# INSTRUCTIONS

Code written by:

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## Introduction:

The code has been written keeping in mind xCELLigence real-time impedance measurements. The program uses a simple kinetic model for predicting the temporal- and dose-dependent effects of chemical in terms of its 50% inhibitory concentration $IC_{50}$ and parameters related to cell turnover, taking the actual cell impedance dynamics into account. The code is in MATLAB but can easily be adapted to the open source version Octave. We hope that the users are familiar with MATLAB.

## Usage and Input:

The following syntax can be entered at the command window of MATLAB to execute the function:

Usage:

      ToxFit(input_file,iterations,start_time)

      Example: ToxFit('Exampledata.xlsx',5,50)

      If ToxFit('Exampledata.xlsx',5,50) is executed, bootstrap sampling will be performed for 5 iterations with a starting time point at 50 h for the data in the file 'Exampledata.xlsx'.

Input:

      input_file: an excel file giving time points in the first column, test concentrations in the first row and normalized cell index values in cells corresponding to the time point and concentration of the test chemical. The time should be provided in hour and concentration in micromolar. Please refer to the 'Exampledata.xlsx' file for more details about the format of the input file.

      iterations: gives the number of bootstrap iterations used for determining the confidence intervals for the fitted parameters.

start_time: defines the offset after which the data will be used for fitting. This normally denotes a  time point in the cytotoxicity-associated phase of growth.

## Output:

IC$_{50}$: gives the concentration of the chemical required to inhibit cell growth by 50%.

Growth rate: gives the estimated growth rate of the cells  in the absence of the test chemical.

Figure: depicting the time-profiles of the simulated and the experimental data. It shows the fit of the simulated (in dark blue) and the experimental data (labeled colored markers). The cyan line indicates the extrapolation of the simulated curves beyond the time-interval of simulations.

## Remark:

- The selection of an appropriate starting time point for simulation is crucial. As shown in the experimental data (figure S1 in the main manuscript), this time-point is selected from the later phase of growth.

- Since the source code is provided, the values of input can be changed in the code itself using an editor.

- In the source code, random seed can be changed according to the requirement.