GUEST LECTURE SERIES

January 8, 2020
Christian Wolfrum, ETH Zurich

Adipose tissue heterogeneity and plasticity – implications for the regulation of systemic metabolism

The adipose tissue organ is generally perceived to function as a buffer for lipids in times of excess calorie intake. Work in recent years however has demonstrated that adipose tissue also functions as an endocrine organ, which regulates systemic metabolism through cross talk with other organs. Furthermore, it is nowadays accepted that adipose tissue is a heterogeneous organ comprised of different cells with varying morphologies and functionalities. The main heterogeneity, which also accounts for 70% of the cells within adipose tissue, resides in the stromal vascular fraction, which encompasses not only adipocyte precursors, but also immune and other regulatory cell types. Recent work by us utilized a single cell sequencing approach to deconvolute this complexity and identified a new cell type, which is an important regulator of adipose tissue growth through paracrine mechanisms. This unexpected finding demonstrates that tissue heterogeneity often precludes the identification of cell subpopulations with distinct functions using a bulk approach.

The other adipose tissue fraction, which consists mainly of the mature adipocytes, characterized by high lipid content and a unique morphology, is believed to be the main functional component within adipose tissue. In humans (with the exception of early development and the postnatal phase), this fraction was thought to be comprised exclusively of white adipocytes, which can store excess lipids in a unilocular lipid droplet. Nowadays it is however accepted that also brown, brite or beige adipocyte can be found in predominantly white adipose tissue depots. To deconvolute this heterogeneity further, we have used single cell analysis of mature adipocytes from different anatomical locations in mice and humans. Using such an approach, we were able to identify different subpopulations of adipocytes, which exhibit different functionalities and thereby contribute to the control of systemic metabolism.

SFB LIPID HYDROLYSIS Projektmanagement
Medizinische-Universität Graz, Gottfried Schatz Forschungszentrum, Neue Stiftingtalstrasse 6/6, 8010 Graz, Austria
tel +43-316-385 71977, fax +43-316-385 79615, email: vanessa.csitkovits@medunigraz.at