

# CELL CULTURE QUALITY ASSESSMENT UTILIZING QUANTITATIVE PHASE DIGITAL HOLOGRAPHIC MICROSCOPY

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## ABSTRACT

Cell culture quality assurance is usually performed by microscopic inspection that depends on the investigator's expertise and experience with the appropriate cell line. Thus, methods for accurate assessment of objective cell parameters that characterize a specific cell line and detect global changes in cell culture are highly desirable. We demonstrate the utilization of quantitative phase imaging with digital holographic microscopy (DHM) [1] to quantify the impact of cell culture conditions on single cells by retrieval of biophysical parameter sets using a pancreatic tumor cell model. Label-free quantitative phase imaging of detached cells in suspension is performed by Michelson interferometer-based self-interference DHM [2]. The quantitative phase images of the cells are analyzed for refractive index, volume and dry mass [3,4]. After identification of adequate cell numbers for reliable statistics the method's performance is illustrated by results from independently repeated measurements and the quantification of the influence of osmolality changes of the cell culture medium. Moreover, we show that the evaluation of quantitative DHM phase images allows to extract absolute biophysical cellular parameters that are related to cell layer confluence states. In summary, the results of our study demonstrate that DHM is capable for label-free imaging cytometry with novel biophysical data sets that are acquired with minimum sample preparation for sophisticated monitoring of cell morphology alterations that are related to changes of cell culture conditions.

## REFERENCES

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