1. No.
   2019G030

2. Title
   Effects of cigarette smoking on placental trophoblast differentiation

3. Period
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4. Summary
   During placentation, placental cytotrophoblast (CT) cells differentiate into syncytiotrophoblast (ST) cells, and extravillous trophoblast (EVT) cells. CT cells should be properly differentiated into ST and EVT cells to promote normal formation and function of the placenta. In this study, to investigate the effect of cigarette smoke on gene expressions in trophoblast differentiation, we performed gene expression analysis using human trophoblast derived BeWo cells and human trophoblast stem (TS) cells. We showed that trophoblast-specific genes such as *GH2*, *CSH1*, *CSH2*, *HSD3B1*, and *INSL4* were affected by CSE treatment in BeWo cells. Among them, *GH2*, *CSH1*, and *CSH2* genes are part of the growth hormone (*GH*) gene cluster. Trophoblast-specific expression of the *GH* gene cluster is regulated by a locus control region (LCR) which is located 30 kb upstream of the gene. To assess the mechanism by which CSE affects expression of trophoblast-specific genes, we investigated effects of CSE on histone modifications at the LCR. ChIP assays revealed no significant effects of the treatment of CSE on the histone modification levels at the *hGH* LCR, suggesting that CSE may affect other transcriptional regulatory region. Furthermore, we examined the effect of CSE on the trophoblast differentiation using human trophoblast-stem (TS) cells. CSE may act on the differentiation of TS cells into ST cells. Our finding shows that maternal cigarette smoking might affect trophoblast differentiation through altered gene expression.