Lab on a Chip

Supplementary Information

Quantitative Dose-Response Curves from Subcellular Lipid Multilayer Microarrays

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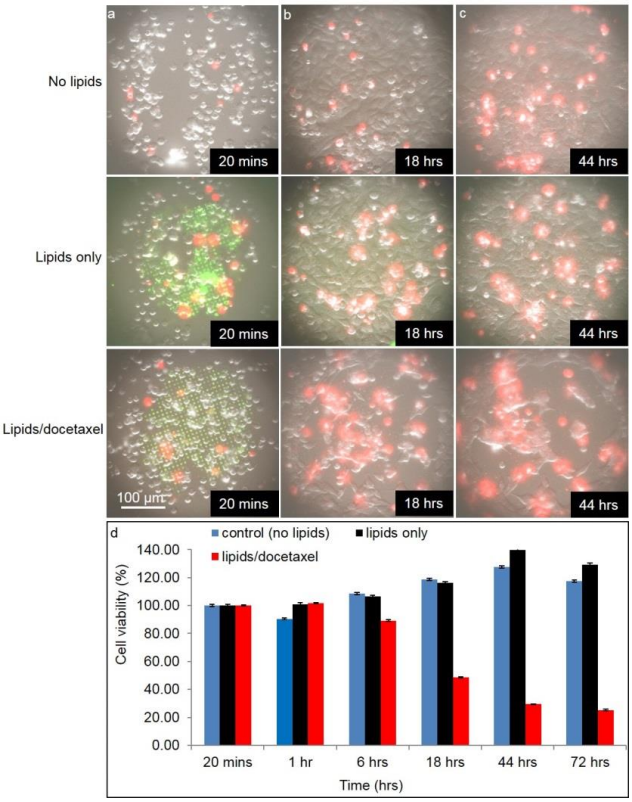
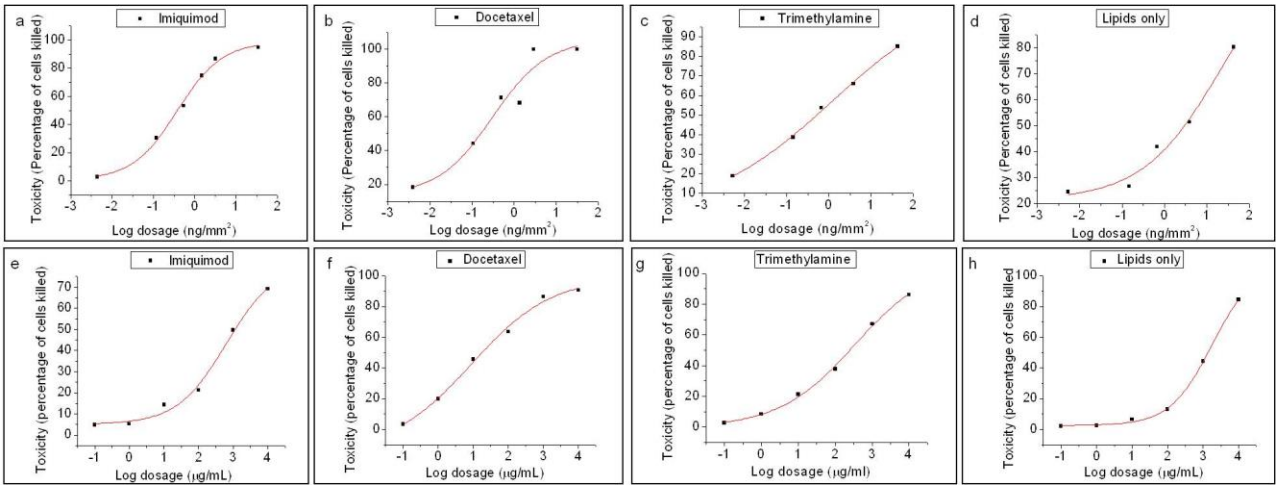
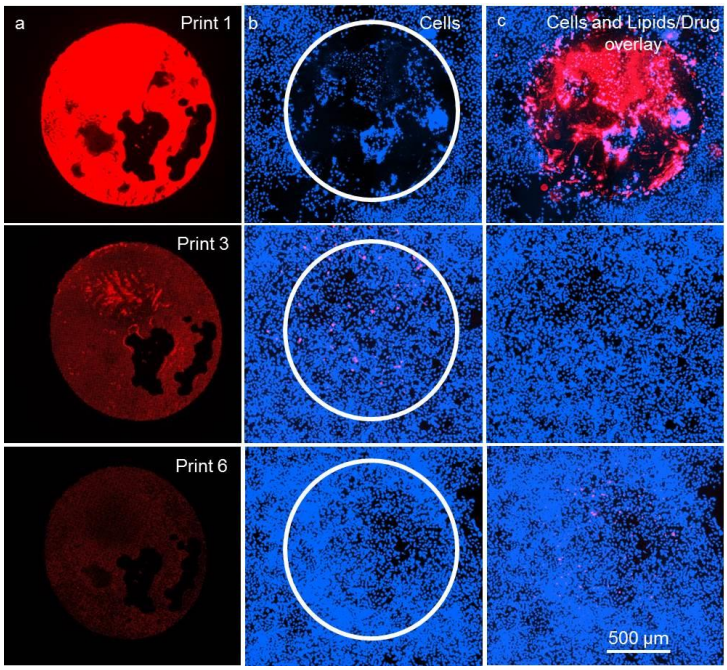
Supplementary figure 1. Toxicity of drugs to cells is due to uptake after cell adhesion to surface, not a lack of adhesion. (a) Adhesion of cells to all three experimental substrates 20 minutes after incubation in cell-culture media. Lipids used here are DOPC/DOTAP (7:3) doped with fluorescein (b) Continued adhesion and proliferation of cells after 18 hrs, on the lipid-free control surface, and on the surfaces with only nanointaglio lipid pattern. The cells over the lipid/docetaxel pattern begin to demonstrate toxicity after 18 hrs. (c) Some cell death is observed in both the no-lipid and the lipid-only cells after 44 hrs, but significantly higher toxicity is observed in the lipid/docetaxel patterned surface. All images are merged from DIC and fluorescence images (red propidium iodide to indicate cell death and green for fluoresceine doped lipid multilayers). (d) Graph showing cell viability over 72 hr culture period. The viability was normalized to the initial cell count at 20 mins incubation time. Error bars are standard error of the means before normalization.



Supplementary figure 2. Dose response curves generated via nanointaglio and from solution. (a), (b), (c) and (d) are imiquimod docetaxel, triethylenemelamine and lipids only, respectively, delivered via nanointaglio patterned lipid multilayers. (e), (f), (g) and (h) are the dose-response curves generated from solution-delivered imiquimod docetaxel, triethylenemelamine and lipids only, respectively.



Supplementary figure 3. Cell viability increases as the dosage of the lipid-multilayer-encapsulated drug decreases. (a) Successive prints of rhodamine-PE doped lipid-multilayer-encapsulated drug. The fluorescence intensity and hence the dosage decreases with increasing print number. (b) The DAPI-stained nuclei of cells cultured over the patterned areas in panel (a). White circle indicates area that has the lipid multilayers. (c) Merged fluorescence images of the corresponding panels in (a) and (c)



Supplementary movies:

Supplentary video 1. Video showing time course of cells first localizing and then adhering to a control region on the cell-culture surface with no lipids present. The cells proliferate over the 72 hr time period of the experiment without extensive cell death. Green is fluorescein doped lipids or lipid/docetaxel multilayers, red is propidium iodide stain indicating cell death.

Supplementary video 2. Video showing timecourse of cells first localizing and then adhering to a region with fluorescein-labelled DOTAP/DOPC (3:7) mixture in the same cell culture surface as the one with no lipids present. The cells proliferate over the 72 hr time period of the experiment without extensive cell death. Green is fluorescein doped lipids or lipid/docetaxel multilayers, red is propidium iodide stain indicating cell death.

Supplenentaty video 3. Video showing timecourse of cells initially localizing, then adhering to a region with docetaxel encapsulated in fluorescein-labelled DOTAP/DOPC on the same cell culture surface as the one with no lipids present. The cells first adhere to the surface and then begin to show high death rate. Green is fluorescein doped lipids or lipid/docetaxel multilayers, red is propidium iodide stain indicating cell death.