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**Innovation and Entrepreneurship Activities:**

Little doubt can be cast on the detrimental effects of obesity and related metabolic diseases such as type 2 diabetes on our society. Two thirds of the US population is overweight or obese and this results in enormous monetary and human costs. Consequently this remains an area of enormous unmet medical need.

Our basic research lab has used two strategies to develop new therapeutic strategies. The first is what we term “reverse translation”. We identify existing therapies for which there remains uncertainty as to the underlying mechanisms. We bring those therapies back to the laboratory and dissect the underlying molecular mechanisms thereby providing new insight into how those therapies might be best applied or improved upon. One example of this is bariatric surgery. Bariatric surgical procedures are by far the most effective treatment strategies for both obesity and type 2 diabetes. However, bariatric surgery is invasive and expensive. The result is that less than 1% of those eligible for surgery receive this effective intervention. Our research lab has built mouse models of these procedures that have allowed us to identify a number of specific signaling pathways that are critical to the effects of these procedures. This allows us to develop less invasive and more scalable solutions that mimic key aspects of how bariatric surgery impacts physiological systems. The result of this has been identification of dietary strategies, novel drug targets and new, less invasive surgical procedures one of which is now in a clinical trial in type 2 diabetic subjects.

The second strategy is to build highly interdisciplinary research teams. Our work has used a wide range of molecular, physiological and behavioral techniques to identify the key systems involved in body weight and metabolic regulation. This has involved individuals from neuroscience, metabolism, molecular biology, physiology, surgical, endocrinology, cell signaling and engineering backgrounds. This has allowed us to build insights into the homeostatic systems that go awry to lead to metabolic disease and how we can make that biology work for us as part of treatment and prevention strategies.

These strategies have resulted in us being able to “diversify” our research support beyond the usual federal sources for basic research. We have received more than \$35 M in research funding from 9 different commercial partners. We have worked hard to cultivate long-term relationships with a number of companies including more than five years of funding from P&G, Ethicon and Novo Nordisk. Such long-term partnerships are the result of listening carefully to the short and long-term goals of our commercial partners and making sure that we deliver value both to the organization and to the individuals within those companies that champion these partnerships. In addition to these research collaborations, I have also served as a consultant or member of a Scientific Advisory Board for venture capital, medical device, pharmaceutical and biotech companies. In many instances, serving in these roles has allowed me to identify opportunities for research collaborations. Ethicon Surgical Care, Novartis, Novo Nordisk, Eli Lilly, Merck, Takeda, Amylin, Angiochem, Zealand, Boehringer Ingelheim, Eisai, Janssen, Novartis, Endobetix, Sanofi and Zafgen.

Commercialization activities/awards:

- Ernst Oppenheimer Award (2008)
  - This award is from the Endocrine Society and is the premier award to a young investigator in recognition of meritorious accomplishment in the field of basic or clinical endocrinology for an individual less than 45 years of age.
- Outstanding Scientific Achievement Award (2009)
  - The Outstanding Scientific Achievement Award is given by the American Diabetes Association in recognition of outstanding scientific achievement in the field of diabetes, taking into consideration independence of thought and originality. It is given to the individual with the highest level of scientific accomplishment who is less than 45 years of age.
- League of Research Excellence (2014)
  - Award from the University of Michigan to individuals who have made the largest contributions to the research mission of the University.
- Research support from Ethicon Surgical Care, Novo Nordisk, Sanofi, Boehringer Ingelheim, Eisai, Zealand, Roche, Ablaris and Procter & Gamble.
- Consulting or Scientific Advisory Board: Ethicon Surgical Care, Novartis, Novo Nordisk, Eli Lilly, Merck, Takeda, Amylin, Angiochem, Zealand, Boehringer Ingelheim, Eisai, Janssen, Novartis, Endobetix, Sanofi and Zafgen.
- Patents:
  - Novel Role for GLP-1 to Mediate Responses to Disparate Stressors (PCT# 20040116331). Inventors: Seeley, R.J., Kinzig, K.P. and D'Alessio, D.A.
  - Overfeeding Methods for Determining Therapeutic Strategies and/or Targets for Obesity Therapeutics (PCT #20050220710). Inventor: Seeley, R.J.
  - Method of using GM-CSF signaling pathways to regulate food intake and body weight (PCT# 20050089508). Inventors: Reed, J.A., Smith, K.B., Clegg, D.J., and Seeley, R.J.
  - Enteroendocrine manipulation for metabolic effect (WO 2011150033 A1). Inventors: Gregory Bakos, Edward G. Chekan, Denzel Z. Herrera-Davis, Jason L. Harris, Gary L. Long, Rudolph H. Nobis, Mark S. Ortiz, Mark D. Overmyer, David N. Plescia, Randy J. Seeley, William B. Weisenburgh, Tamara S. Vetro Widenhouse, Mark S. Zeiner, Andrew M. Zwolinski,
  - Endoluminal sleeve device and methods for deploying an endoluminal sleeve in the gi tract (WO 2013087096 A1). Inventors: Mark Steven Ortiz, José M. BERGER, Randy J. Seeley, James W. Voegele, Michael A. Murray, Michele D'arcangelo, Jason Harris, Alessandro Pastorelli, Carrie BENZINGER, David Cagle,
  - Systems and Methods For Regulating Metabolic Hormone Producing Tissue (US 20110295337 A1). Inventors: Thomas E. Albrecht, Jeffrey L. Aldridge, Edward G. Chekan, Sean P. Conlon, Michael S. Cropper, Daniel F. Dlugos, Jr., Jason L. Harris, Christopher J. Hess, Kevin L. Houser, John V. Hunt, Gary L. Long, Prasanna Malaviya, Amy L. Marcotte, Rudolph H. Nobis, Mark S. Ortiz, Mark D. Overmyer, Alessandro Pastorelli, David N. Plescia, Galen C. Robertson, Randy J. Seeley, Frederick E. Shelton, IV, Michael J. Stokes, Foster B. Stulen, Richard W. Timm, James W. Voegele, B. Weisenburgh II William, James A. Woodard, Jr., David C. Yates, Andrew M. Zwolinski,