1. **No.**

   FP01806081

2. **Title**

   The Investigation of Molecular Mechanisms of Beige Adipocyte Differentiation and Activation

3. **Period**

   2016-2018

4. **Summary**

Beige adipocytes are energy-burning adipocytes in adults and gained much attention as therapeutic targets for obesity and diabetes. In this study, we analyzed the molecular mechanism of differentiation and activation of beige adipocytes and the effect of smoking on beige adipocyte activation. First, we generated white and beige adipocyte cell lines derived from the mice inguinal subcutaneous white adipose tissues. RNA sequencing was performed for profiling of transcriptome between white and beige adipocytes in the time point of differentiation and activation. CD105 is highly expressed in beige adipose precursor cells and is useful as a cell surface marker. Besides, it was clarified that CD105 is involved in the differentiation and activation of beige adipocytes by regulating the Smad signaling pathway. Furthermore, the bombesin-like peptides, NMB and GRP, are highly expressed in beige adipocytes. In particular, it has been suggested that GRP may be a new biomarker for beige adipocyte activation.

In order to investigate the effect of smoking on beige adipocytes, the cells were stimulated with nicotine and cigarette smoke extract (CSE). Although there were no significant differences in cell differentiation or activation by nicotine, CSE significantly suppressed the activation of beige adipocytes. These results suggested that smoking may relate to the pathology of obesity and diabetes by suppressing beige adipocyte function.