

# **Large-scale identification of subcellular phenotypes by image analysis of live cell arrays**

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Light microscopic analysis of cell morphology provides a high-content readout of cell function and protein localization. Cell arrays and microwell transfection assays on cultured cells have made cell phenotype analysis accessible to high-throughput experiments. Both the localization of each protein in the proteome and the effect of RNAi knock-down of individual genes on cell morphology can be assayed by manual inspection of microscopic images. However, the use of morphological readouts for functional genomics requires fast and automatic identification of complex cellular phenotypes. We developed a fully automated platform for high-throughput cell phenotype screening combining human live cell arrays, screening microscopy and machine-learning based classification methods. Our classification method can be adapted to virtually any microscopic assay based on cell morphology, opening a wide range of applications including large-scale protein localization assays and genome-wide RNAi screening in human cells.