

## Q-Phase, a label-free multimodal holographic microscope for quantitative phase imaging

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### Abstract

Live-cell imaging based on holographic microscopy provides a new innovative method for biologists to measure the morphological and dynamic changes of living cells in real-time and without disrupting the routine culture.

Q-Phase is a label-free multimodal holographic microscope that enables quantitative phase imaging (QPI) where the phase shift of the light waves crossing a specimen is being quantified (**Fig.1**). Thus, the produced phase images represent quantitative meaningful values that can be used in various cell analysis applications.

Q-Phase is a top choice holographic imaging cytometry that ensures a very accurate and fast automatic cell segmentation. It provides a high-quality QPI image with precise discrimination of the image background which is totally subtracted to zero values (**Fig. 2**) and thus cells outline segmentation turns into a straightforward process.

The Patented design of Q-Phase provides very high phase detection sensitivity allowing precise measurement of cell dry mass across the time which serves in many aspects as a sensitive parameter for the cell integrity, growth, and dynamics. Moreover, the use of a unique optical configuration and light source with low coherence allows QPI in scattering media with suppression of the common imaging artifacts such as halo effect and coherence noise.

Finally, Q-Phase is a multimodal system that combines both QPI and fluorescence which permits the application of various experimental designs with very low phototoxicity.

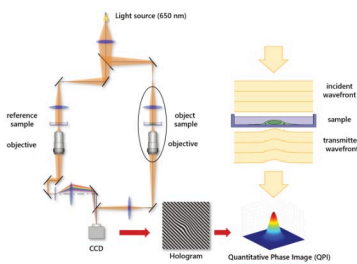


Figure 1: Diagram represents the working principle of Teilight Q-Phase holographic microscope

Halogen light source is split into two paths. Object path that transilluminates the sample and reference path that crosses through a blank. Interference of the two paths creates a hologram from which we calculate the phase shift values induced by the sample.

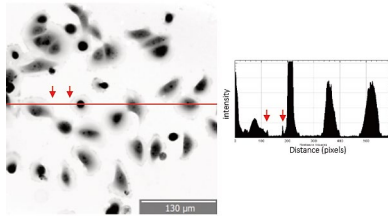


Figure 2: Quantitative phase image for prostate cancer cells “PC3”

Redline crossing the cells indicates the cell dry mass profile in the corresponding histogram. Arrows point to projections in cell membranes with a trivial accumulation of cell dry mass. Background at zero value enables accurate identification of cells outlines.