

Guest lecture

MicroRNAs: an adaptive mechanism in the pancreatic beta cell....and beyond?

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Abstract: The metabolism of glucose as a source of energy is a fundamental property virtually all cell types share from bacteria to humans. Among the most studied mechanisms is the pancreatic beta cell which regulates its output of insulin as part of a complex endocrine network designed to maintain stable glucose concentrations. In addition to adjusting its secreted load, the beta cell will also adapt its transcriptional programming to promote its proliferation in response to chronic hyperglycemia; however it remains unclear how the cell simultaneously balances the energy requirements of both processes. The deletion of miR-375 and Argonaute2 in the pancreatic beta cell both blocked its compensatory expansion during insulin resistance. From these results we hypothesize that the microRNA pathway maintains an adaptive role in the beta cell according to changes in metabolic demand and improving our understanding of this mechanism will continue to be my primary research focus. The high degree of conservation of the microRNA pathway may suggest its functional role is a part of a homeostatic mechanism regulating the energy metabolism of many cell types. It is widely known that glucokinase in mammals is abundant in the liver hepatocyte, endocrine pancreas, neurons of the brain, and the gut; and it remains unclear how these key metabolic tissues balance specific cellular functions versus their rate of proliferation. Therefore, do these tissues maintain similar regulatory mechanisms relevant to glucose homeostasis? Does the microRNA pathway contribute an

adaptive role in the cells of the liver, brain, or gut according to changes in metabolic demand as observed in the beta-cell? Our previous work on the microRNA pathway has established its integral role in the growth and function of the pancreatic beta cell and the future goals of my group will continue to elucidate how non-coding RNAs contribute to cellular energy homeostasis.

Host: Head of Department Peder Thusgaard Ruhoff, Department of Biochemistry and Molecular Biology, SDU.