Nonlinear parameter estimation to quantify cellular phenotype

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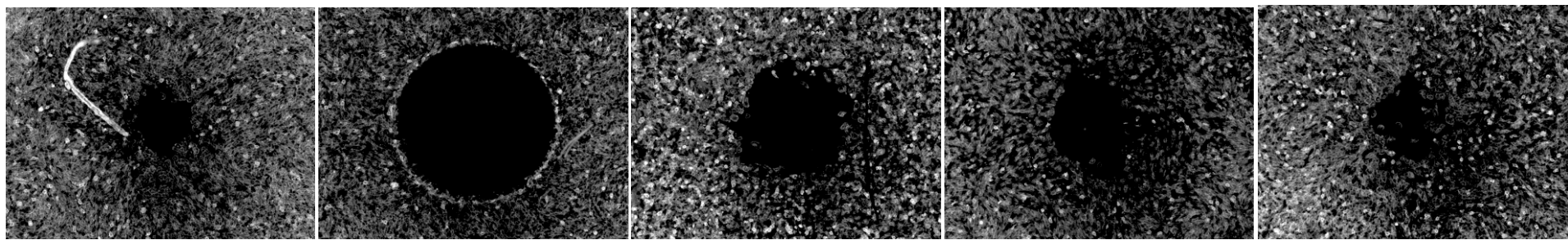School of Engineering

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Motivation

1- Untreated	2 - Stopper	3 - Taxol	4 - AGR2-Ab	5 - IgG (Ctrl-Ab)

We must advance cancer research
from qualitative observations
to quantitative conclusions

User friendly

Thus, need tools for^phenotype quantification
in cancer biology

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Examples of data available

SOP: Thawing, Propagating and Cryopreserving of NCI-PBCF-HTB22 (MCF-7)

APPENDIX 2: GROWTH PROFILE OF NCI-PBCF-HTB22 (MCF-7) CELLS

Figure 4: Growth curve for MCF-7 cells; cells were plated at 4×10^4 viable cells/cm^2; population doubling time (PDT) is approximately 38 h.

Growth curves from papers

High Content Screening Microscope outputs

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What can we do with these data?

1- Record and share it

→ MultiCellDS.org

<u>M</u>ulti<u>cell</u>ular <u>D</u>ata <u>S</u>tandard

2- Quantify key elements of cell phenotype

→ CellPD.MathCancer.org

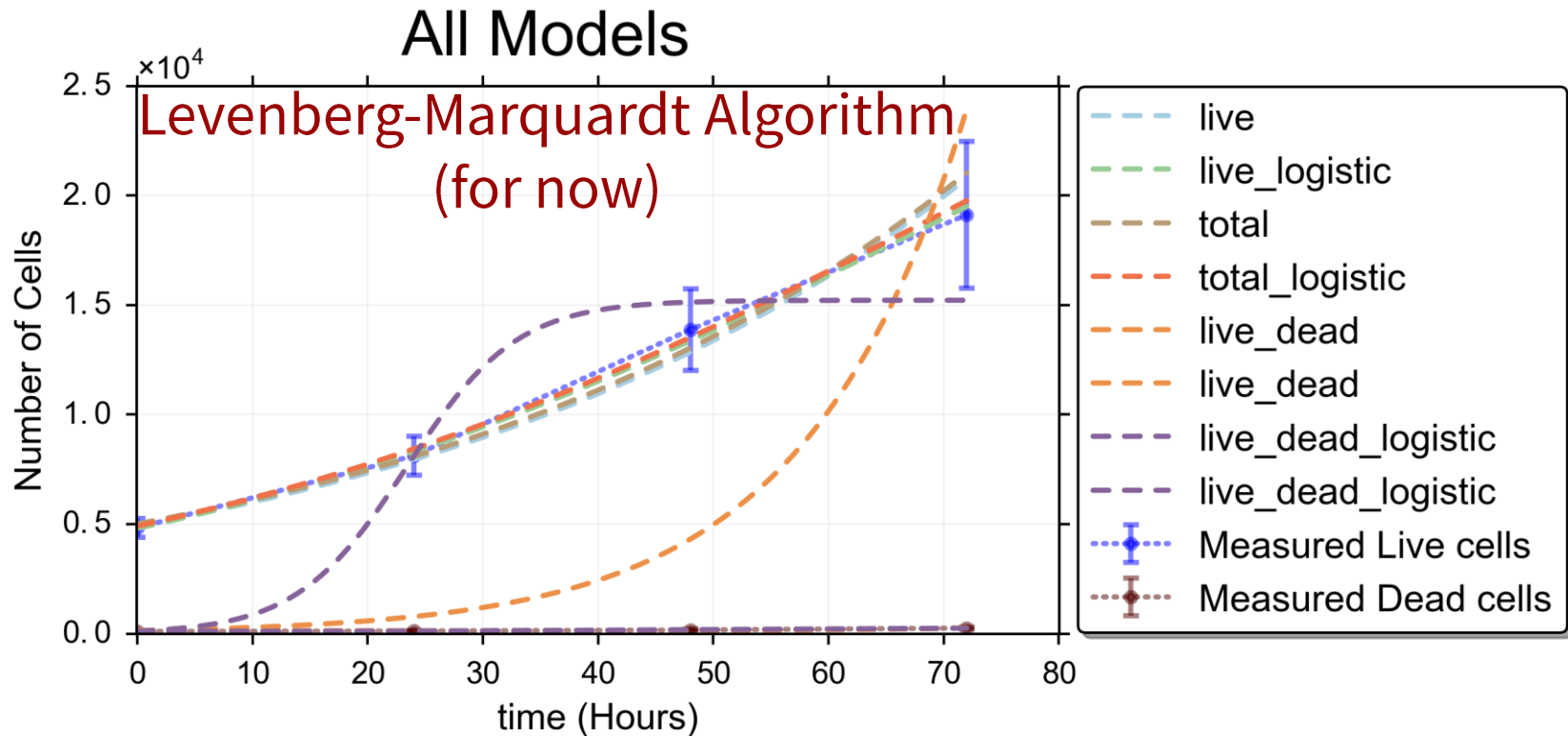<u>Cell</u> <u>P</u>henotype <u>D</u>igitizer

Sample inputs from CellPD

To be user friendly:
CellPD requires one excel file as its only input

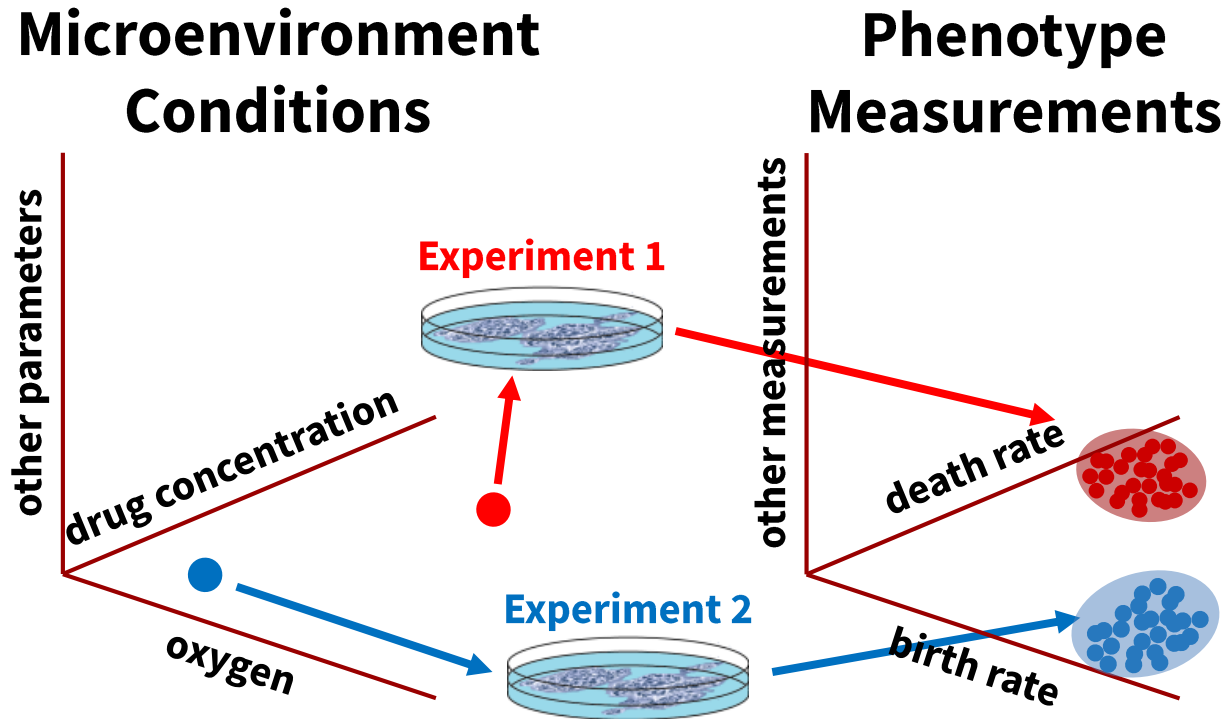# Sample outputs from CellPD

Fit a few basic models to live & dead
cell counts → extract relevant parameters

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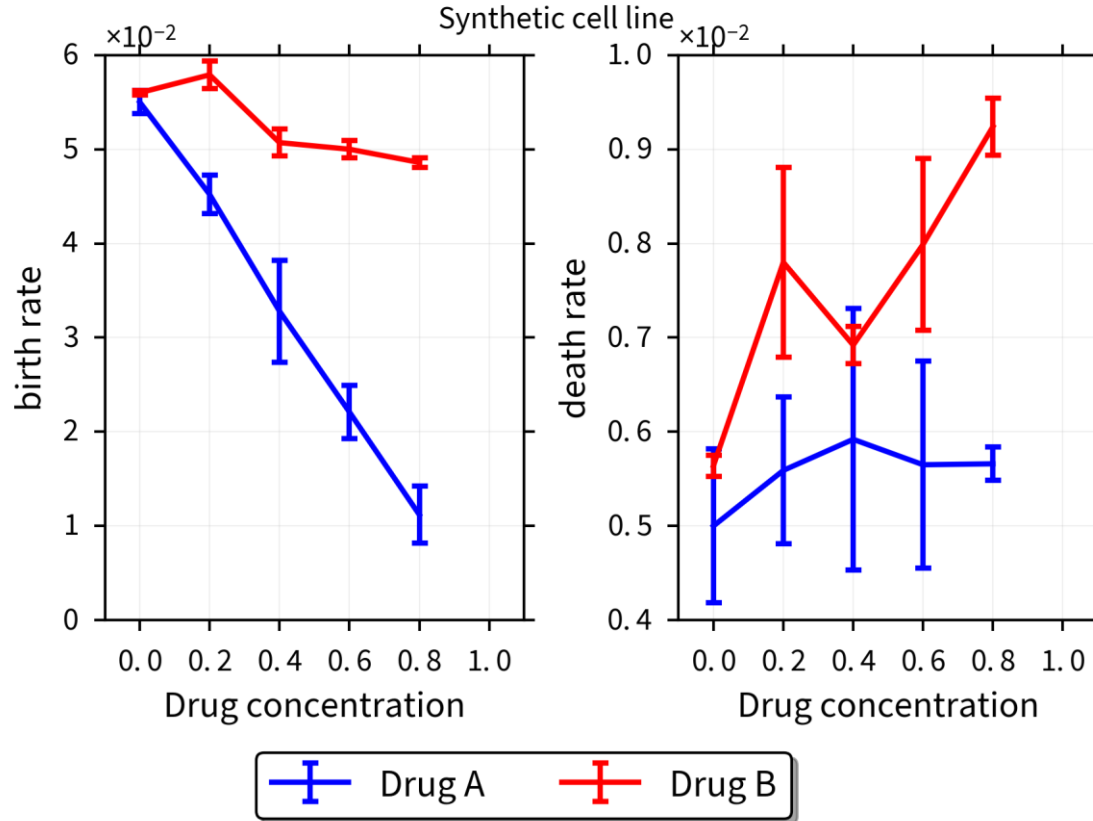
What else can we use CellPD for? Drug classification

Next:

Let's quantify the effects of two synthetic drugs

Synthetic data analyses

CellPD accurately discerns between a
cytostatic drug and a cytotoxic drug

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CellPD brings nonlinear parameter estimation to the hands of biologists

Open source: CellPD.MathCancer.org