



**Figure S1: Effect of caffeine, theaflavin and theobromine on melanin production in Melan-a cells.** Melan-a Cells ( $1 \times 10^5$  cells/mL) were seeded into a 24-well plate and cultured overnight. Then, the IBMX, arbutin, caffeine, theaflavin, or theobromine was added and incubated for three days. The medium was changed to a fresh medium containing each compound every day. After washing with cold PBS, the cells were dissolved in 1 N NaOH, and the absorbance was measured at 405 nm using a spectrophotometer (Victor3, PerkinElmer, Waltham, MA, USA). IBMX was used as a positive control, while arbutin was used as a negative control. ARB: arbutin. Data are expressed as the mean  $\pm$  SD ( $n = 3$ ). All tests were performed in triplicate. \*\*  $p < 0.05$  performed by one-way ANOVA followed by Tukey's test.