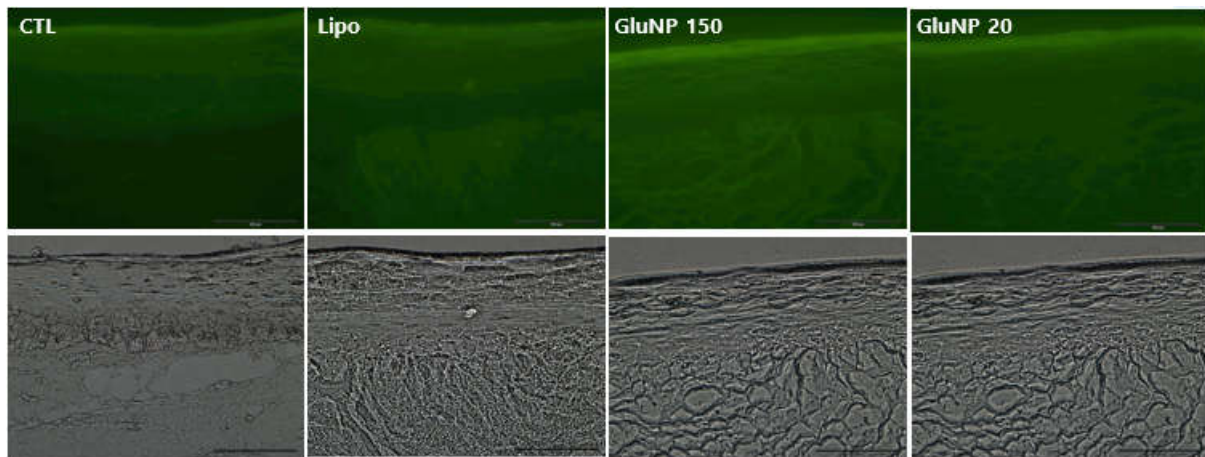


## Supplementary Materials



**Figure S1.** The bright field and fluorescence microscopy images of organotypic 3D skin cryosection with different volumes of GluNP/siRNA (20 and 150  $\mu$ L) and Lipo/siRNA (20  $\mu$ L). The control group (CTL) is treated with siRNA only. The siRNAs are labeled by 5'FAM (green).

## Supplementary Method

### *Skin Penetration of GluNPs*

Artificial skin tissue was provided by AMOREPACIFIC R&D Unit (Yongin-si, Republic of Korea). PBS (control, CTL), 5'-FAM-siRNA-loaded GluNPs (GluNP 20), and Lipofectamine/siRNA(Lipo) were loaded as an aliquot of 20  $\mu$ L on the surface of the artificial skin tissue and incubated for 6 h at 37  $^{\circ}$ C in a humidified 5% CO<sub>2</sub> incubator. Additionally, we tried to add with more high volume of the GluNPs at 150  $\mu$ L(GluNP 150). Afterwards, the surface of the artificial skin tissue was washed three times with PBS, and the artificial skin tissues were frozen for the cryosection. Then, 10  $\mu$ m thick tissue sections were prepared and skin penetration was examined using fluorescent microscope (BX53, Olympus, Japan).