT, Molkentin JD. **Serine 105 phosphorylation of transcription factor GATA4 is necessary for stress-induced cardiac hypertrophy in vivo.** *Proc Natl Acad Sci U S A.* 2011; 108:12331-6.
  26. Wu C, Xia F, Deleger L, Solti I. **Statistical machine translation for biomedical text: are we there yet?.** *AMIA Annu Symp Proc.* 2011; 2011:1290-9.
  27. Xie G, Zhang H, Du G, Huang Q, Liang X, Ma J, Jiao R. **Uif, a large transmembrane protein with EGF-like repeats, can antagonize Notch signaling in Drosophila.** *PLoS One.* 2012; 7:e36362.

# Faculty, Staff, and Trainees

## Faculty Members

**John Hutton, MD**, Professor

**Leadership** Director, Division Chief

**Bruce Aronow, PhD**, Professor

**Leadership** Co-Director, Computational Medicine Center

**Research Interests** Gene Expression Analysis, Gene Regulation, Clinical Genomics, Functional Genomics of Development and Disease

**Anil Jegga, MS, DVM**, Assistant Professor

**Research Interests** Gene Regulatory Networks, Biomedical Ontologies, Integrative Genomics

**Michal Kouril, PhD**, Assistant Professor

**Leadership** Director, Research IT

**Research Interests** Computational Support, High-performance computing, Parallel Programming, High-end Data Storage

**Long Jason Lu, PhD**, Assistant Professor

**Research Interests** Bioinformatics, Machine Learning, Integrative Genomics, Biological Networks, Computational Modeling, Software Development

**Jun Ma, PhD**, Professor

**Research Interests** Development, Transcription, Morphogen Gradient, Embryo, Robustness, Quantitative Studies

**Keith Marsolo, PhD**, Assistant Professor

**Leadership** Director, Software Development and Data Warehouse

**Research Interests** i2b2, Data Integration, Data Warehousing and Data Management

**John Pestian, PhD, MBA**, Associate Professor

**Leadership** Director, Computational Medicine Center

**Research Interests** Natural Language Processing, Clinical Decision Support, Suicide Research, Pathology Research, Psychiatric Research

**S. Andrew Spooner, MD, FAAP**, Associate Professor

**Leadership** Chief Medical Information Officer

**Research Interests** Decision Support, Pharmacy Information Systems

**Imre Solti, MD, PhD, MA**, Assistant Professor

**Research Interests** Computational Linguistics

**Michael Wagner, PhD**, Associate Professor

**Leadership** Faculty Liaison

**Research Interests** Machine Learning, Proteomics, Genome-wide Association, Parallel Computing, Computational Infrastructure, Bioinformatics

## Joint Appointment Faculty Members

**Judith Dexheimer, PhD**, Assistant Professor (Emergency Medicine)

**Research Interests** Clinical Decision Support, Informatics

**Eric Hall, PhD**, Assistant Professor (Neonatology & Pulmonary Biology)

**Research Interests** Clinical Informatics, Knowledge Discovery Tools, Data Mining and Warehousing

**Eric Kirkendall, MD**, Assistant Professor (Hospital Medicine)

**Research Interests** General Pediatrics, Clinical Informatics

**Kakajan Komurov, PhD**, Assistant Professor (Experimental Hematology & Cancer Biology)

**Research Interests** Bioinformatics, Cancer Biology

**Mario Medvedovic, PhD**, Associate Professor (UC Environmental Health)

**Research Interests** Biostatistics

**Jarek Meller, PhD**, Associate Professor (UC Environmental Health)

**Research Interests** Protein Modeling

**Matthew Weirauch, PhD**, Assistant Professor (Rheumatology)

**Research Interests** Transcriptional Regulation, Bioinformatics, Functional Genomics

**Yan Xu, PhD**, Associate Professor (Pulmonary Medicine)

**Research Interests** Bioinformatics; Systems Biology

### Trainees

- **Jacek Biesiada, PhD**, 2000, University of Silesia, Poland
- **Louise Deleger, PhD**, 2009, Pierre et Marie Curie University, Paris, France
- **Feng He, PhD**, 2009, Fudan University, Shanghai, China
- **Rebekah Karns, PhD**, 2012, University of Cincinnati, Cincinnati, OH, USA
- **Qi Li, PhD**, 2011, University of Pittsburgh, Pittsburgh, PA, USA
- **Junbo Liu, PhD**, 2000, Fudan University, Shanghai, China
- **Mayur Sarangdhar, PhD**, 2011, University of Hull, Hull, UK
- **Haijun Zhai, PhD**, 2010, University of Science and Technology of China, Hefei, Anhui Province, China

## Division Collaboration

### **Adherence Psychology** » Dr. Ahna Pai

Dr. Marsolo and his team started the development of a registry that will capture patient reported outcomes and medication adherence data from patients who have received a bone marrow transplant.

### **Allergy & Immunology/Gastroenterology, Hepatology & Nutrition;** » Dr. Pablo Abonia, Dr. James Franciosi, and Dr. Marc Rothenberg

Dr. Marsolo and team have finalized the development of a multi-center registry focused on Eosinophilic Esophagitis. This registry takes advantage of functionality developed for Liver Transplant and extends it to allow patients to complete registry forms and patient reported outcome/quality of life surveys from home, saving time in the initial clinic visit. This study is also piloting a new consent management system developed by BMI that includes functionality for patients to electronically consent through a web browser.

### **Clinical Pharmacology** » Dr. Sander Vinks

Dr. Marsolo and his team are collaborating with Dr. Vinks on the development of a "Drug Dashboard" that pulls electronic health record data, medication adherence data from electronic pill bottles (MEMS caps) and pharmacokinetic and pharmacogenetic information into a single interface along with care recommendations that can be used by clinicians when conducting pre-visit planning.

### **Developmental Biology** » Dr. James Lessard and Dr. Steven Potter

Dr. Aronow's group collaborates with Drs. Potter and Lessard along with an international consortium on the use of genomics analyses to gain insight into the normal or abnormal development of the kidney and lower urinary tract.

**Gastroenterology, Hepatology & Nutrition » Dr. Jorge Bezerra**

Dr. Jegga collaborates with Bezerra Lab to understand the molecular basis of biliary atresia, a rare condition in newborn infants which if unrecognized could lead to liver failure. He provides bioinformatic support that includes data analysis, data-mining and hypothesis generation using systems biology-based approaches.

**Gastroenterology, Hepatology & Nutrition » Dr. Jorge Bezerra**

In his collaboration with Dr. Bezerra, Dr. Aronow serves as the Bioinformatics Core Director on the Digestive Health Center: Bench to Bedside Research in Pediatric Digestive Disease grant project. His role is to aid or supervise in strategic planning, experimental designs, data analysis, and to generate a data portal for the genomics data and sample characterizations.

**Gastroenterology, Hepatology & Nutrition » Dr. John Bucuvalas and Dr. Kathleen Campbell**

Dr. Marsolo and his team have finalized the development of a research registry for Liver Transplant based on the i2b2 informatics framework. This registry allows investigators to enter relevant data into the Epic electronic health record, after which it is transferred into i2b2, where it can be augmented, through the use of data entry screens, with research-specific variables not collected in the clinic. This registry is serving as a pilot template for other research registries throughout CCHMC.

**Heart Institute » Dr. Stephanie Ware**

Dr. Marsolo and his team developed an application to automate the processing and analysis of samples used in genetic and viral testing by the Heart Institute Diagnostic Lab (HIDL). This application will significantly streamline the lab's workflow and more easily allow queries to be run on previous test results, enabling both quality assurance and future research.

**Hematology/Oncology » Dr. John Perentesis**

Dr. Pestian and his team are collaborating with clinicians and scientists to develop methods to identify the clinical needs of end-of-life patients. Drs. Pestian and Solti are collaborating with Dr. Perentesis in detecting Adverse Drug Reactions in the electronic health record notes of patients enrolled in clinical studies. Drs. Solti and Perentesis are collaborating to automate the clinical trial eligibility screening of cancer patients along the aims of Dr. Solti's NIH Grant.

**Hospital Medicine; Information Services » Dr. Samir Shah and Dr. Jeffrey Simmons**

Dr. Kirkendall is working alongside several members of the Hospital Medicine leadership and Information Services to add microbiologic data to the Pediatric Health Information Systems research database (PHIS), renamed PHIS+. This enhanced database will marry clinical and administrative data, allowing more accurate comparative effectiveness research.

**Human Genetics » Dr. Daniel Prows**

As a leading expert in the design and analysis of DNA microarrays, including Incyte and Affymetrix technologies, Dr. Aronow's collaboration efforts with Dr. Prows include microarray design, oversight in all aspects of microarray analysis, including data sorting and data analysis. Additionally, Dr. Aronow oversees the in-depth *in silico* analyses and generates appropriate figures, tables and the related text for manuscript preparation.

**Human Genetics » Dr. William Nichols**

In his collaborations with Dr. Nichols, Dr. Aronow provides complete interaction and direction for the interpretation of resulting data, including statistically and biologically significant gene expression patterns



associated with hypoxia and improved right ventricular function in chronic lung disease in the context of all available information that pertains to understanding of normal, disease and developmental pathway and the gene network based processes. He is also fully involved in the prediction and analysis of strain variant gene polymorphisms that appear to play modifier roles.

Dr. Marsolo and his team are collaborating with Dr. Nichols to create a national biological sample and data repository for Pulmonary Arterial Hypertension. This work involves the creation of a biobank to house the biospecimens, and the creation of a PAH-specific i2b2 warehouse that will allow external users to search for cohorts based on clinical or sample-related criteria and request the corresponding samples for the biobank.

#### **Immunobiology » Dr. H. Lee Grimes**

Dr. Jegga collaborates with Grimes lab in the continuing pursuits to characterize cancer proteins and understand the underlying regulatory mechanisms of oncogenic transformation of hematopoietic progenitor cells.

#### **James M. Anderson Center of Excellence » Yiscah Bracha**

Dr. Marsolo and the i2b2 team have worked extensively with colleagues in the Anderson Center in their efforts to operationalize hundreds of outcome measures as part of the Epic Outpatient implementation and to implement a system intended to document and operationalize all of the legacy outcome measures, the Performance Measurement and Reporting System (PMRS).

#### **James M. Anderson Center of Excellence; Emergency Medicine » Dr. Evaline Alessandrini**

Dr. Marsolo and his team are working to extract data from the electronic health record, transform and upload it into the expanded version of the Pediatric Emergency Care Applied Research Network (PECARN) registry. This expanded registry will eventually include all elements of the health record, including lab results and clinical notes.

#### **James M. Anderson Center of Excellence » Dr. Carole Lannon**

Dr. Marsolo and his team deployed the first iteration of an infrastructure for data collection, reporting and analysis that is to be used by quality improvement networks that are part of the State of Ohio's BEACON initiative (Best Evidence for Advancing Childhealth in Ohio Now), including the Ohio Perinatal Quality Collaborative, where Dr. Lannon is co-PI.

#### **James M. Anderson Center of Excellence » Dr. Eric Kirkendall, Dr. Stephen Muething, and Dr. Uma Kotagal**

Dr. Solti is collaborating with Drs. Kirkendall, Muething, and Kotagal in developing and EHR-based patient safety and predictive modeling research agenda.

#### **James M. Anderson Center of Excellence » Dr. Stephen Muething**

Dr. Marsolo and his team are leading the development of a data collection and reporting infrastructure that will be used by the next iteration of the Solutions for Patient Safety collaborative, a network that is focused on reducing serious safety events.

#### **James M. Anderson Center of Excellence » Dr. KJ Phelan**

Dr. Marsolo and his team, in collaboration with Dr. Phelan, developed a new system for data collection and study management that will be used in the Cincinnati Home Injury Prevention (CHIP) study.

#### **James M. Anderson Center of Health Systems Excellence; Nephrology (Center for Acute Care Nephrology) »**

Dr. Stuart Goldstein, Dr. Stephen Muething, and Dr. Uma Kotagal

Dr. Kirkendall is working alongside leaders from the James M. Anderson Center for Health Systems Excellence and the Center for Acute Care Nephrology to develop an automated system for predicting and detecting nephrotoxic medication-associated acute kidney injury in the inpatient environment.



**James M. Anderson Center of Excellence; Emergency Medicine; Emergency Medicine » Dr. Evaline**

Alessandrini, Dr. Holly Brodzinski, and Dr. Judith Dexheimer

Dr. Solti collaborates with the members of the Anderson Center and Emergency Medicine in the appendicitis risk stratification project. The divisions are developing an automated system to determine the risk of appendicitis in abdominal pain patients.

**James M. Anderson Center of Excellence; Gastroenterology, Hepatology & Nutrition » Dr. Peter Margolis and Dr. Shehzad Saeed**

Dr. Marsolo and his team deployed an i2b2-based registry to support the quality improvement and research efforts of the ImproveCareNow Network, which focuses on improving the outcomes of children with Inflammatory Bowel Disease (IBD). This registry allows users to enter data directly into i2b2, and will allow users to collect data directly into the medical record, after which it can be transferred to the registry by file upload. Also included as part of this registry will be population management and monthly quality reports. These reports can be generated on demand and allow investigators to see data on patients from their own site as well as aggregate numbers from the collaborative as a whole.

**James M. Anderson Center of Excellence; Pulmonary Medicine » Dr. Peter Margolis and Dr. Michael Seid**

Dr. Marsolo is collaborating with Drs. Margolis and Seid on the design of the technical infrastructure needed to support their growing C3N (Clinical Collaborative Care Network). This infrastructure will include personal health records, the ability to visualize and display patient-specific health and outcomes data, the ability to conduct N of 1 trials, and social networking and data sharing functionality.

**Neonatology and Pulmonary Biology » Dr. Kristin Melton**

Dr. Solti and Dr. Kirkendall are working with Dr. Kristin Melton to automate adverse event detection in the Neonatal Intensive Care Unit by using electronic health record data and natural language processing techniques to find harm that is not usually identified by other means. The project is funded by an NIH R21 (PI Solti) grant.

**Neonatology and Pulmonary Biology » Dr. Laurel Bookman**

Dr. Solti and his team are collaborating with Dr. Bookman (Neonatology) and Dr. Jareen Meinen-Derr (Epidemiology and Biostatistics) to develop a classification algorithm for Tongue-Based Airway Obstruction risk.

**Neonatology and Pulmonary Biology » Dr. Yan Xu**

Dr. Lu and his team work closely with Dr. Xu in developing statistical models to analyze gene expression during the development of mouse models with the goal of understanding the role of SREBP network in surfactant lipid homeostasis and lung maturation.

**Neurology » Dr. Tracy Glauser**

Dr. Pestian and his team are collaborating with Dr. Glauser for the ongoing development of CHRISTINE, a clinical decision support system for identifying optimal drug therapy for patients with epilepsy and ADHD.

**Neurology » Dr. Anna Weber Byars**

Dr. Pestian and his team are collaborating with Dr. Byars on innovations in neuropsychology research.

**Neurology; Neurology; Neuroimaging Research Consortium » Dr. Tracy Glauser, Dr. Shannon Standridge, and Dr. Scott Holland**

Dr. Pestian and his team are collaborating with Drs. Glauser, Holland and Standridge to develop the advanced informatics system for The Comprehensive Epilepsy Center.

**Neurology; Neuroimaging Research » Dr. Jennifer VanNest and Dr. Scott Holland**

In his role of informatics lead on an NICHD contract ("Cincinnati MRI Imaging Neuronal Development", Scott Holland, PI), Dr. Wagner collaborates with the PI and Dr. Jennifer VanNest (Div. of Neurology) to build and

disseminate a database of fMRI images of normally developing brains.

#### **Oncology » Dr. John Perentesis**

Dr. Solti collaborates with Dr. Perentesis on the clinical trial announcement grant. Their collaboration efforts focus on extracting eligibility criteria for oncology patients.

#### **Reproductive Sciences » Sudhansu Dey**

Dr. Jegga collaborates with Dey Lab in their mission to understand the signaling networks that influence uterine biology in the context of embryo-uterine interactions during pregnancy and delivery. He is specifically focusing on the miRNA-based regulation of labor.

#### **Rheumatology; Pathology » Dr. Michael Barnes and Dr. Susan Thompson**

Dr. Marsolo and his team are providing the informatics support for the institutional biorepository software and for the Cincinnati Children's Hospital biobank, which provides research sample handling and processing capabilities for investigators. Included in this effort is a migration from a legacy biorepository application, and support for the Better Outcomes for Children (BOfC) project, which aims to the consent patients so that their residual clinical samples can be reused for research. Dr. Marsolo and his team created an application that allows biobank staff to scan a clinical sample and determine whether it can be retained for research purposes.

#### **Rheumatology » Dr. Hermine Brunner and Dr. Susan Thompson**

Dr. Marsolo and his team are part of a joint effort with colleagues at the Children's Hospital Boston to develop a distributed, virtual registry for pediatric rheumatic diseases. Dr. Marsolo and his team have focused on developing functionality to display quality reports and the visualization of patient outcomes. They are also responsible for creating a method to upload electronic health record data into the registry and to create a biobank that can then be linked to the registry.

#### **Rheumatology » Esi Morgan DeWitt**

Dr. Marsolo and his team deployed a population management report for a multi-center quality improvement collaborative focused on juvenile idiopathic arthritis. Future work involves the creation of monthly quality reports and pre-visit planning reports.

#### **Rheumatology » Dr. David Glass, Dr. John Harley, and Dr. Susan Thompson**

As Director of the Informatics Core of the NIAMS-sponsored Cincinnati Core Center for Rheumatic Diseases (Susan Thompson, PI), Dr. Michael Wagner collaborates closely with Rheumatology Investigators Dr. David Glass, Dr. Susan Thompson, and Dr. John Harley on genome-wide analyses of variants contributing to juvenile rheumatic disease.

#### **Rheumatology » Dr. John Harley**

Drs. Hutton, Marsolo, Solti, and Wagner are providing informatics support for CCHMC's participation in the electronic MEDical Records and GENomics (eMERGE) Network. Cincinnati Children's Hospital Medical Center in collaboration with colleagues from Boston Children's and are looking at correlations between EMR-derived phenotypes and genotypes.

## Grants, Contracts, and Industry Agreements

Grant and Contract Awards

Annual Direct

### **ARONOW, B**

#### **Defining Preadipocyte Signature Genes**

National Institutes of Health(University of Toledo Health Science Campus)

R21 DK 083643

09/20/10-08/31/12

\$13,335

**Generating Molecular Markers that Subjectively Label Urothelial Sub-Populations**

National Institutes of Health(Columbia University Medical Center)  
U01 DK 094530 09/30/11-09/29/16 \$8,000

**Molecular Signatures of Cancer Metastasis**

Department of Defense  
W81XWH-10-1-0325 05/01/10-04/30/13 \$98,037

**DTRA: Exploiting Advances in Biotechnology for Force Protection**

United States Air Force(UES, Inc.)  
FA8650-10-C-6152 07/01/2011-06/30/2012 \$36,525

**Nextgen Dissection of the Genomic Basis of Kidney Development**

National Institutes of Health  
RC4 DK 090891 09/30/10-09/29/13 \$\$395,357

**Digestive Health Center - Bioinformatics Core**

National Institute of Health  
P30 DK 078392 06/10/12-05/31/17 \$100,272

**Cincinnati Center for Clinical/Translational Sciences & Training**

National Institutes of Health(University of Cincinnati)  
UL1 RR 0256314 04/03/09-03/31/14 \$23,181

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**HE, F****Dissecting the Roles of dCBP in the Drosophila Bicoid Morphogen Gradient System During Development**

American Heart Association  
07/01/10-06/30/12 \$45,000

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**HUTTON, J.****Building Modular Pediatric Chronic Disease Registries for QI and CE Research**

Agency for Healthcare Research and Quality  
1R01HS020023 09/30/2010-09/29/2013 \$2,982,970

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**LU, L****The Molecular Basis for High Density Lipoprotein Heterogeneity**

National Institutes of Health(University of Cincinnati)  
R21 HL 104136 08/15/10-06/30/12 \$40,763

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**MA,JUN****Probing the Robustness of a Developmental System**

National Science Foundation  
IOS-0843424 05/15/09-04/30/13 \$227,372

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**MARSOLO, K****Harvard Clinical and Translational Science Center: Distributed Health Outcome Monitoring and Evaluation Using i2b2**

National Institutes of Health(Harvard Medical School)  
UL1 RR 025758 09/01/11-04/30/12 \$13,333

**MEDTAPP-BEACON Data Infrastructure Project**

Ohio Department of Jobs and Family Services(Ohio State University)  
09/23/11-06/30/12 \$349,923

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**PESTIAN, J****Multi-Institutional Pediatric Epilepsy Decision Support**

National Library of Medicine  
R01 LM 011124 07/22/11-06/30/14 \$256,736

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**SOLTI, I****Increasing Clinical Trial Enrollment: A Semi-Automated Patient Centered Approach**

National Library of Medicine

|   |                            |                    |
|---|----------------------------|--------------------|
| R00 LM 010227   | 10/02/10-09/21/13          | \$156,235          |
| <b>WAGNER, M</b>  |                            |                    |
| <b>Cincinnati Rheumatic Disease Core Center</b>                             |                            |                    |
| National Institutes of Health   |                            |                    |
| P30 AR 047363   | 08/25/11-06/30/16          | \$58,332           |
| <b>Gene Expression in Pediatric Arthritis</b>                               |                            |                    |
| National Institutes of Health   |                            |                    |
| P01 AR 048929   | 09/01/11 -08/31/16         | \$115,116          |
| <b>Cincinnati Center for Clinical/Translational Sciences &amp; Training</b> |                            |                    |
| National Institutes of Health(University of Cincinnati)                     |                            |                    |
| UL1 RR 026314   | 04/03/09-03/31/14          | \$92,397           |
|   | <b>Current Year Direct</b> | <b>\$4,617,527</b> |

Funded Collaborative Efforts

**ARONOW, B.**

**Progenitor Cell Biology Consortium Administrative Coordinating Center**

University of Maryland  
 Malik, P. 09/01/2010-04/30/2013 4%

**Immunobiology of IFRD1, a Gene Modifying CF Lung Disease**

National Institutes of Health  
 Karp, C. 08/01/2009-07/31/2013 4%

**Global Gene Expression Atlas of Craniofacial Development**

National Institutes of Health  
 Potter, S. 09/21/2009-04/30/2014 4%

**Genetic Analysis of Hyperoxia Induced Acute Lung Injury**

National Institutes of Health  
 Prows, D. 05/01/2009-04/30/2013 4%

**Genetic Analysis of Murine Chronic Hypoxia-Induced Pulmonary Hypertension**

National Institutes of Health  
 Nichols, W. 04/01/2010-03/31/2014 4%

**Cincinnati Center for Clinical & Translational Sciences & Training**

University of Cincinnati  
 Heubi, J. 04/03/2009-03/31/2014 8%

**Digestive Health Center**

National Institutes of Health  
 Bezerra, J. 08/01/2007-05/31/2012 7%

**Epithelial Genes in Allergic Inflammation**

National Institutes of Health  
 Hershey, G. 09/15/2006-08/31/2011 3%

**Risk Stratification and Identification of Immunogenetic and Microbial Markers of Crohn's Disease**

Emory University  
 Denson, L. 07/01/2009-06/30/2012 5%

**Glomerulosclerosis in Human FSGS and Animal Models**

National Institutes of Health  
 Potter, S. 09/14/2009-09/13/2012 4%

**Nextgen Dissection of the Genomic Basis of Kidney Development**

National Institutes of Health  
 Potter, S. 09/30/2010-09/29/2013 12%

**HUTTON, J.**

**Cincinnati Center for Clinical & Translational Sciences & Training**

University of Cincinnati  
 Heubi, J. 04/03/2009-03/31/2014 13%

**JEGGA, A.**

**Cincinnati Cell Characterization Core**  
University of Maryland

Malik, P. 09/01/2010-04/30/2013 5%

**Digestive Health Center**

National Institutes of Health

Bezerra, J. 08/01/2007-05/31/2012 20%

**Biological Basis of Phenotypes & Clinical Outcomes in Biliary Atresia**

National Institutes of Health

Bezerra, J. 09/01/2009-08/31/2013 5%

**Molecular Signatures of Cancer Metastasis**

Department of Defense

Aronow, B. 05/01/2010-04/30/2013 10%

**DTRA: Exploiting Advances in Biotechnology for Force Protection**

United States Air Force/UES

Aronow, B. 07/01/2009-06/30/2014 25%

**Nextgen Dissection of the Genomic Basis of Kidney Development**

National Institutes of Health

Potter, S. 09/30/2010-09/29/2013 10%

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**KOURIL, M.**

**Cincinnati Center for Clinical & Translational Sciences & Training**

University of Cincinnati

Heubi, J. 04/30/2009-03/31/2014 20%

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**LU, LJ**

**Role of SREBP Network in Surfactant Lipid Homeostasis and Lung Maturation**

National Institutes of Health

Xu, Y. 07/01/2011-06/30/2015 10%

**Probing the Robustness of a Developmental System**

National Science Foundation

Ma, J. 05/15/2009-04/30/2013 5%

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**MARSOLO, K.**

**Open Source Science: Transforming Chronic Illness Care**

National Institutes of Health

Margolis, P. 09/30/2009-08/31/2014 15%

**Leveraging EPIC for Quality Improvement in Rheumatology**

CCHMC

Morgan-DeWitt, E. 07/01/2010-06/30/2012 5%

**Comparative Effectiveness of Pediatric Eosinophilic Esophagitis**

National Institutes of Health

Rothenberg, M. 09/30/2009-08/31/2012 25%

**Cincinnati Center for Clinical & Translational Sciences & Training**

University of Cincinnati

Heubi, J. 04/03/2009-03/31/2014 15%

**Building Modular Pediatric Chronic Disease Registries for QI & CE Research**

Agency for Healthcare Research and Quality

Hutton, J. 09/30/2010-09/29/2013 25%

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**PESTIAN, J.**

**Impact of Initial Therapy and Response on Long Term Outcomes**

National Institutes of Health

Glauser, T. 09/01/2010-08/31/2014 30%

**Improved Diagnosis and Treatment of Pediatric Mood Disorders**

The Oxley Foundation

Kowatch, R. 03/01/2009-02/28/2012 20%

**WAGNER, M.**

**Pediatric Functional Neuroimaging Research Network**

National Institutes of Health

Holland, S. 09/28/2009-09/27/2014

20%

**Genetic Linkage in Lupus**

National Institutes of Health

Harley, J. 09/07/2010-02/28/2015

12%

**Cincinnati Rheumatic Disease Core Center**

National Institutes of Health

Thompson, S. 09/01/2006-06/30/2011

10%

**Cincinnati Center for Clinical & Translational Sciences & Training**

University of Cincinnati

Heubi, J. 04/03/2009-03/31/2014

20%

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**Total \$4,617,527**