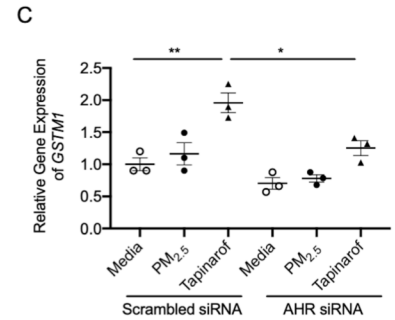
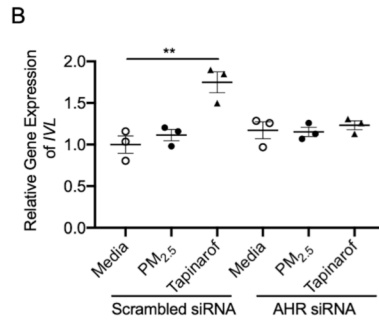
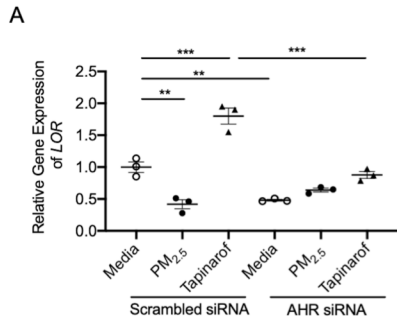


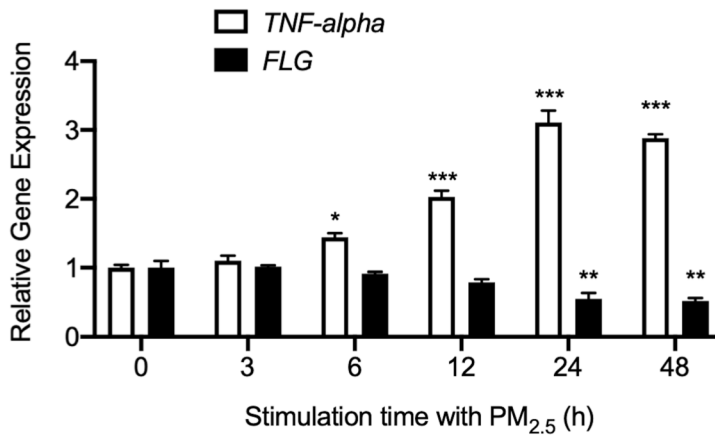
Supplementary Figure 1. PM_{2.5} modulates the epidermal barrier proteins in human primary keratinocytes.

HEKs were differentiated for 3 days and then the cells were stimulated with various concentrations of PM_{2.5}, Th2 cytokines (IL-4 and IL-13), or IFN-γ for an additional 48 h. Gene expressions of *LOR* (A), *IVL* (B), keratin-1 (C), desmocollin-1 (D), corneodesmosin (E), and claudin-1 (F) were evaluated using real-time RT-PCR. Data are representative of three independent experimental repetitions. The data are shown as the mean ± SEM. n = 3 per group. **P*<0.05, ***P*<0.01, ****P*<0.001 by one-way ANOVA with Tukey-Kramer post-hoc test.



Supplementary Figure 2. PM_{2.5} and tapinarof modulate gene expressions of epidermal barrier proteins and *GSTM1* in human primary keratinocytes.

Gene expressions of *LOR* (A), *IVL* (B), and *GSTM1* (C) were examined in cultured HEKs using real-time RT-PCR. n = 3 per group. Data are representative of three independent experimental repetitions. The data are shown as the mean ± SEM. **P*<0.05, ***p*<0.01, ****p*<0.001 by one-way ANOVA with Tukey-Kramer post-hoc test.



Supplementary Figure 3. $PM_{2.5}$ induces expression of *TNF-alpha* and inhibits *FLG* subsequently in human primary keratinocytes.

HEKs were differentiated for 3 days and then the cells were stimulated with $PM_{2.5}$ for various periods up to 48 h. Gene expressions of *TNF-alpha* and *FLG* were evaluated using real-time RT-PCR. Data are representative of three independent experimental repetitions.

The data are shown as the mean \pm SEM. n = 3 per group. * P <0.05, ** P <0.01, *** P <0.001 by repeated measures ANOVA with Tukey-Kramer post-hoc test.