# Simulx - GUI: a flexible and user-friendly application for simulations

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### Simulx – GUI 2020

- Advanced simulator of clinical trials and decision-making tool
- Easy-to-use and interactive interface
- Intuitive workflow
- Interconnected with MonolixSuite applications
- Flexible in building simulation scenarios
- Advanced computational capabilities with C++ engine
- Immediate visual feedback
- Export of plots and results

### How does it work?



### Example

**Remifentanil PKPD dataset -** opioid analgesic drug used for sedation tested on 65 healthy adults who received an infusion at different rates; concentration of the drug and EEG measurements

### **Clinical study questions:**

- 1. What percentage of individuals reach the efficacy target at different dose levels?
- 2. What is the uncertainty of the result in a small size trial and how does it change if more individuals are recruited?

### Methods:

Model: PKPD model from the Monolix library with the population parameters estimated in Monolix

qualitative and quantitative Simulations: comparison of two arms with different treatments and different number of subjects



### **DEFINITION & EXPLORATION**

### Import from Monolix

Starting a Simulx project from a Monolix project loads automatically the model developed in Monolix and creates all simulation elements with values estimated by Monolix or read from a dataset.



### Definition of simulation elements

Creating new simulation elements is very flexible using single values, regular grids, distributions or external files.

### New treatment elements:

- Infusion for 2h with different infusion rates: 25 or 50 ug/min
- Definition of the infusion starting time, the dose amount and the infusion duration
- options: cycles, Other scaling, covariate noncompliance probability

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### Exploration

Exploration tab allows to simulate a typical individual to investigate different treatments and effects of model parameters.



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The Outcomes & Endpoints task is used for post-processing of the simulation outputs. Several outcomes can be combined into an endpoint, and several endpoints can be created. Statistical tests compare endpoints between groups.



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# in 2020 release?

### SIMULATION

### Simulation of a clinical trial with two treatments

he Simulation tab aim is to simulate populations of individuals in roups, either one or several. It contains a simulation scenario uilder which uses simulation elements defined in the "Definition"

Four groups with different treatments (25 or 50 μm/min infusion rate) and different number of individuals (20 or 100) Individual parameters simulated using population parameters estimated by Monolix and covariates from the original dataset **Output:** model predictions for the concentration and EEG Several simulations of the scenario (replicates) for uncertainty assessment

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### Efficacy target

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- Outcome: EEG at time 120 min in the EEG target range [5, 15] Hz
- Efficacy endpoint: percentage of individuals in the EEG target
- Stat test: Fisher's exact test for the odds ratio between test groups and reference group

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### Results

Tables display the percentage of individuals in the EEG target for each replicates. With 20 individuals per arm, this percentage varies from 20 to 65 for the 25µm/min arm and from 50 to 95 for the 50µm/min arm. The difference between arms is significative: 36% over the clinical trial replicates. With 100 individuals per arm, the probability of success is 76% for the  $50\mu$ m/min arm.



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### **PLOTS & RESULTS**





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