

研究区分	教員特別研究推進（地域振興）
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研 究 テーマ	The effect of claudin-15 deletion on the characteristics and maturation of fat cells from visceral, subcutaneous, and brown adipose tissue depots in rats				
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講演題目
Claudin-15 expression in 3T3-L1 cells and rat adipose tissue
研究の目的、成果及び今後の展望
Claudin-15 is a protein that is expressed at the boundary between 2 or more epithelial cells, called a tight junction. Claudin-15 plays an important role in intestinal Na⁺ transport and homeostasis. In both mice and rats, claudin-15 deletion results in reductions of visceral fat. In rats, claudin-15 deletion results in reduced bodyweight and visibly decreased fat accumulation compared to wildtype rats, despite the presence of an enlarged intestinal tract. Analysis of white and brown adipose tissue markers revealed that two visceral fat depots (epididymal fat and mesenteric fat) exhibit decreased white adipose tissue markers (Leptin) and increased brown adipose tissue markers (UCP-1) in claudin-15 knockout rats. Fat tissue is reported to express claudin-15, implying that the loss of claudin-15 may affect the maturation of fat cells. The goal of this research is to establish if claudin-15 is expressed in fat tissue, including finding differences amongst various fat tissue depots, such as visceral white adipose tissue and subcutaneous white adipose tissue. First using the mouse fibroblast cell line 3T3-L1, which differentiates into adipocytes, the expression of claudin-15 was investigated in undifferentiated and differentiated cells. <i>Cldn15</i> mRNA expression increased from a relative expression level of 1.0 at day 0, to 18.3 at day 8, and 27.9 at day 15 post-insulin treatment, implying that claudin-15 may play a role in maturation or cell fate of adipocytes. Next the cellular localization of claudin-15 was investigated in undifferentiated and differentiated 3T3-L1 cells. Claudin-15 signal was greatly increased in differentiated cells revealing that the changes in protein localization follow the same pattern as mRNA expression. Lastly, the expression of claudin-15 was investigated by immunofluorescence in actual rat fat tissue. Subcutaneous white adipose tissue and perigonadal visceral fat tissue were examined. Preliminary results showed the expression of claudin-15 differs significantly between subcutaneous and visceral white adipose tissue. Claudin-15 has been shown for the first time to be expressed in white adipose tissue, and in addition, there is a tissue-depot specific effect. To investigate the role of claudin-15 in fat tissue further, the next step is to investigate whether claudin-15 knockout has an effect on the maturation or metabolic function of fat cells. In addition, claudin-15 expression in mesenteric adipose tissue and brown adipose tissue will be investigated.