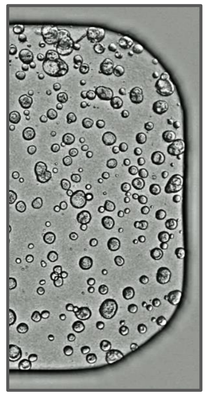
Multi-dimensional patient-derived organoid analysis highly correlates with progression-free survival of pancreatic cancer patients in a retrospective clinical trial

Abraham Lin[1,2], Maxim Le Compte[1], Tyler Gilcrest[2], Edgar Cardenas De La Hoz[3], Geert Roeyen[4], Filip Lardon[1], Christophe Deben[1]

[1]Center for Oncological Research, University of Antwerp, Belgium, [2]Orbits Oncology, San Francisco, USA, [3]Industrial Vision Lab, University of Antwerp, Belgium, [4]Department of Hepatobiliary Transplantation & Endocrine Surgery, University Hospital Antwerp, Belgium

Introduction



Patient-derived organoids have the potential to represent human tumors better than any other in vitro cancer model

- Retains patient tumor heterogeneity
- Retains patient mutational landscape
- Retains patient tumor histological architecture

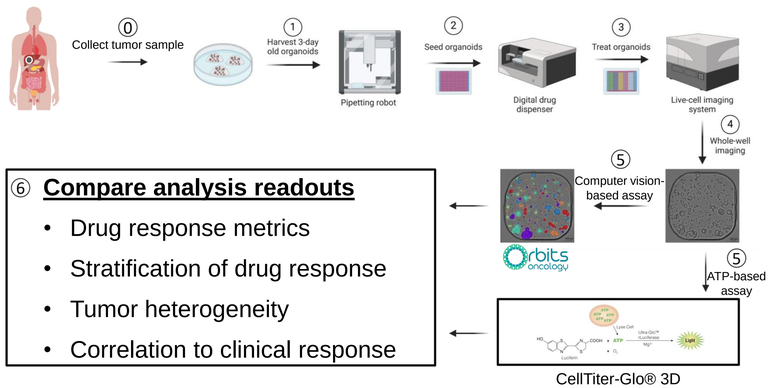
The biggest limitation is the current analysis methods, which largely rely on ATP-based assays (CellTiter-Glo3D)

- Single-timepoint and endpoint assays
- Extracts only a fraction of clinically-relevant information
- Fails to capture patient tumor heterogeneity

We hypothesized that using higher-dimensional analysis methods will further unlock the predictive performance of organoids and facilitate translation of research.

Aims & Methods

The aim of our study is to evaluate the clinical relevance of organoid analysis following dynamic quantification of organoids at a single-organoid resolution.

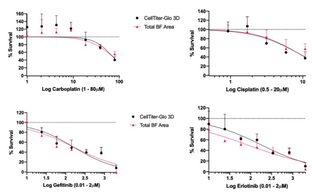


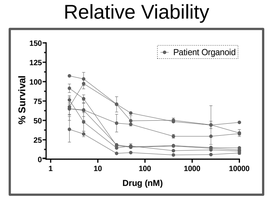
⑥ **Compare analysis readouts**

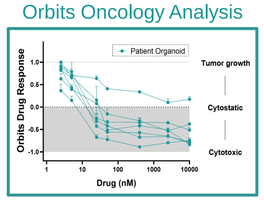
- Drug response metrics
- Stratification of drug response
- Tumor heterogeneity
- Correlation to clinical response

Results

1. Dynamic quantification of organoids delineates drug mechanism of action

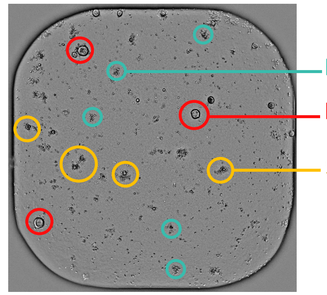


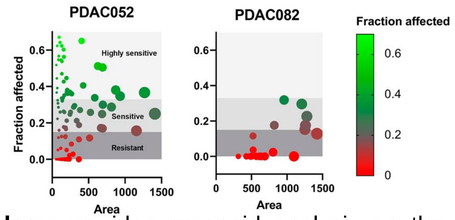




CellTiter-Glo3D is an ATP-based, endpoint viability analysis. **Orbits Oncology** analysis is a computer vision-based analysis that monitors organoid drug response over time. Our brightfield (BF) image-based analysis also enables stratification of patient-organoid drug responses where traditional viability analysis has failed.

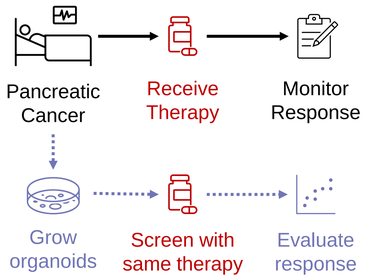
2. Single-organoid resolution analysis quantifies tumor heterogeneity

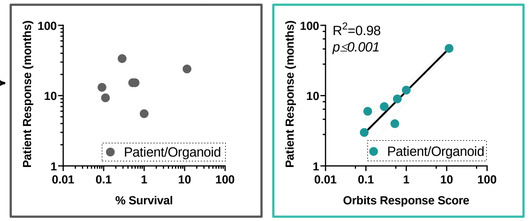




Orbits Oncology provides organoid analysis on the single-organoid level, which enables quantification of resistant and sensitive clones within the patient tumor.

3. Drug responses from Orbits Oncology highly correlate with patient response





Conclusions

Computer vision-based analysis **extracts more information** from your organoid experiments:

- Delineate cytotoxic and cytostatic drug effects
- Stratify patient-organoid drug response
- Quantify tumor heterogeneity

Computer vision-based analysis enables **higher correlation** with patient therapy response.

This work highlights the potential applications of our organoid drug screening approach in cancer drug development and personalized medicine, which is extendable to other tumor types.

Related references:

https://doi.org/10.1038/s41698-023-00480-y

SCAN ME

Contact

Interested in drug screening?

Prof. Dr. Christophe Deben

University of Antwerp, Belgium

Tumor Organoid Screening Lab–Principal Investigator

christophe.deben@uantwerpen.be

Interested in organoid analysis?

Dr. Abraham Lin

Orbits Oncology – CEO

www.orbits-oncology.com

abraham.lin@orbits-oncology.com