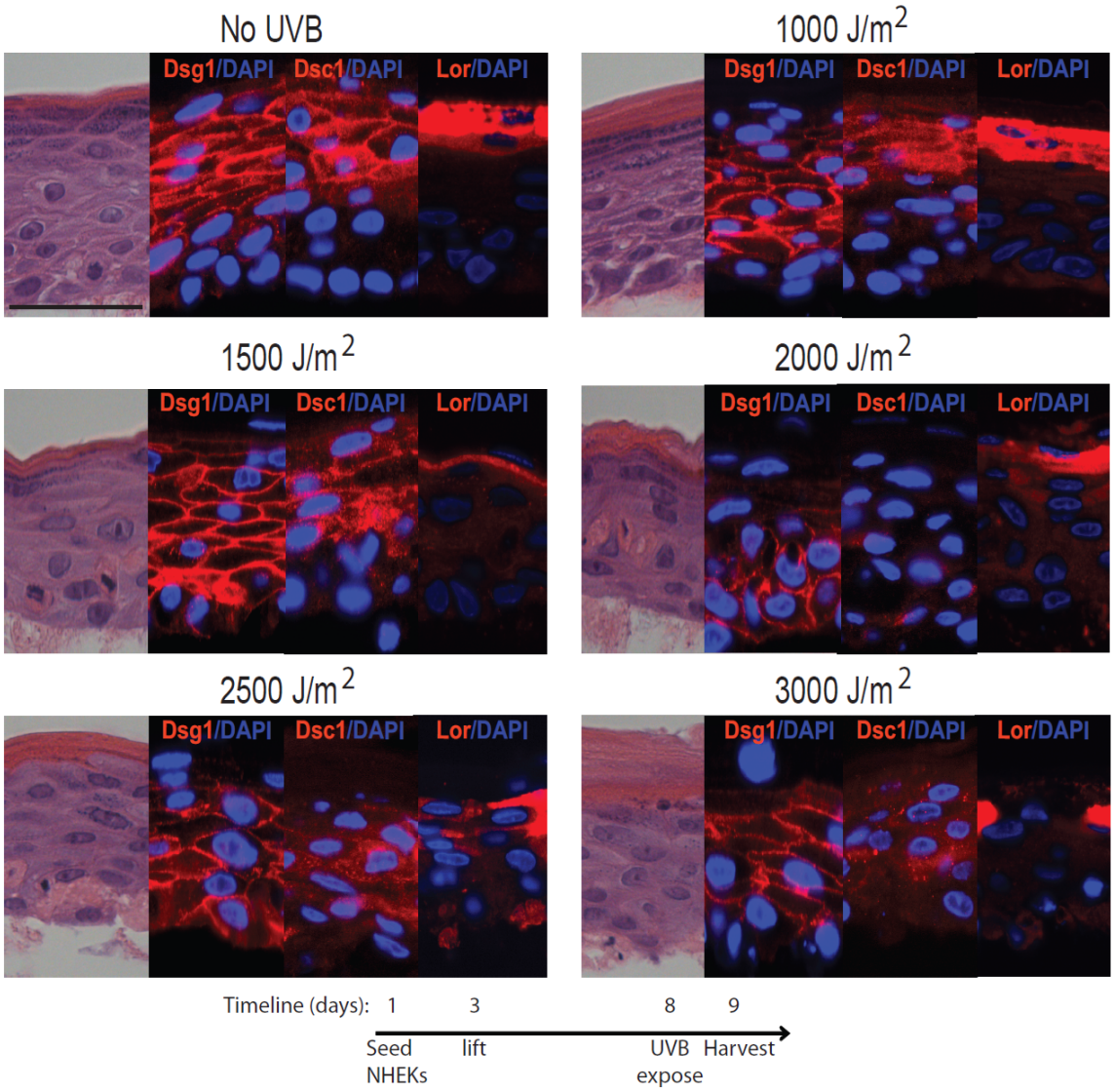
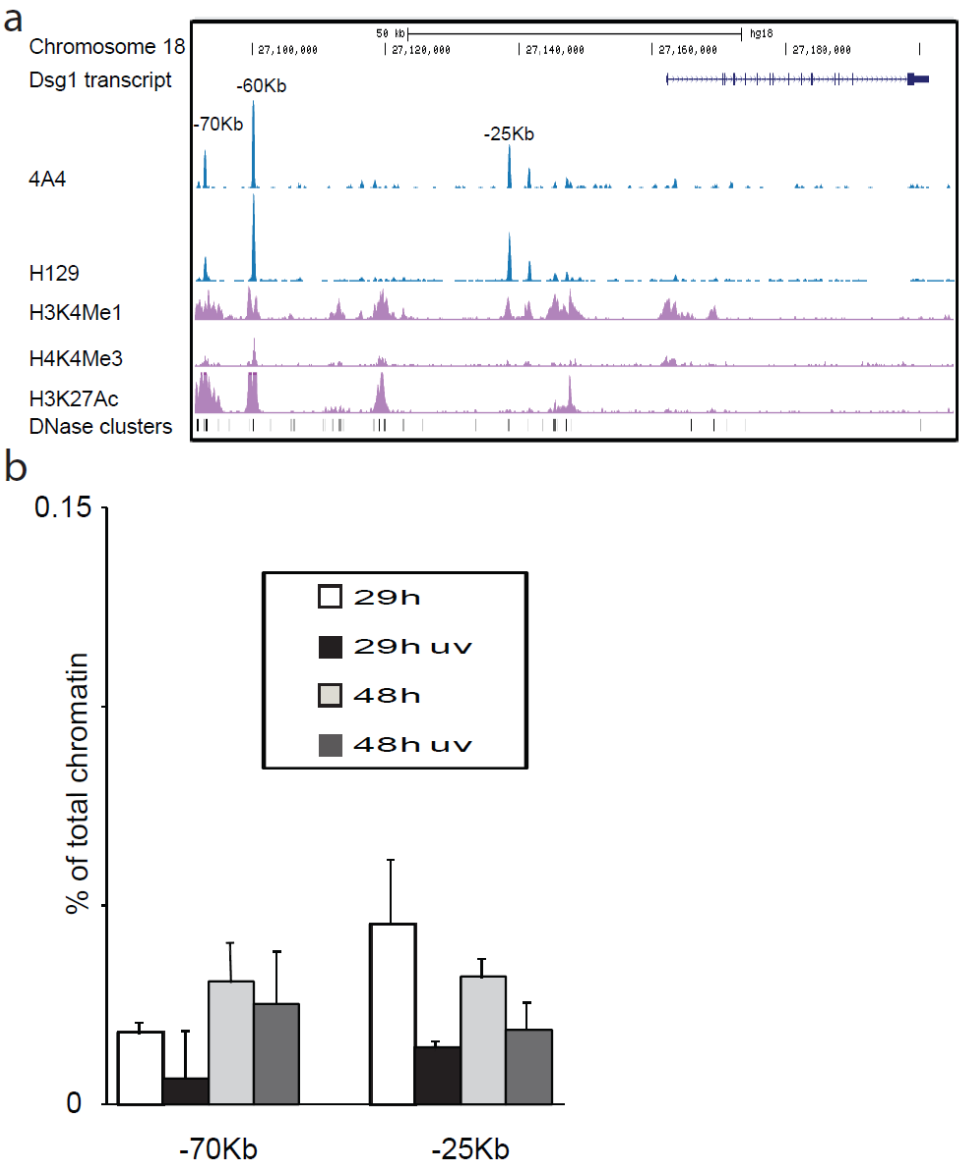
Supplemental Figure 1: **Morphology of organotypic skin cultures 24 hours after exposure to indicated UVB dosages:** Organotypic skin cultures were grown for 6 days after being lifted to the air-liquid interface, exposed to the indicated dosage of UVB, harvested 24 hours later (see timeline), fixed in formalin, sectioned, and H&E stained or stained with anti-loricrin (Lor), anti-Dsg1, or anti-Dsc1 antibodies. Exposure to 1000 J/m^2 UVB resulted in thickening of the stratum corneum while exposure to higher dosages of UVB resulted in disorganized structure, reduced granular layer, patchy loricrin expression, reduced Dsg1 and Dsc1 expression, and increased sunburn cells. DAPI = nuclei. Bars = 50 μm.



Supplemental Figure 2: **UVB exposure correlates with reduced binding of the transcription factor p63 to enhancer regulatory regions of the Dsg1 gene:** a) Snapshot of the human Dsg1 gene and regulatory regions from Genome Browser. In the Dsg1 genomic locus, three p63-binding regions (-25Kb, -60Kb, -70Kb) were upstream of the gene and corresponded to genomic features indicative of active transcription (see Materials and Methods). b) Binding of p63 to the Dsg1 gene regulatory regions was confirmed using ChIP (see also Fig. 3d) and was decreased following exposure of NHEKs to 2000 J/m^2 UVB compared to unexposed controls.



Supplemental Figure 3: **Treatment of cells with the HDAC inhibitor TSA increases expression of desmosomal cadherins after UVB exposure:** Immunoblots revealed that TSA treatment helped rescue Dsg1 and Dsc1 expression after UVB exposure. Monolayer NHEKs were exposed to 2000 J/m^2 UVB prior to switching to high calcium medium, treated with TSA 24 hours later, then harvested 72 hours after calcium switch. Numbers represent band intensity fold change comparing unexposed treated and untreated cultures and comparing UVB-exposed treated and untreated cultures after normalization to GAPDH.