Nonlinear parameter estimation to quantify cellular phenotype

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We must advance cancer research from qualitative observations to quantitative conclusions.

**User friendly**
Thus, need tools for phenotype quantification in cancer biology.
Examples of data available

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

Figure 4: Growth curve for MCF-7 cells; cells were plated at $4 \times 10^4$ viable cells/cm²; population doubling time (PDT) is approximately 38 h.

**Growth curves from papers**

**High Content Screening Microscope outputs**
What can we do with these data?

1- Record and share it
   → MultiCellDS.org

2- Quantify key elements of cell phenotype
   → CellPD.MathCancer.org

Multicellular Data Standard

Cell Phenotype Digitizer
Sample inputs from CellPD

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

All Models

Levenberg-Marquardt Algorithm
(for now)

Fit a few basic models to live & dead cell counts → extract relevant parameters
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
CellPD brings nonlinear parameter estimation to the hands of biologists

Open source: CellPD.MathCancer.org