Onsite!!

IMEG Seminar Series

The road to global science

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Using human brown adipocytes to develop new therapies for type II diabetes

This seminar series is open to all students and researchers in Kumamoto University.
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Most patients with type 2 diabetes (T2D) take some form of medication, but these focus on controlling hyperglycemia, using drugs that have common or overlapping mechanisms of action. These medications often have undesirable side effects and have only incremental efficacy in reducing hemoglobin A1C levels. This is often compounded by the need for dual and triple-drug therapies in conjunction with injectable insulin, and reduced efficacy over time. Insulin resistance and resulting hyperglycemia that develops in T2D is associated with increased, systemic inflammation that contributes to a broad range of clinical complications. Therefore, the efficacy of drugs that solely regulate glucose homeostasis as a mechanism of action is limited. This establishes a need to develop new approaches for the treatment of T2D.

Human brown adipose tissue (hBAT) regulates metabolic homeostasis and energy expenditure by impacting the clearance of circulating glucose and triglycerides. A second aspect of this involves the secretion of 'adipokines', lipoprotein complexes, and vesicles by BAs that impact inflammation and systemic metabolic regulation. These BA-associated functions restrict the development of T2D at the metabolic level and minimize disease complications. Animal model studies show that transplantation of BAT from healthy individuals reverses T2D and a broad range of associated complications. In humans, increased BAT activity improves insulin-sensitivity in type 2 diabetics and improves the clinical status of individuals with co-morbidities. Patients with T2D typically have limited amounts of brown adipocytes, leading to the proposal that increasing the mass of BAT depots would be a viable therapeutic strategy. A major impediment preventing the development of such a therapy has been the unavailability of a transplantable cell source. This presentation will discuss our approach to solving this challenge, using pluripotent stem cells as a technology platform.

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