1. **No.**

   FP01808108

2. **Title**

   Metabolome Analysis of Placentas with Smoking Mother and Human Umbilical Vein Endothelial Cells (HUVEC) under Nicotine Exposure

3. **Period**

   2016-2018

4. **Summary**

   We performed a metabolome analysis based on fluctuations in the primary metabolite due to nicotine exposure in the placenta and *in vitro*, to investigate its influence on the placenta (umbilical cord) of pregnant women who smoke. First, we performed a metabolome analysis of a human placenta and looked for differences in the primary metabolite in a regular placenta and an abnormal placenta (pregnancy-induced hypertension syndrome). The result was that in terms of changes in the primary metabolite of the two placentas, it was identified that fluctuations could be analyzed in 372 metabolites (78%) of the 475 metabolites. Due to the multivariate analysis, the pentose phosphate pathway, ribulose 5-phosphate and ribose 5-phosphate increased in the abnormal placenta ($p<0.05$). Furthermore, primaly cultured cells（HUVEC and placenta villi cells） were established, and activity in the SIRT1-NDRG1 system, which is one of the low-oxygen response systems, using a molecular biological approach, was observed.

   Additionally, when *in vivo*, an experiment was performed using rat tobacco stimulants（TS）, due to the influence of TS, there were clear differences in the various tissue, and some interesting results showing fluctuations in tissue-specific metabolic pathways were observed. In particular, fluctuations in the primary metabolite within tissue due to TS stimulants, against expectations, exhibited more fluctuation in the ovaries than in the lungs, and this suggested an important correlation between TS and ovarian metabolism. Moving forward, we would like to proceed with further analysis on the metabolite fluctuation factors in the ovaries confirmed on this occasion and deepen the analysis on the influence of TS on hormone metabolism and fertility.