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Poster Abstract Deadline: 18th September 2022

Poster Title:

Kinetic phenotyping of cellular morphology, proliferation and motility using quantitative phase imaging ptychography.

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Poster Abstract:

The unique phenotype of a cell results from the culmination of numerous cellular processes that coalesce through a network of molecular interactions to produce a distinct morphological signature. Visual cell phenotyping is the characterization and subsequent quantification of these observable traits from cellular images. As the magnitude and complexity of visual cellular phenotypic assays increase in terms of scale, resolution and throughput, modern imaging solutions coupled with more powerful computing and analysis software offers novel ways to investigate new molecules.

Here, we tested a panel of metabolic inhibitor compounds in several primary and immune cell lines to assess real-time cellular stress responses with the Phasefocus Livecyte system. The system utilises ptychography, a form of quantitative phase imaging, to generate accurate high-resolution readouts of morphological change, motion, and dry mass of individual cells at specific predetermined intervals. This results in a more complete kinetic characterisation of live cell phenotypic properties under the influence of compound treatments than can be achieved by conventional end-point assay readouts.

Our results revealed a robust reduction of cellular activity in the presence of inhibitor compounds, coupling decreased proliferation rates and cellular motility with morphological changes in both a concentration- and treatment time-dependent manner (72-hour read duration comprising 15 min capture intervals; n=3). This work demonstrates the growing capabilities of novel imaging systems in *in vitro* drug discovery compound screening in comparison with traditional platforms. Moreover, it outlines the importance of capturing detailed kinetic experimental data with multiparameter readouts to aid the profiling of live cell phenotypic responses.