



PLENARY SESSION

Exercise, Inactivity, and Circadian Rhythms – Re-setting the clock in Metabolic Disease

*Juleen R. Zierath*¹⁻³

¹Department of Molecular Medicine and Surgery, Integrative Physiology, Karolinska Institutet, Stockholm, Sweden

²Department of Physiology and Pharmacology, Integrative Physiology, Karolinska Institutet, Stockholm, Sweden

³Novo Nordisk Foundation Center for Basic Metabolic Research, University of Copenhagen, Copenhagen, Denmark

email: juleen.zierath@ki.se

Type 2 diabetes is a life-threatening metabolic disease reaching epidemic proportions, with disease risk scaling linearly due to obesity and inactivity. Disturbed circadian rhythms can cause metabolic dysfunction, highlighting a role of this circuit in type 2 diabetes pathogenesis. Nevertheless, mechanisms underlying disrupted circadian rhythmicity of the intrinsic molecular-clock in type 2 diabetes are unknown. In this lecture, I will cover some of my latest work related to mechanisms by which the timing of food intake or exercise (energetic stressors) interact with peripheral clocks to control metabolic homeostasis. My overarching hypothesis is that synchronizing energetic stressors such as diet and exercise to the molecular circadian clock may maximize the health promoting benefits on glucose and energy metabolism. The goal of my current work is to elucidate the mechanisms by which physiological processes are modulated by the clock machinery in a diurnal manner including, glucose control, systemic metabolism, and mitochondrial respiration, and how dysregulation of these processes contribute to type 2 diabetes. Molecular mechanisms underpinning the link between peripheral circadian clocks, energy-sensing pathways, and the control of glucose homeostasis may one day form the basis of a new class of therapies to prevent insulin resistance.