

**Mini-symposium on Insulin in Control of Energy Expenditure & *Adipose Tissue Biology***  
May 11, 2015, at the Institute of Physiology of the Czech Academy of Sciences

Address: Vídeňská 1083  
142 20 Praha 4

PROGRAMME

14,00 – 14,10 Award ceremony for the best 2014 publications  
of the Institute

14,10 – 15,10 **Bureš lecture of Prof. Michael P. Czech**  
*“Insulin in Control of Energy Expenditure”*

*Summary:* Of the many pathways that cause insulin resistance and decreased energy expenditure in obesity, high circulating insulin levels may contribute significantly. Our data indicate that hyperinsulinemia promotes inflammation in adipose tissue through a MAP kinase-based mechanism, which in turn can have deleterious or beneficial effects on glucose tolerance depending on the physiological context. High insulin may also act through its stimulation of adipocyte fatty acid synthesis, which in turn appears to suppress white adipose browning, energy expenditure and whole body glucose homeostasis.

15,10 – 15,30 Refreshments

15,30 – 16,15 Lecture of Prof. Silvia Corvera  
*“Adipose tissue angiogenesis and metabolic disease”*

*Summary:* Adipose tissue is capable of expanding many-fold during adulthood, therefore requiring the formation of new vasculature to meet oxygen and nutrient needs. Moreover, the adipose tissue vasculature is the developmental niche for adipocyte progenitors, and factors that affect angiogenesis can directly impact the generation of new adipocytes. Thus, appropriate adipose tissue angiogenesis is a critical element in adipose tissue expandability, and as such is a contributing factor to insulin resistance and metabolic disease. We have developed a model system to study the formation of human adipose tissue vascular networks, which consists of culture of adipose tissue fragments in hydrogel under a variety of pro-angiogenic conditions. This has allowed us to define factors that influence angiogenesis and the proliferation of adipocyte progenitor cells. We find that in both mouse and human the development of adipose tissue vasculature is controlled by IGF binding proteins, such as IGFBP4 and IGFBP5, and that alterations in the levels of these are predictive of insulin resistance in humans.



American Diabetes Association, 1982; the David Rumbough Scientific Award of the Juvenile Diabetes Foundation, 1985; NIH MERIT Awards, 1997-2005 and 2012-2017; the Elliot P. Joslin Medal, 1998; the 2000 Banting Medal & 2004 Albert Renold Mentorship Award of the American Diabetes Association, and the Jacobaeus Prize presented in Umea Sweden, 2009.

**Prof. Silvia Corvera, M.D.**

Silvia Corvera is Endowed Chair in Diabetes Research and Professor in Program in Molecular Medicine, University of Massachusetts Medical School. She received her MD degree from the National University of Mexico in 1983, and a MSc in Biochemistry at the same institution in 1984. She received a Fogarty International Fellowship from the National Institutes of Health to perform Postdoctoral studies. Prior to joining the faculty at UMMS, she held the position of Assistant Professor of Pathology and Laboratory Medicine at the University of Pennsylvania.

The goal of Silvia Corvera's team is to understand the cellular and molecular basis of adipose tissue function and its relationship to metabolic disease. Their most recent studies are focused on understanding the mechanisms of adipose tissue expansion during obesity in human adults. This process entails the hypertrophic growth of existing adipocytes, the differentiation of precursor cells to form new adipocytes, and the coordinate expansion of the adipose tissue capillary network. They believe that failure of any of these mechanisms can result in adipose tissue dysfunction, ectopic lipid deposition and metabolic diseases such as type 2 diabetes

**Prof. Francesc Villarroya, Ph.D.**

Francesc Villarroya is professor of Biochemistry and Molecular Biology and current director of the Institute of Biomedicine of the University of Barcelona. After research in CNRS (Paris) and New York University Medical Center, he established a research group in the University of Barcelona in the early 90's of the last century focused to the identification of the molecular actors controlling energy metabolism and adiposity. The role of mitochondrial function on energy balance and metabolism as well as the regulation of brown adipose tissue thermogenic activity were main interests.

Francesc Villarroya and his team identified major mechanisms of transcriptional control of the genes encoding UCP1, the key mediator of brown fat thermogenesis, and other uncoupling proteins. More recently, FGF21 was identified as a novel actor in the control of brown fat activity and its consequences in the control of systemic metabolism. Translational research has been developed in relation to human metabolic pathologies such as obesity and diabetes.. After the appearance of lipodystrophy and metabolic disturbances in antiretroviral-treated HIV patients, an extensive translational research program has been developed which allowed to identify relevant molecular events causing these alterations and potential tools to ameliorate or prevent them.