What is cell painting?

The Imaging Platform at the Broad Institute seeks to characterize perturbations by measuring the morphological changes they induce using a high-throughput assay called Cell Painting. Cell Painting (https://www.nature.com/articles/nprot.2016.105)is a morphological profiling assay that multiplexes six fluorescent dyes, imaged in five channels, to reveal eight broadly relevant cellular components or organelles. Cells are plated in multiwell plates, perturbed with the treatments to be tested, stained, fixed, and imaged on a high-throughput microscope. Next, automated image analysis open-source software, CellProfiler (http://cellprofiler.org/), is used to identify individual cells and measures ~1,700 morphological features (various measures of size, shape, texture, intensity, etc) to produce a rich profile that enables the detection of subtle phenotypes. Profiles of cell treated with different experimental perturbations can be compared to suit many goals, such as identifying the phenotypic impact of chemical or genetic perturbations, grouping compounds and/or genes into functional pathways, and identifying signatures of disease. The assay offers single-cell resolution, and is complementary to the Connectivity Map (https://clue.io/cmap), which characterizes cell population responses to perturbation using transcriptomics.

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