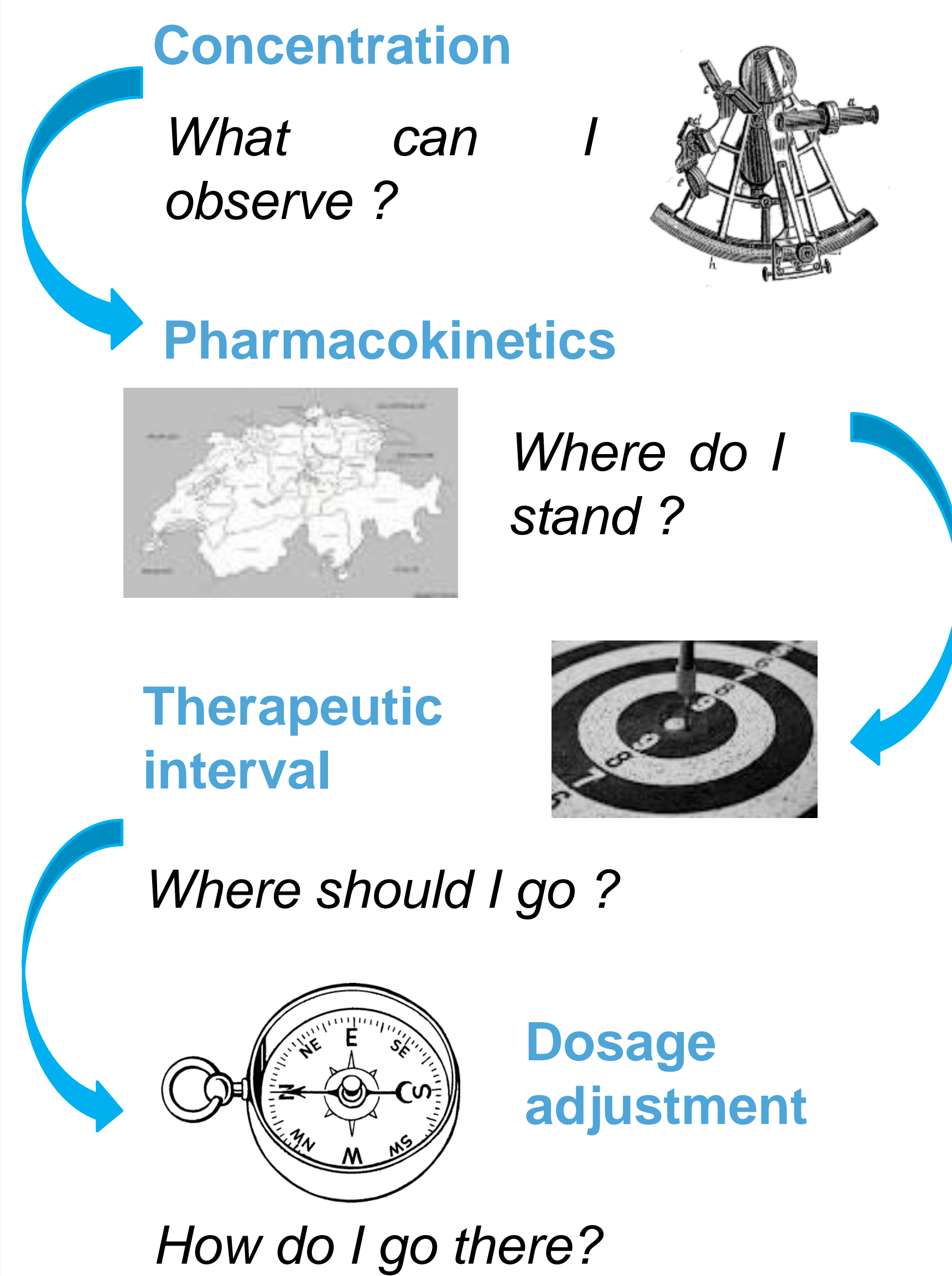


Benchmarking therapeutic drug monitoring software

A systematic evaluation of available computer tools

Background

- Therapeutic drug monitoring (TDM) aims at predicting treatment success, failure or toxicity, and to adjust prescription in consequence¹.
- Treatment is optimized by individualizing dosage regimen based on the measurement of blood concentrations.
- To maintain concentrations within a target range requires pharmacokinetic and clinical capabilities. Bayesian calculation represent a gold standard TDM approach, but requires computing assistance².
- In the last decades computer programs have been developed to assist clinicians in this assignment³.
- The development of miniaturized drug measurement methods will require embedded software to assist clinicians in dosage individualization.



Objectives

1. To assess and compare computer tools developed to assist clinicians in the routine individual TDM-guided dosage adjustment.
2. To identify suitable specifications for the development of a novel tool designated for microplatforms.

Method

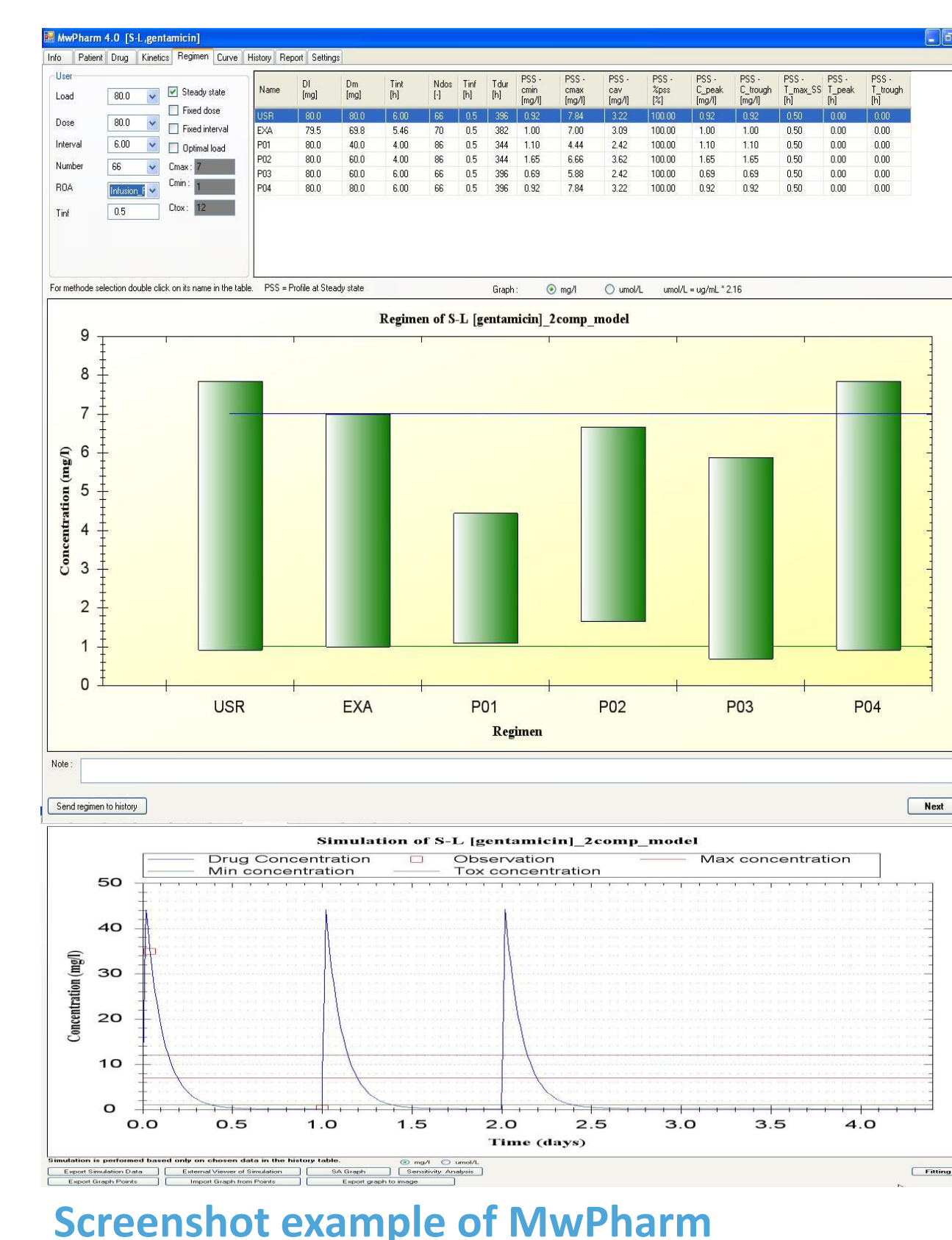
- Literature and Internet were searched to identify software.
- Each program was scored against a standardized grid covering aspects such as pharmacokinetic relevance, user-friendliness, computing aspects, interfacing, and storage.
- A consensual weighting factor was applied to each criterion of the grid for its relative importance.
- Six representative clinical vignettes were processed through each of them to assess the robustness of the software.

Results

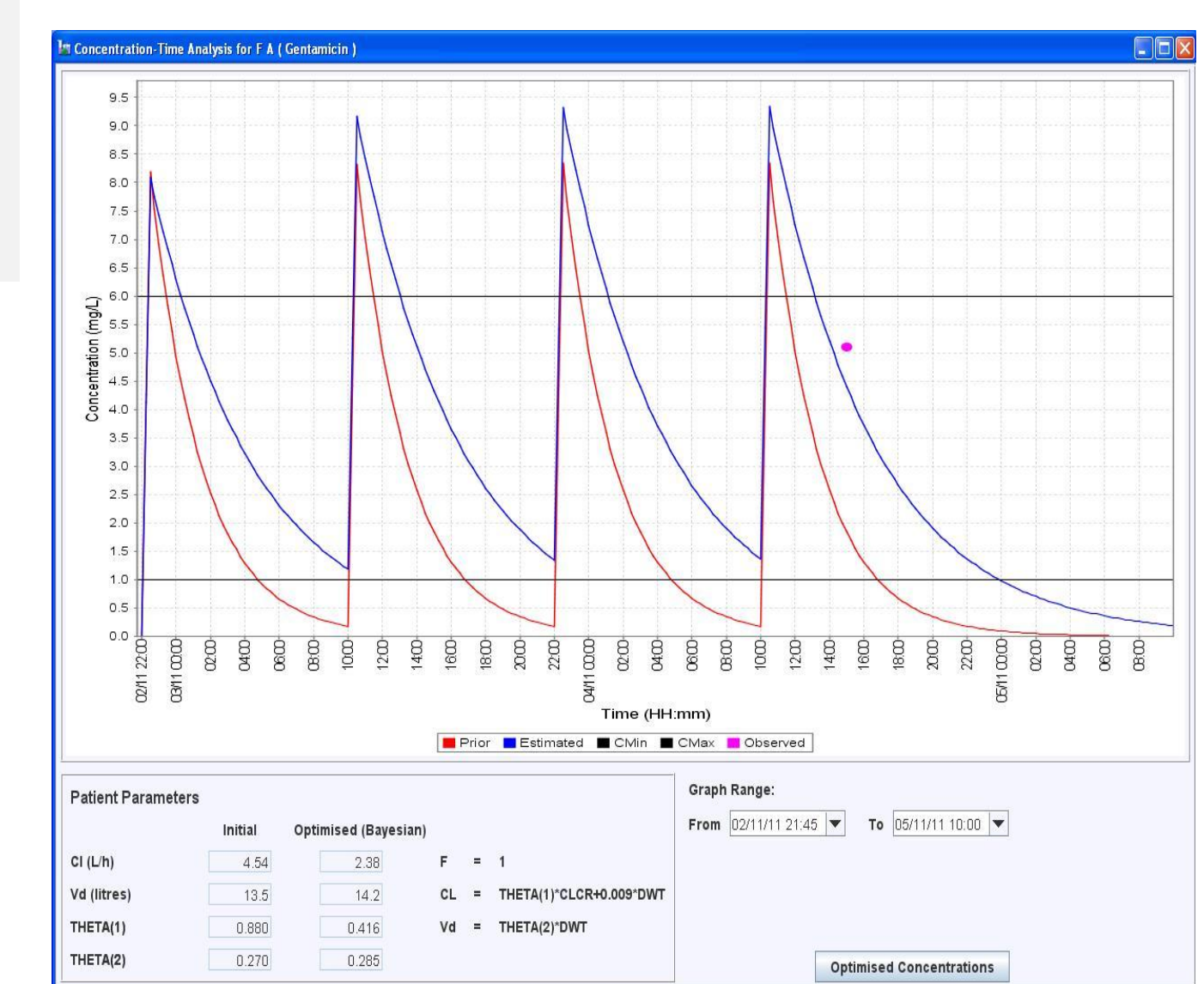
- 12 software tools were identified, tested and ranked, representing a comprehensive review of available software.
- MwPharm (1250 € per license) and TCIWorks (free) were best ranked tools but represent sophisticated programs.
- Numbers of drugs handled by the software vary widely (from 2 to 180).
- 8 programs offer the possibility to add new drug models based on population pharmacokinetic data.
- Bayesian computation to predict dosage adaptation based on a blood concentration (*a posteriori* adjustment) is performed by 10 tools, while 9 are also able to propose *a priori* dosage regimens, only based on individual patient covariates such as age, gender, and weight. They mostly converge to similar predictions (when clinical vignette were able to be processed).

Table 1: Categories and overall ranking (top three highlighted in blue)

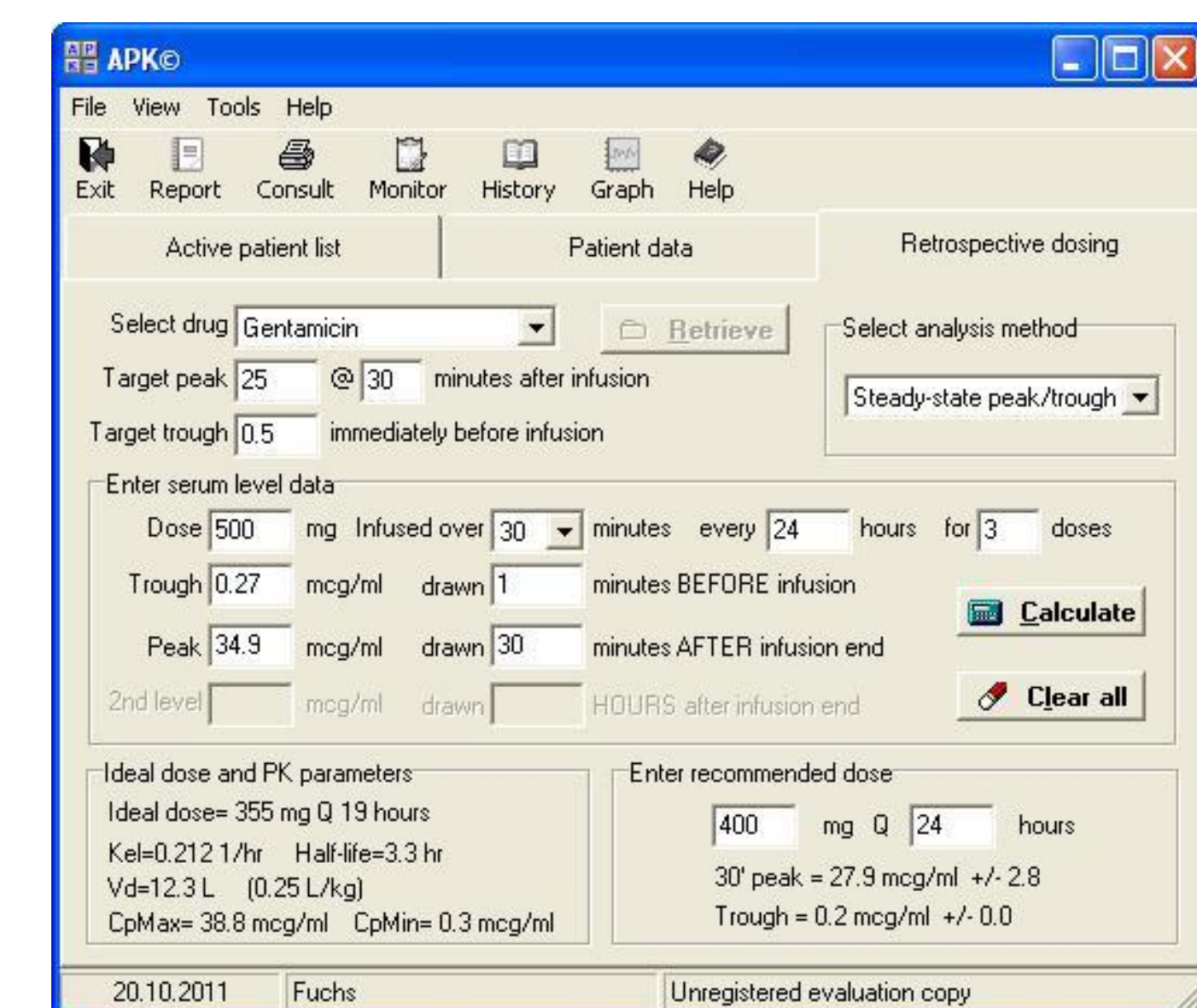
	MM-USC *Pack	Mw Pharm	TCI Works	JKPD	TDM for R	Antibiotic Kinetics	APK	Kinetics	Kinetindex	TDMS 2000	Data Kinetics	RAD Kinetics
General characteristics												
User interface	10	4	7	6	11	3	1	2	5	9	8	12
Interfacing	5	1	5	5	5	2	2	2	5	5	5	5
Storage	7	2	8	10	10	10	3	1	5	6	4	9
Report	10	1	7	8	12	9	2	2	6	5	4	10
Cost	4	8	3	6	6	5	1	1	12	8	10	11
Computational aspects	10	3	1	2	11	6	6	6	9	5	4	12
Total	10	3	4	9	11	8	1	2	6	7	5	12
Pharmacokinetic aspects												
Population and drug	7	1	6	2	11	9	3	8	5	4	10	12
Models	1	3	2	9	10	8	7	6	4	5	11	12
Modularity	7	8	1	1	11	4	4	4	3	9	11	10
Plot	1	3	2	10	11	6	6	6	3	3	6	11
Various	10	3	1	5	12	7	7	9	6	4	2	11
Total	3	2	1	8	11	9	6	7	4	5	10	12
Authors												
Expertise of authors	1	3	2	9	9	6	6	6	12	5	4	9
GLOBAL RANK	6	1	2	9	11	8	3	4	7	5	10	12



Screenshot example of MwPharm



Screenshot example of TCIWorks



Screenshot example of APK

Perspective

- Computer-assisted therapeutic monitoring gains growing interest and should further improve, especially in terms of user-friendliness, institutional information system interfacing, data storage capacity and report generation.
- It will represent an important component of future microplatforms for point of care drug concentration monitoring.

References

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Support

