

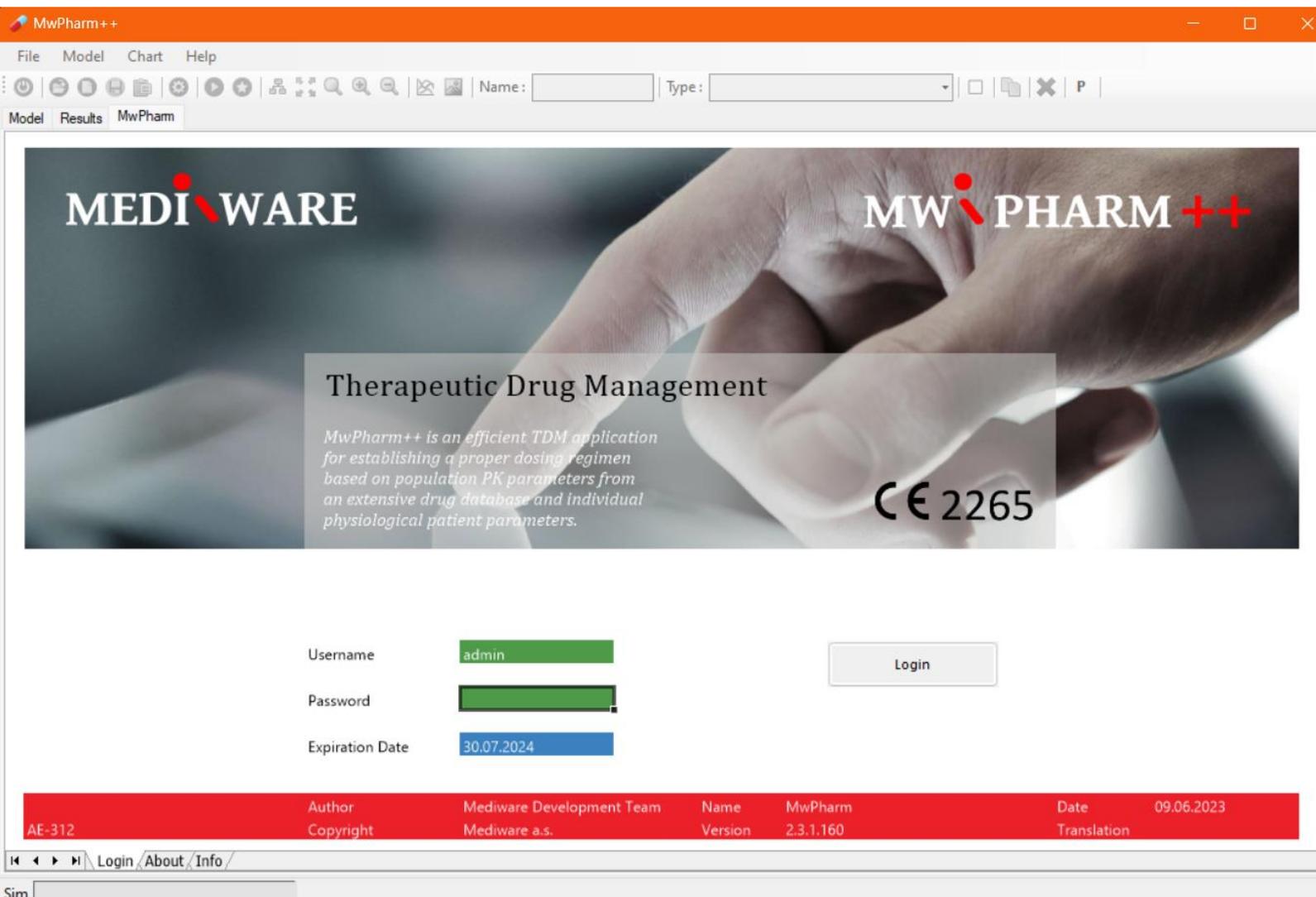
## MWPHARM++ USER MANUAL

### LOGIN SCREEN

After launching and loading the app, it is necessary to log in. By default (until the user changes it), the account logins are:

<b>Administrator:</b>	Username: admin	Password: admin
<b>Super user:</b>	Username: super	Password: super
<b>Normal user:</b>	Username: user	Password: user
<b>Guest:</b>	Username: guest	Password: guest

The application supports **multiple user accounts**.



## PATIENT SCREEN – CREATING A NEW RECORD

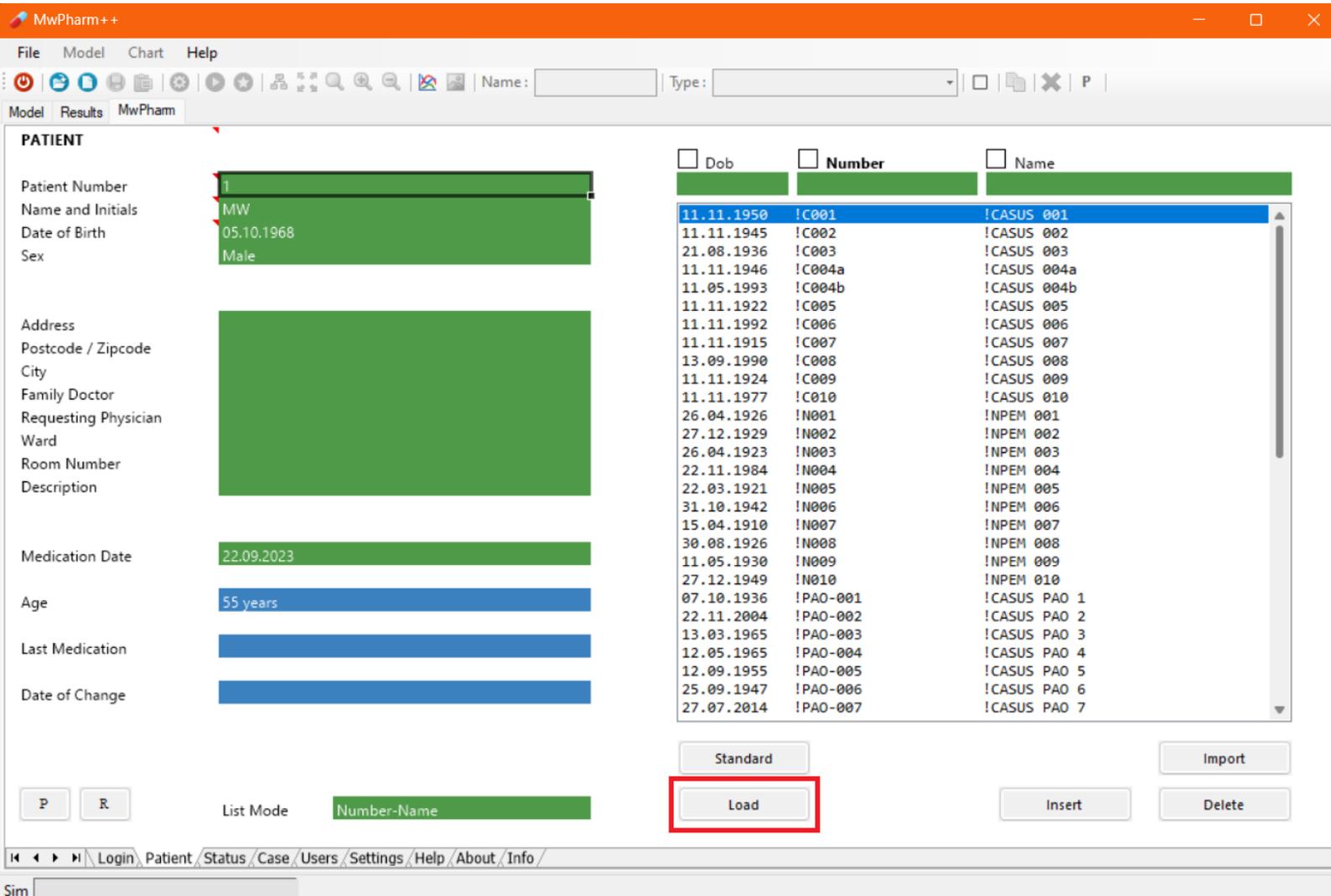
Click on **Standard** button to create a new record in the patient database. Fill the Patient Number, Name, Date of Birth and Sex and click on **Insert** button. New patient will be inserted into the database.

The screenshot shows the MwPharm++ application interface. The main window is titled "MwPharm++" and has a menu bar with "File", "Model", "Chart", and "Help". Below the menu bar is a toolbar with various icons. The main area is divided into two panes. The left pane is titled "PATIENT" and contains a form for creating a new patient record. The form fields are: Patient Number (1), Name and Initials (MW), Date of Birth (05.10.1968), Sex (Male), Address (2), Postcode / Zipcode, City, Family Doctor, Requesting Physician, Ward, Room Number, and Description. Below these fields are Medication Date (22.09.2023), Age (55 years), Last Medication, and Date of Change. The right pane is a list of existing records with columns for Dob, Number, and Name. The list contains 21 records. At the bottom of the screen, there are three buttons: "Standard" (1), "Insert" (3), and "Import". The "Standard" button is highlighted with a red box and the number 1. The "Insert" button is highlighted with a red box and the number 3. The "Standard" button is highlighted with a red box and the number 1. The "Insert" button is highlighted with a red box and the number 3. The "Standard" button is highlighted with a red box and the number 1. The "Insert" button is highlighted with a red box and the number 3.

Dob	Number	Name
11.11.1950	!C001	!CASUS 001
11.11.1945	!C002	!CASUS 002
21.08.1936	!C003	!CASUS 003
11.11.1946	!C004a	!CASUS 004a
11.05.1993	!C004b	!CASUS 004b
11.11.1922	!C005	!CASUS 005
11.11.1992	!C006	!CASUS 006
11.11.1915	!C007	!CASUS 007
13.09.1990	!C008	!CASUS 008
11.11.1924	!C009	!CASUS 009
11.11.1977	!C010	!CASUS 010
26.04.1926	!N001	!NPEM 001
27.12.1929	!N002	!NPEM 002
26.04.1923	!N003	!NPEM 003
22.11.1984	!N004	!NPEM 004
22.03.1921	!N005	!NPEM 005
31.10.1942	!N006	!NPEM 006
15.04.1910	!N007	!NPEM 007
30.08.1926	!N008	!NPEM 008
11.05.1930	!N009	!NPEM 009
27.12.1949	!N010	!NPEM 010
07.10.1936	!PA0-001	!CASUS PAO 1
22.11.2004	!PA0-002	!CASUS PAO 2
13.03.1965	!PA0-003	!CASUS PAO 3
12.05.1965	!PA0-004	!CASUS PAO 4
12.09.1955	!PA0-005	!CASUS PAO 5
25.09.1947	!PA0-006	!CASUS PAO 6
27.07.2014	!PA0-007	!CASUS PAO 7

## PATIENT SCREEN – SELECTING EXISTING PATIENT

Select the patient and click **Load** button to load existing patient from the database.



The screenshot shows the MwPharm++ application window. The title bar reads "MwPharm++". The menu bar includes "File", "Model", "Chart", and "Help". The toolbar contains various icons for file operations and search. The main window is divided into two main sections: a patient form on the left and a patient list on the right.

**PATIENT Form Fields:**

- Patient Number: [Redacted]
- Name and Initials: MW
- Date of Birth: 05.10.1968
- Sex: Male
- Address: [Redacted]
- Postcode / Zipcode: [Redacted]
- City: [Redacted]
- Family Doctor: [Redacted]
- Requesting Physician: [Redacted]
- Ward: [Redacted]
- Room Number: [Redacted]
- Description: [Redacted]
- Medication Date: 22.09.2023
- Age: 55 years
- Last Medication: [Redacted]
- Date of Change: [Redacted]

**Buttons:** P, R, List Mode, Standard, Load (highlighted with a red box), Import, Insert, Delete.

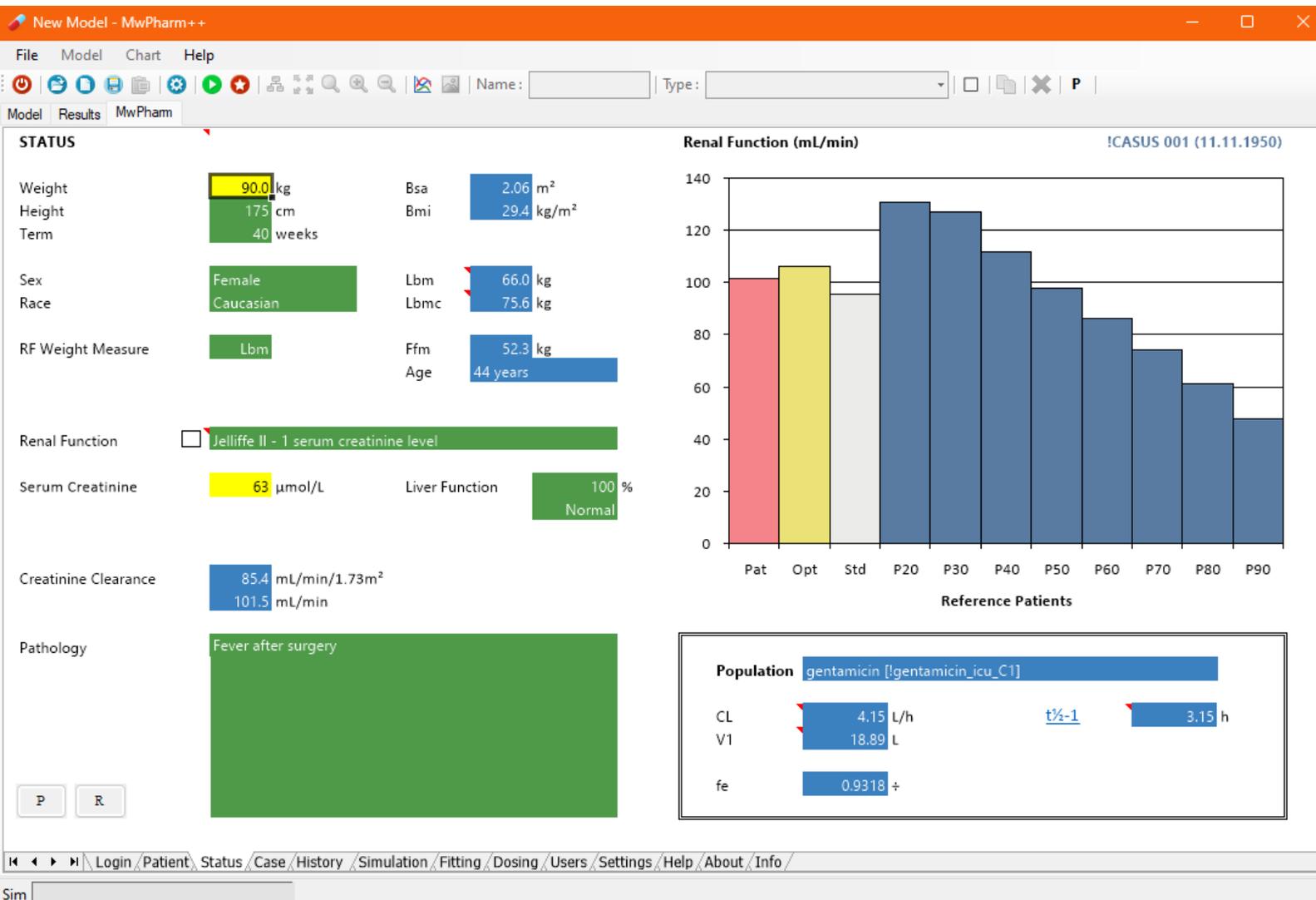
**Patient List Table:**

<input type="checkbox"/> Dob	<input type="checkbox"/> Number	<input type="checkbox"/> Name
11.11.1950	!C001	!CASUS 001
11.11.1945	!C002	!CASUS 002
21.08.1936	!C003	!CASUS 003
11.11.1946	!C004a	!CASUS 004a
11.05.1993	!C004b	!CASUS 004b
11.11.1922	!C005	!CASUS 005
11.11.1992	!C006	!CASUS 006
11.11.1915	!C007	!CASUS 007
13.09.1990	!C008	!CASUS 008
11.11.1924	!C009	!CASUS 009
11.11.1977	!C010	!CASUS 010
26.04.1926	!N001	!NPEM 001
27.12.1929	!N002	!NPEM 002
26.04.1923	!N003	!NPEM 003
22.11.1984	!N004	!NPEM 004
22.03.1921	!N005	!NPEM 005
31.10.1942	!N006	!NPEM 006
15.04.1910	!N007	!NPEM 007
30.08.1926	!N008	!NPEM 008
11.05.1930	!N009	!NPEM 009
27.12.1949	!N010	!NPEM 010
07.10.1936	!PAO-001	!CASUS PAO 1
22.11.2004	!PAO-002	!CASUS PAO 2
13.03.1965	!PAO-003	!CASUS PAO 3
12.05.1965	!PAO-004	!CASUS PAO 4
12.09.1955	!PAO-005	!CASUS PAO 5
25.09.1947	!PAO-006	!CASUS PAO 6
27.07.2014	!PAO-007	!CASUS PAO 7

The "Load" button is highlighted with a red box, indicating the action to be taken to load the selected patient.

## STATUS SCREEN

Specify the data of your patient: weight, height, sex, etc.



**STATUS**

Weight: 90.0 kg  
 Height: 175 cm  
 Term: 40 weeks

Sex: Female  
 Race: Caucasian

RF Weight Measure: Lbm

Renal Function:  Jelliffe II - 1 serum creatinine level

Serum Creatinine: 63  $\mu\text{mol/L}$

Creatinine Clearance: 85.4 mL/min/1.73m<sup>2</sup>  
 101.5 mL/min

Pathology: Fever after surgery

Bsa: 2.06 m<sup>2</sup>  
 Bmi: 29.4 kg/m<sup>2</sup>  
 Lbm: 66.0 kg  
 Lbmc: 75.6 kg  
 Ffm: 52.3 kg  
 Age: 44 years

Liver Function: 100% Normal

**Renal Function (mL/min)** !CASUS 001 (11.11.1950)

Reference Patient	Renal Function (mL/min)
Pat	~102
Opt	~108
Std	~95
P20	~130
P30	~128
P40	~115
P50	~100
P60	~85
P70	~75
P80	~62
P90	~48

**Population** gentamicin [!gentamicin\_icu\_C1]

CL	4.15 L/h	$t_{1/2}$	3.15 h
V1	18.89 L		
fe	0.9318 +		

List of abbreviations (Status screen):

Bsa	Body surface area
Bmi	Body mass index
Lbm	Lean body mass
Lbmc	Corrected lean body mass
Ffm	Fat-free mass
CL	Total clearance
V1	Volume of distribution
fe	Fraction excreted unchanged
$t_{1/2}$	Elimination half-life

Select appropriate renal function:

New Model - MwPharm++

File Model Chart Help

Name: Type: P

Model Results MwPharm

**STATUS**

Weight 90.0 kg Bsa 2.06 m<sup>2</sup>  
 Height 175 cm Bmi 29.4 kg/m<sup>2</sup>  
 Term 40 weeks

Sex Female Lbm 66.0 kg  
 Race Caucasian Lbmc 75.6 kg

RF Weight Measure Lbm Ffm 52.3 kg  
 Age 44 years

Renal Function  
 Serum Creatinine  
 Creatinine Clearance 101.5 mL/min

Pathology  
 Fever after surgery

Renal Function (mL/min) !CASUS 001 (11.11.1950)

Reference Patients

Population gentamicin [gentamicin\_icu\_C1]

CL 4.15 L/h  $t_{1/2}$  3.15 h  
 V1 18.89 L  
 fe 0.9318 +

Login Patient Status Case History Simulation Fitting Dosing Users Settings Help About Info

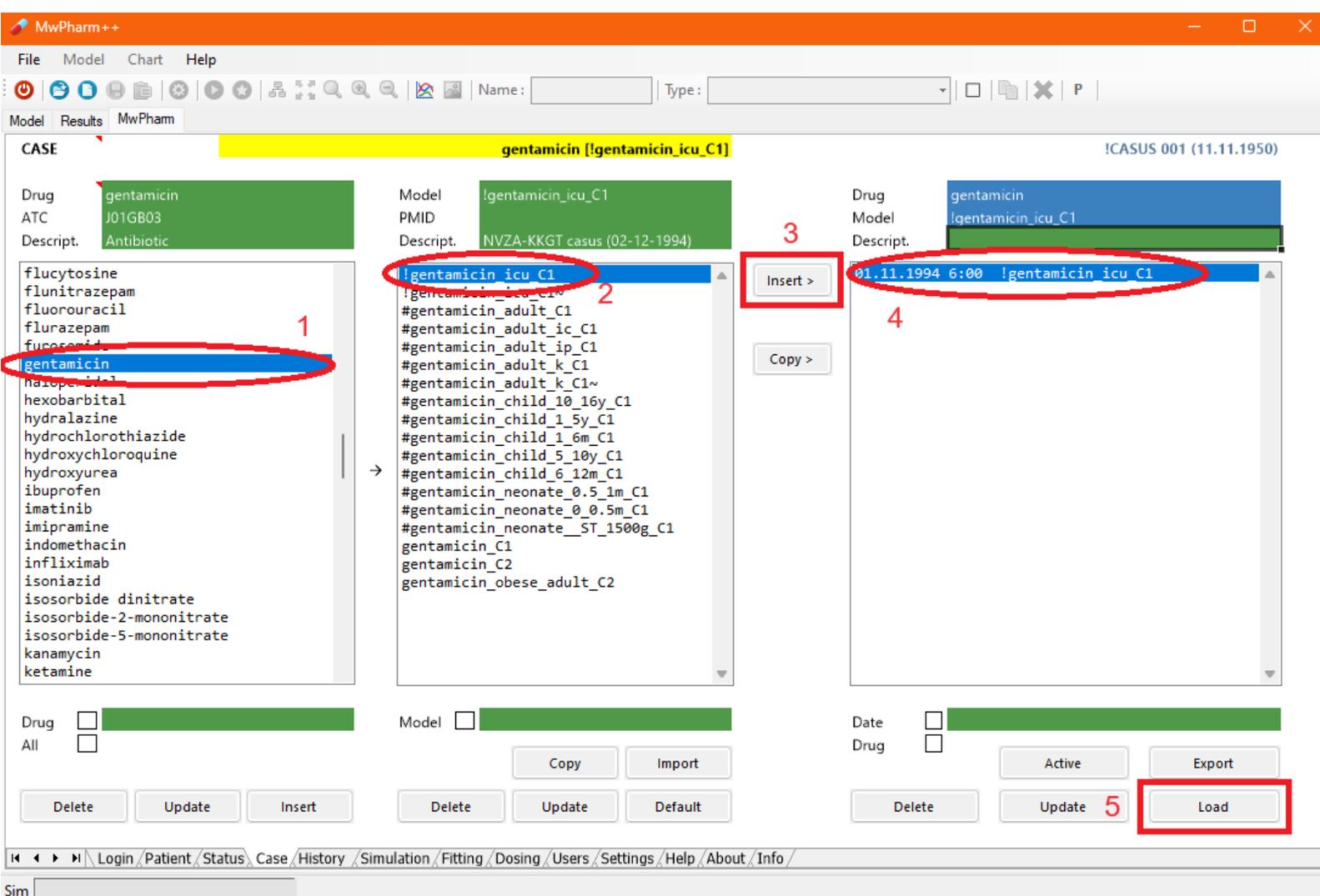
Sim

## CASE SCREEN

To administer a drug to the patient, select appropriate one from the left column (1).

In the middle column, there are listed available models of the chosen drug for specific groups of patients (specific PK parameters). By selection of the appropriate model from the middle column (2) and clicking **Insert** button (3) is the drug assigned to the patient and the History screen is opened.

To edit or view an existing case, select the case in the right column (4) and click **Load** button (5).



The screenshot displays the MwPharm++ Case Screen interface with the following components and annotations:

- Left Column (1):** A list of drugs. "gentamicin" is highlighted in blue.
- Middle Column (2):** A list of models for the selected drug. "!gentamicin\_icu\_C1" is highlighted in blue.
- Right Column (4):** A list of existing cases. "01.11.1994 6:00 !gentamicin\_icu\_C1" is highlighted in blue.
- Buttons:**
  - "Insert >" button (3) is highlighted in red.
  - "Load" button (5) is highlighted in red.
- Case Information:**
  - Case Name: gentamicin [!gentamicin\_icu\_C1]
  - Drug: gentamicin
  - ATC: J01GB03
  - Descript.: Antibiotic
  - Model: !gentamicin\_icu\_C1
  - PMID: NVZA-KKGT casus (02-12-1994)
  - Drug: gentamicin
  - Model: !gentamicin\_icu\_C1
  - Descript.: 01.11.1994 6:00 !gentamicin\_icu\_C1
- Bottom Panel:** Includes buttons for "Delete", "Update", "Insert", "Copy", "Import", "Default", "Active", "Export", and "Load".

## HISTORY SCREEN

Fill the drug administration history: date, time, route of administration, and dosing.

When you move cursor over the red triangle, the help text describing function of the particular field appears.

To save the patient history, click **Store** button or get back to the Case screen and click on **Update** button under right column.

To perform the simulation, click **Sim** button or move forward to the Simulation screen.

The screenshot shows the MWP Pharm++ interface with the History screen active. The table displays the following data:

Date	Time	Roa	Value	Unit	No	Interv [h]	T(inf) [h]	Conc. mg/L	Weight kg	Creat. μmol/L	Liver %
01.11.1994	06:00	iv	120	mg		3	12	0.7	90	63	
02.11.1994	05:30							0.37			
02.11.1994	07:20							4.58			
02.11.1994	18:00	iv	160	mg		8	12	0.5			

A tooltip for the 'Liver' column is shown, containing the text 'Liver function'.

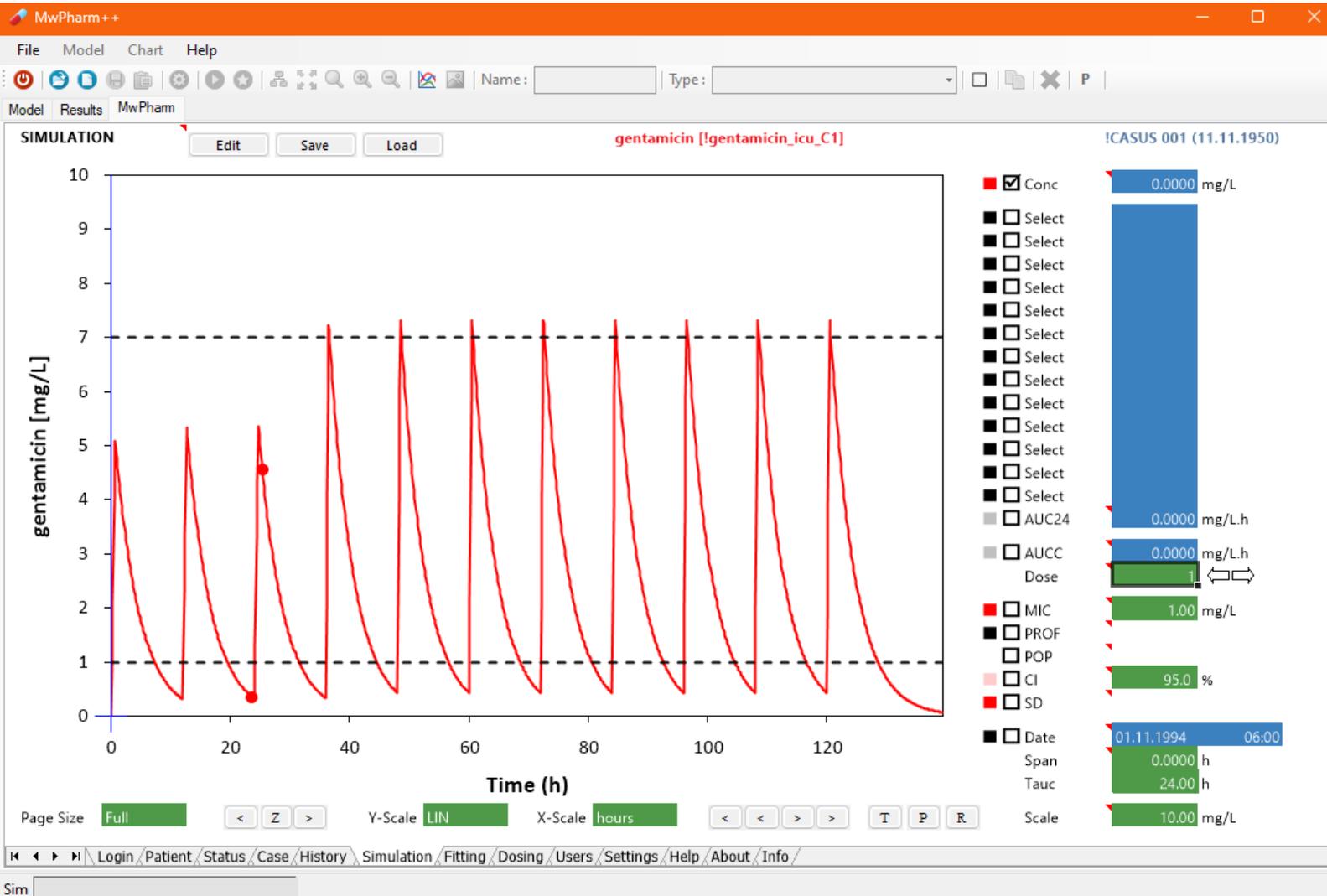
List of abbreviations (History screen):

- Roa Road of administration
- No Number of administrations or dialyses
- Interv Time interval between administrations or dialyses
- T(inf) Duration of administrations or dialyses
- Conc. Drug concentration
- Creat. Creatinine level

## SIMULATION SCREEN

By checking the boxes, user can show different curves in the graph such as: concentration, AUC (under every peak), AUCC (from zero to the infinity), creatinine clearance confidence interval etc. By clicking the **Select** field, user can add additional observable curves to the right panel.

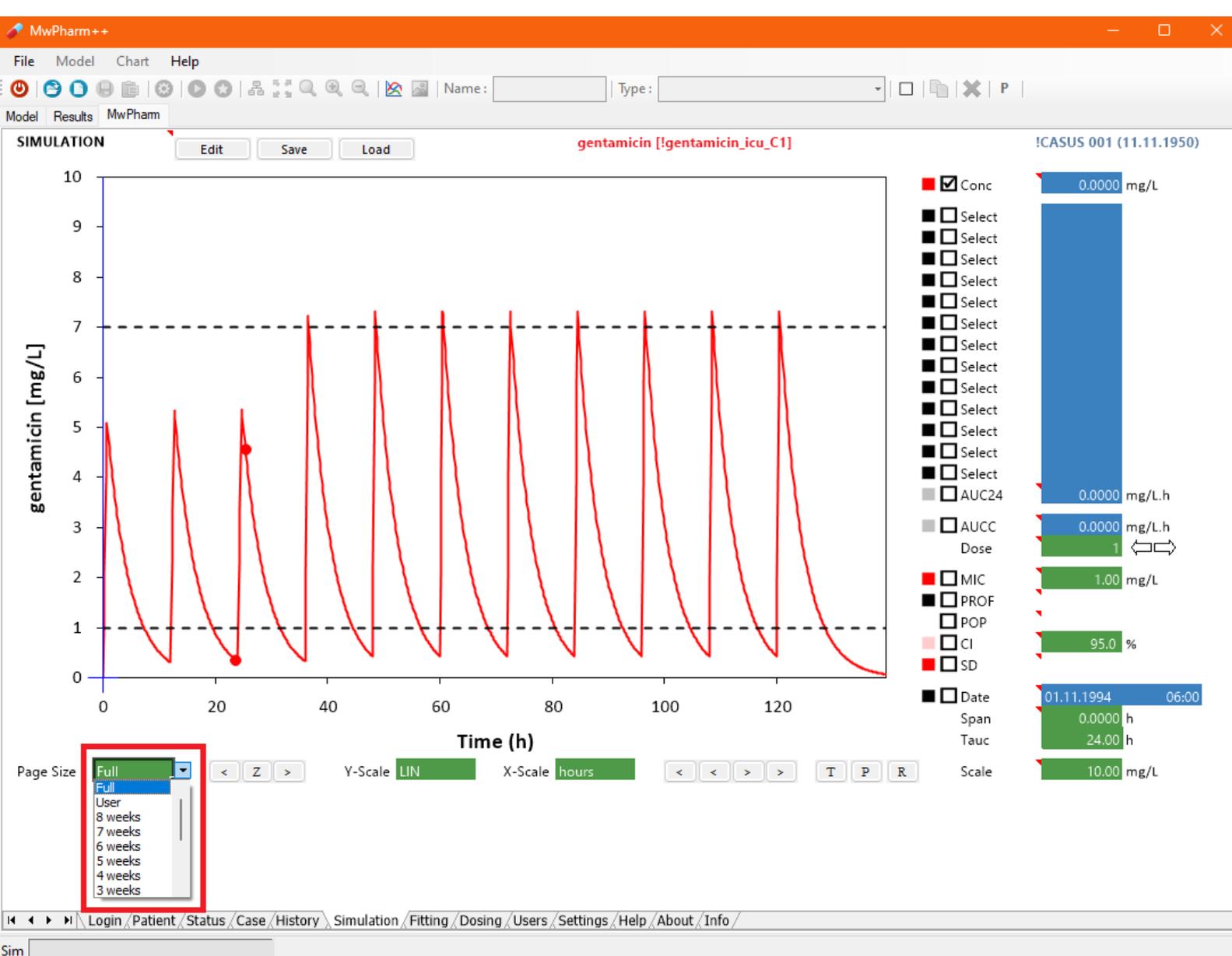
To perform the fitting, move to the Fitting screen.



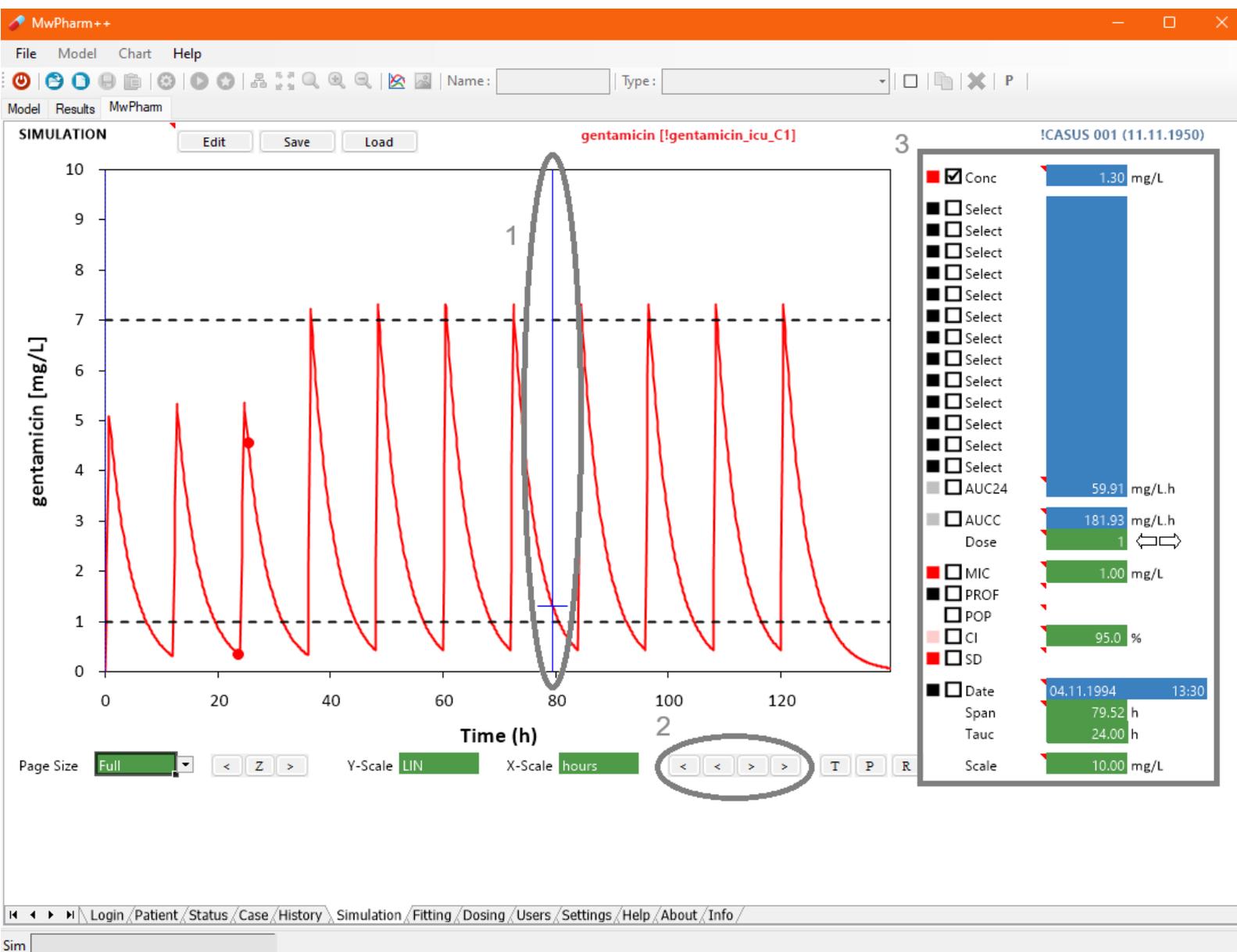
List of the main abbreviations (Simulation screen):

Conc	Concentration	CLcrN	Normalized creatinine clearance
Cave	Average concentration	Bsa	Body surface area
AUC	Area under curve	Lbmc	Corrected lean body mass
AUCC	Area under curve from zero to infinity	Bw	Body weight
Ccr	Creatinine concentration	CI	Confidence interval
CLcr	Creatinine clearance	INI	Initial prefit curve

To zoom the graph, select particular time interval.



To find out exact concentration, AUC etc. at specific time, use the **arrow** (1) buttons to move the blue indicator (2). Values will appear in the boxes on the right side of the screen (3).

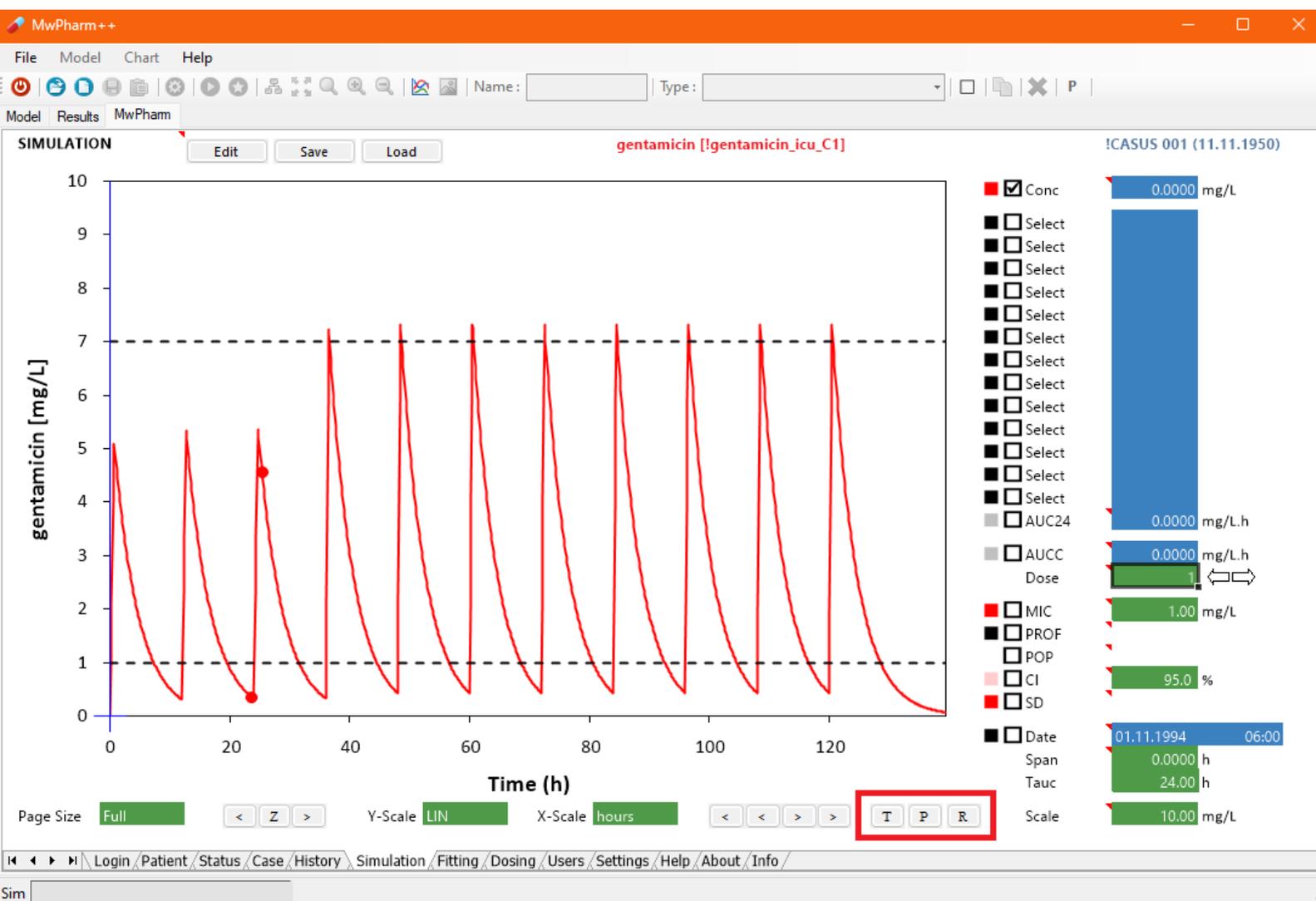


By clicking **T** button, you can add a text to the simulation graph.

By clicking **P** button, a prinscreen is created.

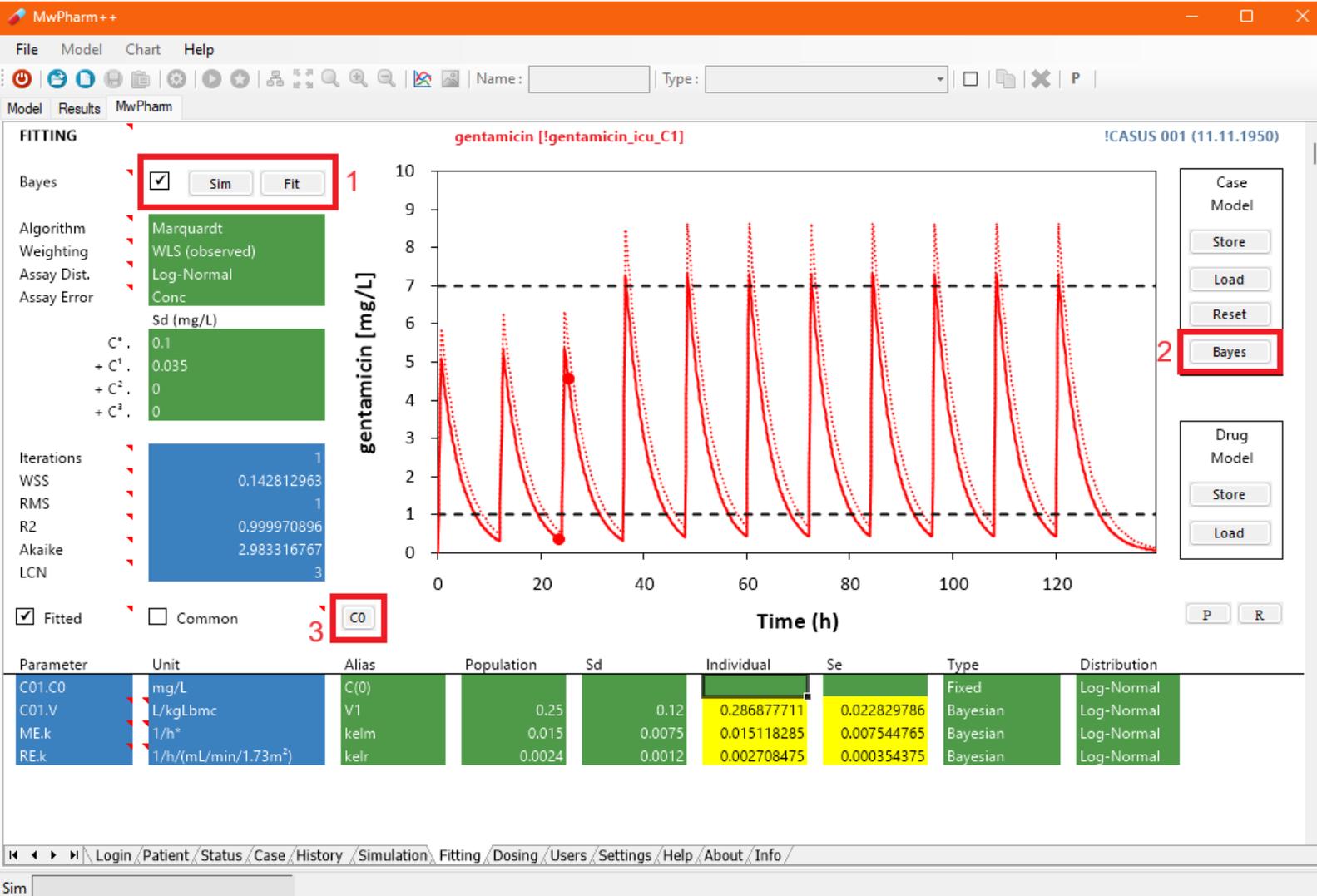
By clicking **R** button, a new report is generated.

**R** and **P** buttons can be found on Patient, Status, History, Simulation, Fitting, and Dosing screen.



## FITTING SCREEN

To fit the PK parameters, click on **Fit** button (1). To Bayes fitting, check the **Bayes** checkbox (1). If the Bayesian Parameters aren't already generated, you can set them by clicking the **Bayes** button (2). You can also use the **C0-Wizard** for the model adjusting (3).



**Parameter Table:**

Parameter	Unit	Alias	Population	Sd	Individual	Se	Type	Distribution
C01.C0	mg/L	C(0)					Fixed	Log-Normal
C01.V	L/kgLbmc	V1	0.25	0.12	0.286877711	0.022829786	Bayesian	Log-Normal
ME.k	1/h*	kelm	0.015	0.0075	0.015118285	0.007544765	Bayesian	Log-Normal
RE.k	1/h/(mL/min/1.73m <sup>2</sup> )	kelr	0.0024	0.0012	0.002708475	0.000354375	Bayesian	Log-Normal

List of abbreviations (Fitting screen):

- WSS     Weighted sum of squares
- RMS     Root mean squares
- R2       Correlation coefficient
- Akaike   Akaike information criterion
- LCN      Number of lost significant digits (log10)
- WSS      Weighted sum of squares
- RMS      Root mean squares
- R2       Coefficient of determination
- Akaike   Duration of administrations or dialyses

After the fitting, there are the individual PK parameters on the Status screen. Individual parameters can be deleted by clicking on **POP** button.

The screenshot displays the MwPharm++ software interface. The main window is titled "MwPharm++" and contains several sections:

- STATUS:** A list of patient characteristics including Weight (90.0 kg), Height (175 cm), Term (40 weeks), Sex (Female), Race (Caucasian), RF Weight Measure (Lbm), Bsa (2.06 m<sup>2</sup>), Bmi (29.4 kg/m<sup>2</sup>), Lbm (66.0 kg), Lbmc (75.6 kg), Ffm (52.3 kg), and Age (44 years).
- Renal Function (mL/min):** A bar chart titled "Renal Function (mL/min)" for "ICASUS 001 (11.11.1950)". The chart shows values for various patients: Pat (100), Opt (105), Std (95), P20 (130), P30 (125), P40 (110), P50 (95), P60 (85), P70 (75), P80 (65), and P90 (50). The x-axis is labeled "Reference Patients".
- Renal Function Parameters:** Jelliffe II - 1 serum creatinine level (checkbox), Serum Creatinine (63 μmol/L), Liver Function (100% Normal), Creatinine Clearance (85.4 mL/min/1.73m<sup>2</sup> and 101.5 mL/min).
- Pathology:** Fever after surgery.
- Individual PK Parameters:** A table showing parameters for "gentamicin [gentamicin\_icu\_C1]":
 

Individual	gentamicin [gentamicin_icu_C1]		POP
CL	5.34 L/h	t <sub>1/2-1</sub>	2.81 h
V1	21.68 L		
fe	0.9386 +		

The "POP" button is highlighted with a red box in the individual PK parameters section.

## DOSing SCREEN

On Dosing screen, you can compare different estimated dosing regimens by checking individual dosing regimens checkboxes and observing corresponding curves in the graph.

The screenshot displays the 'DOSE CALCULATOR' interface for gentamicin. It features two graphs: a line graph on the left showing concentration over time for regimens 'Exact', 'P1', 'P2', 'P3', and 'P4', and a bar chart on the right showing peak concentrations for 'USR', 'EXA', 'P1', 'P2', 'P3', and 'P4'. Below the graphs is a table of dosing parameters for each regimen, and a control panel on the right for targets and route settings.

Profile	User	Exact	P1	P2	P3	P4	
Load	161.3	161.3	160	160	160	160	mg
Dose	140.9	140.9	120	140	140	160	mg
Tint	8.40	8.40	8	8	12	12	h
Ndos	2	2	3	2	2	2	-
Tdur	0.50	0.50	0.50	0.50	0.50	0.50	h
Max	7.00	7.00	6.07	7.04	6.44	7.30	mg/L
Min	1.00	1.00	0.96	1.11	0.38	0.43	mg/L
Tmax	0.50	0.50	0.50	0.50	0.50	0.50	h
Tmin	8.40	8.40	8.00	8.00	12.00	12.00	h
Ave	3.14	3.14	2.82	3.27	2.19	2.49	mg/L
pSS	100	100	100	100	100	100	%

List of abbreviations (Fitting screen):

- Load      Loading dose
- Dose      Maintenance dose
- Tint      Time interval between doses
- Ndos      Number of doses

You can select appropriate route of administration and define different therapeutic range. C checkbox is for choosing continuous infusion.

New Model - MwPharm++

File Model Chart Help

Name: Type: P

Model Results MwPharm

**DOSE CALCULATOR** gentamicin [!gentamicin\_icu\_C1] C01.C (mg/L)

C01.C (mg/L) ICASUS 001 (11.11.1950)

Profile	User	Exact	P1	P2	P3	P4	
Load	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	160 mg
Dose	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	160 mg
Tint	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	12 h
Ndos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2 -
Tdur	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0.50 h
Max	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7.30 mg/L
Min	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0.43 mg/L
Tmax	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0.50 h
Tmin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	12.00 h
Ave	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.49 mg/L
pSS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	100 %

**Targets**

Max  7.00 mg/L

Min  1.00 mg/L

Ave  4.00 mg/L

Tint  12.00 h

AUC24  96.00 mg/L.h

Error  No  Log Scale

P-Mode  Practical

**Route** Input **IV**  C

**Reference** Levels **R01**

Variable **C01.C**

**Method** Load **Optimal**

Dose **Min-Max**

Algorithm **EXP**

Force DIF

Speed **114 ms**

Add to History P R

Sim

By clicking the **arrow** button (1) next to the abbreviation of regimen, it is possible to load practical regimen to the User regimen. In the User regimen column (2), user can adjust the regimen parameters (loading dose, maintenance dose, time interval, and number of doses). User dosing regimen can be added to History screen by clicking on **Add to History** button (3).

**DOSE CALCULATOR** gentamicin [!gentamicin\_icu\_C1] C01.C (mg/L)

**Profile**

	User	Exact	P1	P2	P3	P4	
Load	161.3	161.3	160	160	160	160	mg
Dose	140.9	140.9	120	140	140	140	mg
Tint	8.40	8.40	8	8	12	12	h
Ndos	2	2	3	2	2	2	-
Tdur	0.50	0.50	0.50	0.50	0.50	0.50	h
Max	7.00	7.00	6.07	7.04	6.44	7.30	mg/L
Min	1.00	1.00	0.96	1.11	0.38	0.43	mg/L
Tmax	0.50	0.50	0.50	0.50	0.50	0.50	h
Tmin	8.40	8.40	8.00	8.00	12.00	12.00	h
Ave	3.14	3.14	2.82	3.27	2.19	2.49	mg/L
pSS	100	100	100	100	100	100	%

**Targets**

- Max  7.00 mg/L
- Min  1.00 mg/L
- Ave  4.00 mg/L
- Tint 12.00 h
- AUC24  96.00 mg/L.h
- Error No  Log Scale
- P-Mode Practical

**Route** Input IV C

**Reference** Levels R01 Variable C01.C

**Method** Load Optimal Dose Min-Max Algorithm EXP Force DIF

Speed 114 ms

**Add to History** P R