

(a) Cytotoxicity test of PAE and its isolated compound, FQA, on HaCaT cells



Figure s1. Dose tests

As shown here, both PAE and FQA did not show significant cytotoxicity on HaCaT cells, at the effective concentrations used for the biological experiments in the study, and 2% PAE displayed highly significant effect on Ca²⁺ signaling in both HBT-SM and HaCaT cells.



Figure s2. Western blots of PAR-2

PAR-2 protein was estimated as 32 kDa, and the strongest signal was detected at the expected size.



Figure s3. Western blot of Occludin

Occludin protein was estimated as 65 kDa, and the strongest signal was detected at the expected size. Extended electrophoresis did not reveal any change of the pattern.



Figure s4. Western blots of ZO-1

ZO-1 protein was estimated as 220 kDa, where the signal was detected as known multiple bands. To analyze correctly, a strong nonspecific signal around 180 kDa should be removed by trimming the membrane above the 191-kDa band of pre-stained marker.





(c) Palmatine



(e) 13 C-NMR Spectra of Berberine (100MHz, CD₃OD)



(f) Berberine



(g) ¹H-NMR Spectra of 4-O-Feruloylquinic acid (400MHz, CD₃OD)



(h) ¹³C-NMR Spectra of 4-O-Feruloylquinic acid (100MHz, CD₃OD)



Figure s5. NMR spectra analyses of isolated compounds from PAE



Figure s6. Dose-dependent effect of FQA on DPM stress

HBT-SM cells were treated with different concentrations of FQA, in the presence of DPM. 100 ppm showed more significant reduction of Ca²⁺ influx, which was confirmed in HaCaT cells, as Figure 7a.



Figure s7. Transcriptional regulation of PAR-2 expression by FQA.