2013 Research Annual Report

Endocrinology

Cincinnati Children's

Division Details

Division Data Summary

RESEARCH AND TRAINING DETAILS	
Number of Faculty	16
Number of Joint Appointment Faculty	3
Number of Support Personnel	16
Direct Annual Grant Support	$1,715,264
Direct Annual Industry Support	$84,599
Peer Reviewed Publications	34

CLINICAL ACTIVITIES AND TRAINING	
Number of Clinical Staff	50
Number of Clinical Fellows	10
Inpatient Encounters	3,846
Outpatient Encounters	13,494

Division Photo

Row 1: A Sanghavi Shah, S Rose, N Crimmins, D Elder
Row 2: S Corathers, I Gutmark-Little, L Dolan, S Lawson
Row 3: S Handwerger, P Backeljauw

Significant Accomplishments

Long-Term (IGF-1) Growth Factor Replacement Therapy is Safe and Effective

A study led by Philippe Backeljauw, MD, published in July 2013 in *Hormone Research in Paediatrics*, reports that long-term therapy with recombinant human insulin-like growth factor-1 (IGF-1) appears to be effective and safe as a replacement therapy in children with short stature due to severe IGF-1 deficiency (IGFD), a disorder caused by resistance to the effects of growth hormone. Previous reports from this long-term study led to U.S. and European approvals for this treatment. This study reports final height data after tracking participants as they grew to adulthood. For some children with severe short stature, IGF-1 therapy is the only effective option because they are resistant to exogenous growth hormone therapy. Participants who received IGF-1 doses of 120 µg/kg twice daily experienced significant increases in height velocity. Although most did not reach normal heights, many achieved an adult height significantly greater than expected in the absence of therapy. Because the spectrum of growth hormone insensitivity is wider than the patients reported upon in this study, further investigation into the therapeutic applicability of IGF-1 in patients with varying degrees of IGFD is warranted.

IGF-1 Therapy Improves Height for Boys with Duchenne Muscular Dystrophy

Backeljauw and Meilan Rutter, MD, FRACP, Endocrinology, also worked with James Collins, MD, PhD, and Brenda Wong, MD, MBBS, Neuromuscular Center, to study recombinant human insulin-like growth factor-1 (IGF-1) as a potential treatment in Duchenne muscular dystrophy (DMD) patients. This progressive, incurable muscle disorder affects one in 3,500 boys. DMD is treated with glucocorticoids (GC), which improve motor

function, but cause significant endocrine adverse effects such as growth failure and insulin resistance. IGF-1 is used to treat children with certain growth disorders. It also has been shown to improve muscle strength and survival in genetically engineered mice with DMD. The investigators hypothesized that IGF-1 therapy would improve statural growth and preserve muscle function in GC-treated DMD boys. They found that six months of a once-daily injection of IGF-1 therapy doubled height velocity and significantly increased height standard deviation scores compared to controls. Markers of insulin resistance also improved. However, there was no difference in motor functional outcomes.

Functional Hormone Production in Human Intestine Generated from Pluripotent Stem Cells

Jonathan Howell, MD, PhD, works with James Wells, PhD, to understand the nature of the human intestinal incretin hormones, GIP and GLP-1, which play an important role in regulating glucose homeostasis and are often dysfunctional in diabetes. Wells' lab has established a method for differentiating human pluripotent stem cells into intestinal organoid tissue, which serves as a novel model for studying intestinal development and function. Howell has shown that the proximal-distal regional identity of intestinal organoids is regulated by bone morphogenetic protein (BMP) signaling, such that BMP inhibition promotes a proximal (small intestinal) fate, whereas activation results in a distal (large intestinal) fate. Importantly, there is segregation of intestinal incretin hormone producing cells within regionalized organoids, which mimics normal human intestine *in vivo*. These findings have allowed for the study human intestinal incretin pathology in the context of diseases such as diabetes and cystic fibrosis. Howell and colleagues are investigating the dynamics of hormone cell emergence in developing human intestinal tissue, the transcriptional network that controls individual hormone-specific cell fate, and the ability of experimental incretin-secreting drugs to elicit hormone responses. Results of this work will potentially impact new therapeutic regimens for patients with intestinal diseases and disorders of glucose homeostasis.

Division Publications

1. Bang P, Ahmed SF, Argente J, Backeljauw P, Bettendorf M, Bona G, Coutant R, Rosenfeld RG, Walenkamp MJ, Savage MO. **Identification and management of poor response to growth-promoting therapy in children with short stature**. *Clin Endocrinol (Oxf)*. 2012; 77:169-81.
2. Beebe DW, Simon S, Summer S, Hemmer S, Strotman D, Dolan LM. **Dietary intake following experimentally restricted sleep in adolescents**. *Sleep*. 2013; 36:827-34.
3. Black MH, Lawrence JM, Pihoker C, Dolan LM, Anderson A, Rodriguez B, Marcovina SM, Mayer-Davis EJ, Imperatore G, Dabelea D, Group SfDiYS. **HLA-associated phenotypes in youth with autoimmune diabetes**. *Pediatr Diabetes*. 2013; 14:121-8.
4. Cook DM, Rose SR. **A review of guidelines for use of growth hormone in pediatric and transition patients**. *Pituitary*. 2012; 15:301-10.
5. Couch SC, Crandell JL, Shah AS, Dolan LM, Merchant AT, Liese AD, Lawrence JM, Pihoker C, Mayer-Davis EJ. **Fructose intake and cardiovascular risk factors in youth with type 1 diabetes: SEARCH for diabetes in youth study**. *Diabetes Res Clin Pract*. 2013; 100:265-71.
6. Dabelea D, Mayer-Davis EJ, Andrews JS, Dolan LM, Pihoker C, Hamman RF, Greenbaum C, Marcovina S, Fujimoto W, Linder B, Imperatore G, D'Agostino R, Jr.. **Clinical evolution of beta cell function in youth with diabetes: the SEARCH for Diabetes in Youth study**. *Diabetologia*. 2012; 55:3359-68.
7. Gray WN, Dolan LM, Hood KK. **Impact of blood glucose monitoring affect on family conflict and glycemic control in adolescents with type 1 diabetes**. *Diabetes Res Clin Pract*. 2013; 99:130-5.

8. Gutmark-Little I, Backeljauw PF. **Cardiac magnetic resonance imaging in Turner syndrome**. *Clin Endocrinol (Oxf)*. 2013; 78:646-58.
9. Gutmark-Little I, Hor KN, Cnota J, Gottliebson WM, Backeljauw PF. **Partial anomalous pulmonary venous return is common in Turner syndrome**. *J Pediatr Endocrinol Metab*. 2012; 25:435-40.
10. Hood KK, Lawrence JM, Anderson A, Bell R, Dabelea D, Daniels S, Rodriguez B, Dolan LM, Group SfDiYS. **Metabolic and inflammatory links to depression in youth with diabetes**. *Diabetes Care*. 2012; 35:2443-6.
11. Kanakatti Shankar R, Pihoker C, Dolan LM, Standiford D, Badaru A, Dabelea D, Rodriguez B, Black MH, Imperatore G, Hattersley A, Ellard S, Gilliam LK, Group SfDiYS. **Permanent neonatal diabetes mellitus: prevalence and genetic diagnosis in the SEARCH for Diabetes in Youth Study**. *Pediatr Diabetes*. 2013; 14:174-80.
12. Kansra AR, Dolan LM, Martin LJ, Deka R, Chernausek SD. **IGF receptor gene variants in normal adolescents: effect on stature**. *Eur J Endocrinol*. 2012; 167:777-81.
13. Kottyan LC, Woo JG, Keddache M, Banach W, Crimmins NA, Dolan LM, Martin LJ. **Novel variations in the adiponectin gene (ADIPOQ) may affect distribution of oligomeric complexes**. *Springerplus*. 2012; 1:66.
14. Li J, Sipple J, Maynard S, Mehta PA, Rose SR, Davies SM, Pang Q. **Fanconi anemia links reactive oxygen species to insulin resistance and obesity**. *Antioxid Redox Signal*. 2012; 17:1083-98.
15. Lotstein DS, Seid M, Klingensmith G, Case D, Lawrence JM, Pihoker C, Dabelea D, Mayer-Davis EJ, Gilliam LK, Corathers S, Imperatore G, Dolan L, Anderson A, Bell RA, Waitzfelder B, Group SfDiYS. **Transition from pediatric to adult care for youth diagnosed with type 1 diabetes in adolescence**. *Pediatrics*. 2013; 131:e1062-70.
16. Lu B, Nakamura T, Inouye K, Li J, Tang Y, Lundback P, Valdes-Ferrer SI, Olofsson PS, Kalb T, Roth J, Zou Y, Erlandsson-Harris H, Yang H, Ting JP, Wang H, Andersson U, Antoine DJ, Chavan SS, Hotamisligil GS, Tracey KJ. **Novel role of PKR in inflammasome activation and HMGB1 release**. *Nature*. 2012; 488:670-4.
17. Maahs DM, Dabelea D, D'Agostino RB, Jr., Andrews JS, Shah AS, Crimmins N, Mayer-Davis EJ, Marcovina S, Imperatore G, Wadwa RP, Daniels SR, Reynolds K, Hamman RF, Dolan LM, Study SfDiY. **Glucose control predicts 2-year change in lipid profile in youth with type 1 diabetes**. *J Pediatr*. 2013; 162:101-7 e1.
18. Mayer-Davis EJ, Davis C, Saadine J, D'Agostino RB, Jr., Dabelea D, Dolan L, Garg S, Lawrence JM, Pihoker C, Rodriguez BL, Klein BE, Klein R, Group SfDiYS. **Diabetic retinopathy in the SEARCH for Diabetes in Youth Cohort: a pilot study**. *Diabet Med*. 2012; 29:1148-52.
19. Miller MM, Rohan JM, Delamater A, Shroff-Pendley J, Dolan LM, Reeves G, Drotar D. **Changes in executive functioning and self-management in adolescents with type 1 diabetes: a growth curve analysis**. *J Pediatr Psychol*. 2013; 38:18-29.
20. Myers KC, Rose SR, Rutter MM, Mehta PA, Khoury JC, Cole T, Harris RE. **Endocrine evaluation of children with and without Shwachman-Bodian-Diamond syndrome gene mutations and Shwachman-Diamond syndrome**. *J Pediatr*. 2013; 162:1235-40, 1240 e1.
21. Patton SR, Dolan LM, Chen M, Powers SW. **Dietary adherence and mealtime behaviors in young children with type 1 diabetes on intensive insulin therapy**. *J Acad Nutr Diet*. 2013; 113:258-62.
22. Pettitt DJ, Talton JW, Liese AD, Liu LL, Crimmins N, West NA, D' Agostino RB J, Kahn HS, Group SfDiYS. **Comparison of two waist circumference measurement protocols: the SEARCH for diabetes in youth study**. *Pediatr Obes*. 2012; 7:e81-5.
23. Pihoker C, Badaru A, Anderson A, Morgan T, Dolan L, Dabelea D, Imperatore G, Linder B, Marcovina S,

Mayer-Davis E, Reynolds K, Klingensmith GJ, Group SfDiYS. **Insulin regimens and clinical outcomes in a type 1 diabetes cohort: the SEARCH for Diabetes in Youth study**. *Diabetes Care*. 2013; 36:27-33.

24. Rohan JM, Pendley JS, Delamater A, Dolan L, Reeves G, Drotar D. **Patterns of self-management in pediatric type 1 diabetes predict level of glycemic control 2 years later**. *J Dev Behav Pediatr*. 2013; 34:186-96.
25. Rose SR, Auble BA. **Endocrine changes after pediatric traumatic brain injury**. *Pituitary*. 2012; 15:267-75.
26. Rose SR, Myers KC, Rutter MM, Mueller R, Khoury JC, Mehta PA, Harris RE, Davies SM. **Endocrine phenotype of children and adults with Fanconi anemia**. *Pediatr Blood Cancer*. 2012; 59:690-6.
27. Rutter MM, Collins J, Rose SR, Woo JG, Sucharew H, Sawnani H, Hor KN, Cripe LH, Wong BL. **Growth hormone treatment in boys with Duchenne muscular dystrophy and glucocorticoid-induced growth failure**. *Neuromuscul Disord*. 2012; 22:1046-56.
28. Shah AS, Dolan LM, Lauer A, Davis C, Dabelea D, Daniels SR, Hamman RF, Marcovina S, Wadwa RP, Urbina EM. **Adiponectin and arterial stiffness in youth with type 1 diabetes: the SEARCH for diabetes in youth study**. *J Pediatr Endocrinol Metab*. 2012; 25:717-21.
29. Shankar RK, Rutter MJ, Chernausek SD, Samuels PJ, Mo JQ, Rutter MM. **Medullary thyroid cancer in a 9-week-old infant with familial MEN 2B: Implications for timing of prophylactic thyroidectomy**. *Int J Pediatr Endocrinol*. 2012; 2012:25.
30. Sheridan RM, Stanek J, Khoury J, Handwerger S. **Abnormal expression of transcription factor activator protein-2alpha in pathologic placentas**. *Hum Pathol*. 2012; 43:1866-74.
31. Urbina EM, Khoury PR, McCoy CE, Dolan LM, Daniels SR, Kimball TR. **Triglyceride to HDL-C ratio and increased arterial stiffness in children, adolescents, and young adults**. *Pediatrics*. 2013; 131:e1082-90.
32. Winer KK, Rothenberg ME, Guimond J, Handwerger S, Boxer LA, Grave G, Devaskar SU, Castle VP. **The Child Health Research Centers: twenty-one years of promoting the development of pediatrician scientists from 1990-2011**. *J Pediatr*. 2012; 161:975-6.
33. Wu YP, Hilliard ME, Rausch J, Dolan LM, Hood KK. **Family involvement with the diabetes regimen in young people: the role of adolescent depressive symptoms**. *Diabet Med*. 2013; 30:596-602.
34. Xie H, Sun X, Piao Y, Jegga AG, Handwerger S, Ko MS, Dey SK. **Silencing or amplification of endocannabinoid signaling in blastocysts via CB1 compromises trophoblast cell migration**. *J Biol Chem*. 2012; 287:32288-97.

Faculty, Staff, and Trainees

Faculty Members

Lawrence M Dolan, MD, Professor

Leadership Division Director, Robert and Mary Shoemaker Professor of Pediatrics

Research Interests Diabetes mellitus; non-insulin dependent diabetes; sexual development disorders; growth disorders; disorders of the thyroid; goiters; hypoglycemia

Philippe Backeljauw, MD, Professor

Leadership Director, Cincinnati Turner Syndrome Center

Research Interests Growth disorders; disorders of bone and calcium metabolism; Turner Syndrome

Nancy Crimmins, MD, Assistant Professor

Research Interests Diabetes; obesity

Deborah Elder, MD, Assistant Professor

Research Interests Diabetes; growth disorders; precocious puberty; calcium disorders

Bethany Freedman, MD, PhD, Assistant Professor

Research Interests Adrenal disorders, glucocorticoid suppression of the adrenal axis, obesity and quality improvement programs to enhance patient care and clinical efficiency

Iris Gutmark-Little, MD, Assistant Professor

Research Interests Airway and great vessel disorders in Turner syndrome

Stuart Handwerger, MD, Professor

Leadership Professor of Cancer and Cell Biology

Research Interests Growth and thyroid disorders; perinatal endocrinology

Jonathan Howell, MD, PhD, Assistant Professor

Research Interests Using human stem cell derived intestinal tissue to understand human gut hormone development and function in order to facilitate new therapeutic options for diabetes

David J Klein, MD, PhD, Associate Professor

Research Interests Diabetes mellitus; intensive diabetes management programs; early detection of renal disease; effects of diabetes mellitus on renal proteogycan synthesis

Sarah Lawson, MD, Assistant Professor

Research Interests Turner syndrome; Septo-optic dysplasia; endocrine abnormalities related to oncology and its treatments

Takahisa Nakamura, PhD, Assistant Professor

Research Interests Focus on endogenous dsRNA pathways to address questions concerning why and how inflammatory responses are initiated and thus involved in the pathogenesis of obesity.

Susan Rose, MD, Professor

Research Interests Hypothalamic pituitary function; thyroid disorders; disorders of growth or puberty; endocrine function in cancer survivors; endocrine function after head injury

Meilan Rutter, MD, Assistant Professor

Research Interests Calcium disorders; endocrine function in childhood cancer survivors; endocrine function in muscular dystrophy

Amy Shah, MD, Assistant Professor

Research Interests Type 2 diabetes; pre-diabetes; insulin resistance; obesity; lipid disorders

Peggy Stenger, DO, Assistant Professor

Research Interests Disorders of bone and calcium metabolism; Growth disorders; disorders of sexual development; pubertal disorders; disorders of the thyroid; goiter

Nana-Hawa Yayah Jones, MD, Assistant Professor

Research Interests Adherence/compliance in type 1 diabetes

Joint Appointment Faculty Members

Jonathan Katz, PhD, Professor (Immunobiology)

Research Interests The immunology of type 1 diabetes mellitus

Jane Khoury, PhD, Associate Professor (Biostatistics & Epidemiology)

Research Interests Diabetes in pregnancy and effect on offspring; stroke

James Wells, PhD, Professor (Developmental Biolosy)

Research Interests Vertebrate gut development, stem cells, mammal

Trainees

Bethany Auble, MD, PL-6, University of Rochester
Nathan Bingham, MD, PhD, PL-6, Cincinnati Children's Hospital Medical Center
Cassandra Brady, MD, PL-4, Vanderbilt University
Janet Chuang, MD, PL-6, Rainbow Babies Children's Hospital
Sarah Corathers, MD, PL-7, University of Cincinnati
Marjorie Golekoh, MD, PL-4, Cincinnati Children's Hospital Medical Center
Pranati Jha, MBBS, PL-5, Albany Medical Center
Christel Keefe, MD, PL-4, Cincinnati Children's Hospital Medical Center
Arti Shah, MBBS, PL-5, University at Buffalo Program
Nicole Sheanon, MD, PL-6, University of Massachusetts
Stephanie Sisley, MD, PL-8, Indiana University
Halley Wasserman, MD, PL-4, Cincinnati Children's Hospital Medical Center

Division Collaboration

Adolescent Gyn, Urology, Genetics » Lesley Breech, MD, Curtis Sheldon, MD, Shumyle Alam, MD, Pramod Reddy, MD, and Howard Saal, MD

Clinical collaboration - Disorders of Sexual Development Clinic

(Cincinnati Disorders of Sex Development Center)

Adolescent Medicine » Jennifer Hillman, MD, MS

Diagnosis, screening for comorbidities and management of Polycystic Ovarian Syndrome across three disciplines within an academic hospital

Behavioral Medicine and Psychology » Jessica Kichler, PhD

Depression Screening in Type 1 Diabetes clinical care and research projects

Biomedical Informatics » Bruce Aronow, PhD and Anil Jegga, MS, DVM

Research

Cardiology » Elaine Urbina, MD, Thomas Kimball, MD, and John Morrison, PhD

Clinical management protocol for cardiac disease in Turner syndrome

The epidemiology of peripheral cardiovascular disease in youth with a specific emphasis on the role of obesity, insulin resistance and diabetes

The epidemiology of central (heart) cardiovascular disease in youth with a specific emphasis on the role of obesity, insulin resistance and diabetes

The ability of pre-teen variables to predict the development of obesity, insulin resistance, diabetes and cardiovascular disease

HDL Subspecies and Vascular Function

Center for Adherance in Psychiatry » Denny Drotar, PhD and Korey Hood, PhD

Research

Emergency Medicine » Mike Gittelman, MD and Wendy Pomerantz, MD

Injury prevention project (RWJ sponsored) in an obesity prevention project in an area experiencing health disparities

Epidemiology and Biostatistics » Lisa Martin, PhD, Jane Khoury, PhD, Jessica Woo, PhD, Heidi Sucharew, PhD, and Lindsey Hornung

Contribution of genetics to obesity in adolescents

The effect of maternal type 1 diabetes on adolescents and young adult offspring with a focus on obesity and carbohydrate metabolism

Creation of clinical database for the Comprehensive Weight Management Center

Contribution to collaborative research in Duchenne Muscular Dystrophy

Study of Clinical Efficacy of Three Month Depot GnRH Agonist in Suppression of Central Puberty

Study of birth length, growth patterns and GH therapy in patients with Diamond Blackfan anemia

Study on Endocrine phenotype of children with Shwachman-Diamond syndrome

Analysis of Prospective Annual Adrenocorticotropin (ACTH) Stimulation Testing among Survivors of Intracranial Tumor, a retrospective study

Gastroenterology » Lee Denson, MD

Study of the effects of growth hormone on patients with Crohn's disease

General Pediatrics » Maria Britto, MD, MPH

Research

Healthworks; Preventive Cardiology; Gastroenterology » Holly Ippisch, MD, Robert Siegel, MD, and Stavra Xanthakos, MD, MS

Center for Better Health and Nutrition clinical collaboration

Hematology Oncology » Richard Harris, MD, Stella Davies, MD, Parinda Mehta, MD, Karen Burns, MD, Kasiani Myers, MD, and Maryam Fouladi, MD

Funded study of oxadrolone therapy in children with Fanconi Anemia

Research, database, and multicenter care of patients with Fanconi Anemia and other bone marrow failure syndromes

Study of endocrine phenotype of children with Shwachman-Diamond syndrome

Analysis of Prospective Annual Adrencorticotropin (ACTH) Stimulation Testing among Survivors of Intracranial Tumor, a retrospective study

Study of endocrine effects after reduced intensity BMT

Study of endocrine effects after new treatment modality for high risk medulloblastoma

ICU » Derek Wheeler, MD

Research

Mayerson Center » Kathi Makoroff, MD

Pfizer funded study shaken infants

Molecular and Developmental Biology » James Wells, PhD

Research

Neonatology & Pulmonary Biology » Cindy Bachurski, PhD, Jeffrey Whitsett, MD, and Alexander Lange, PhD

Research

Neurology » Brenda Wong, MD and James Collins, MD

IGF-I therapy and muscle function in Duchenne Muscular Dystrophy research study

Research, database and interdisciplinary team care of patients with Duchenne Muscular Dystrophy

Pathology » Jerzy Stanek, MD, PhD and Rachel Sheridan, PhD

Research

Pharmacy » Anne Lesko, PharmD and Shannon Saldana, PharmD, MS, BCPP

Research

Physical Medicine and Rehabilitation » Linda Michaud, MD

Pfizer funded study of endocrine function after traumatic brain injury

Psychiatry » Michael Sorter, MD and Mary Matias-Akhtar, MD

Project to see if Metformin given at the initiation of anti-psychotic treatment can prevent weight accretion, which occurs commonly in children on these agents

Psychology and Behavioral Medicine » Scott Powers, PhD

Eating behaviors in individuals 16 years of age with type 1 diabetes

Pulmonary » Gary McPhail, MD

Impaired Fasting Glucose and Indeterminant Glucose Tolerance in a Cystic Fibrosis Population (Two and Four Year Clinical Outcomes)

Blood Glucose Monitoring in the hospitalized patient with Cystic Fibrosis - Validation of the expert opinion using Continuous Glucose Monitoring

Reproductive Sciences » S.K. Dey, MD and Sanjoy Das, PhD

Research

Rheumatology » Hermine Brunner, MD

NIH funded grant of Triptorelin therapy in lupus patients

Solid Organ Transplantation » John Bucuvalas, MD

Screening and Management of Diabetes in youths with solid organ transplantation

Sports Medicine » Gregory Myer, PhD

Research

Surgery » Thomas Inge, MD, PhD

Bariatric surgery in youth: safety, efficacy, and effect on carbohydrate and cardiovascular outcomes

International Hypothalamic Obesity Registry

HDL Subspecies and their changes post bariatric surgery

Grants, Contracts, and Industry Agreements

Grant and Contract Awards	Annual Direct

CRIMMINS, N

Type I Diabetes TrialNet

National Institutes of Health(George Washington University)

U01 DK 061055	07/01/12-06/30/13	$28,567

DOLAN, L

Air Pollution, Subclinical CVD and Inflammatory Markers in the SEARCH Cohort
National Institutes of Health(University of Maryland)

R01 ES 019168	09/27/11-06/30/15	$16,299

SEARCH for Diabetes in Youth, Phase 3: Registry Study
Center for Disease Control and Prevention

U18 DP 002709	09/30/10-09/29/15	$427,358

Vitamin D and Arterial Stiffness in Youth
University of Cincinnati

	11/01/12-06/14/13	$44,363

HANDWERGER, S

Transcriptional Control of Human Placental Differentiation
National Institutes of Health

R01 HD 065339	02/01/11-01/31/16	$192,924

KATZ, J

Control of Diabetes by Manipulation of Bc12 Family Members
National Institutes of Health

R01 DK 081175	07/01/11-06/30/15	$217,500

Dendritic Cells in the Breaking of Peripheral Tolerance in Type 1 Diabetes
National Institutes of Health

R01 DK 090978	09/20/10-08/31/13	$183,150

Dissecting Dendritic Cell Function in Autoimmune Diabetes
National Institutes of Health

R01 DK 078179	08/01/09-07/31/14	$213,173

NAKAMURA, T

Analysis of Pathogenic Double-Stranded RNA in Chronic Inflammatory Disease
Japan Science and Technology Corporation

	02/11/13-03/31/16	$59,900

Functional Analysis of PKR, JNK, and RISC in Metabolic Inflammation and Homeostasis
American Heart Association

11SDG5270010	01/01/13-12/31/14	$70,000

RUTTER, M

DMD Insulin Growth Factor - 1
Charley's Fund

	11/1/10-10/31/13	$200,000

SISLEY, S

CNS NFkappaB Regulation of Glucose Homeostasis
National Institutes of Health

F32 DK 091077	07/01/11-07/30/12	$62,030

Current Year Direct	**$1,715,264**

Industry Contracts

BACKELJAUW, P

Eli Lilly and Company	$3,503
Tercica, Inc	$8,952
Versartis, Inc	$7,469
Novo Nordisk Pharmaceuticals	$20,400

DOLAN, L

Jaeb Center	$9,447

KLEIN, D

Novo Nordisk Pharmaceuticals	$24,533

ROSE, S

Debiopharm SA	$10,295

Current Year Direct Receipts	**$84,599**

Total	**$1,799,863**