

## MWPHARM++ USER MANUAL

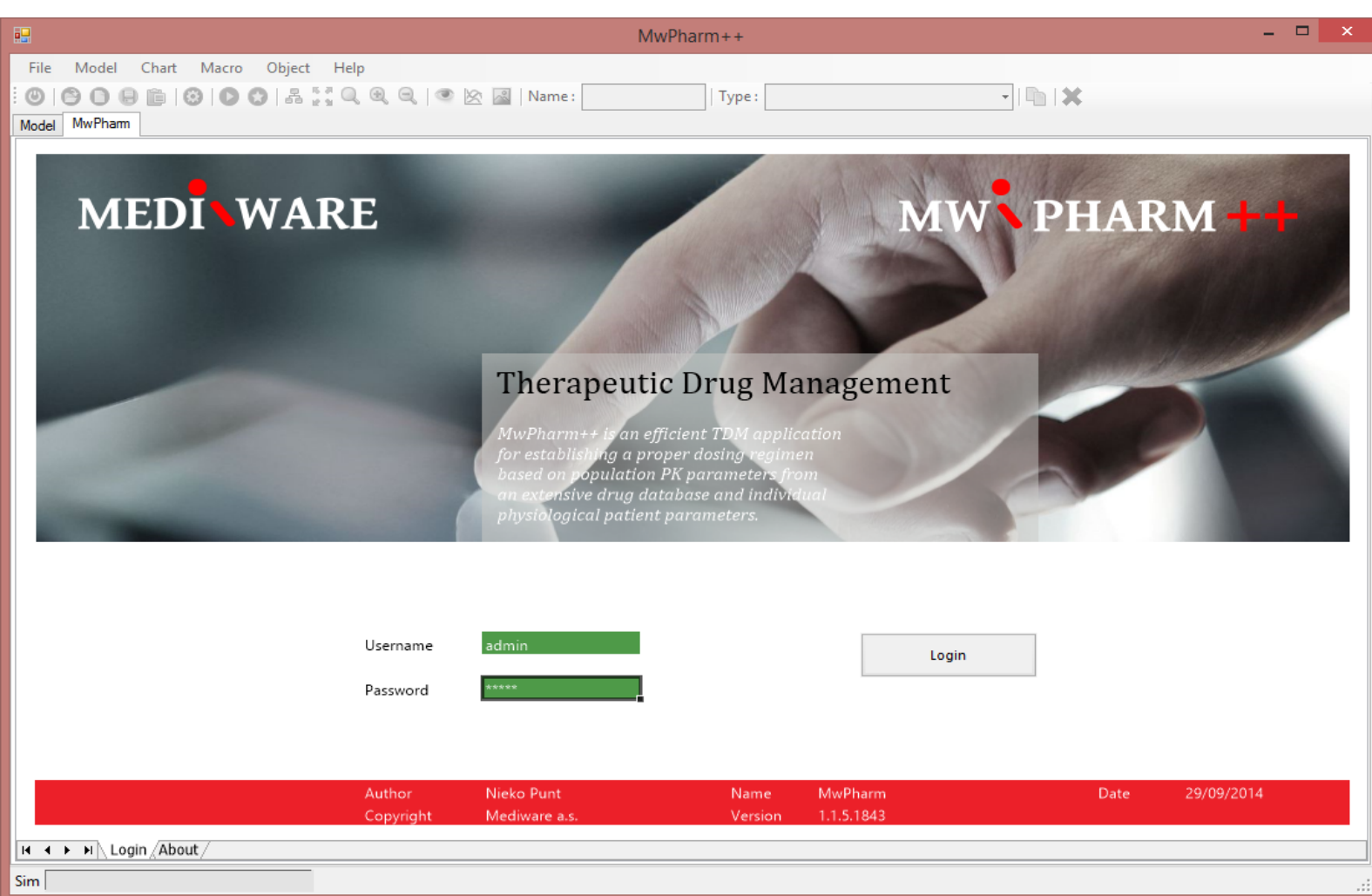
### LOGIN SCREEN

After launch and load the app, it is necessary to log in. By default (until the user changes it) via:

Username: **admin** and Password: **admin** or

Username: **user** and Password: **user**.

New version supports **multiple user accounts** – each user can have their own drug and patient database, or partially or fully shared with another specific user.



## PATIENT SCREEN

Click on **Standard** button to create 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 window. The 'PATIENT' form is on the left, and a list of patients is on the right. The 'Standard' button is circled in red and labeled '1.', and the 'Insert' button is circled in red and labeled '3.'. The Patient Number field in the form is circled in red and labeled '2.'. The patient list table is as follows:

<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
19/07/1939	0 EXAMPLE 1	Adult
19/07/1939	0 EXAMPLE 2	Dialysis
19/07/1939	0 EXAMPLE 3	CAPD
14/07/1994	0 EXAMPLE 4	Neonate
19/07/1939	0 HISTORY	Tour De Pharm
06/11/1959	1	MW
01/01/1951	102	TEST-D
01/01/1935	1234	TEST-E
01/01/1958	31	TFST-R

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

The screenshot shows the MwPharm++ application window. The interface is divided into several sections:

- PATIENT** section on the left, containing fields for Patient Number, Name and Initials, Date of Birth, Sex, Address, Postcode / Zipcode, City, Family Doctor, Requesting Physician, Ward, Room Number, Description, Medication Date, Age, Last Medication, and Date of Change.
- Table** on the right with columns for Dob, Number, and Name. The table lists various patient records, with the entry for Dob: 21/08/1936, Number: !C003, and Name: !CASUS 003 highlighted in blue.
- Buttons** at the bottom right: Standard, Load (circled in red), Active, Delete, Update, and Insert.
- Navigation** at the bottom: Login, Patient, Status, Case, History, Simulation, Fitting, Dosing, Users, Settings, About.

<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
19/07/1939	0 EXAMPLE 1	Adult
19/07/1939	0 EXAMPLE 2	Dialysis
19/07/1939	0 EXAMPLE 3	CAPD
14/07/1994	0 EXAMPLE 4	Neonate
19/07/1939	0 HISTORY	Tour De Pharm
06/11/1959	1	MW
01/01/1951	102	TEST-D
01/01/1935	1234	TEST-E
01/01/1958	31	TEST-R

## STATUS SCREEN

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

The screenshot displays the STATUS SCREEN in MwPharm++. The interface includes a menu bar (File, Model, Chart, Macro, Object, Help), a toolbar, and a main workspace. The workspace is divided into several sections:

- STATUS:** A list of patient parameters with input fields.
 

Weight	60.0 kg	Bsa	1.68 m <sup>2</sup>
Height	168 cm	Bmi	21.3 kg/m <sup>2</sup>
Sex	Male	Lbm	60.0 kg
Race	Caucasian	Lbmc	60.0 kg
RF Weight Measure	Lbm	Ffm	49.3 kg
RF Schwartz Constant k	0.55	Age	58 years
- Renal Function (mL/min):** A bar chart titled "!CASUS 003 (21-08-1936)". The y-axis ranges from 0 to 140 mL/min. The x-axis shows reference patients: Pat, Opt, Std, P20, P30, P40, P50, P60, P70, P80, P90. The bars are colored: Pat (red), Opt (yellow), Std (light blue), and P20-P90 (dark blue). The patient's value (Pat) is approximately 48.7 mL/min.
- Serum Creatinine:** 115 μmol/L and 1.30 mg/dL.
- Creatinine Clearance:** 48.7 mL/min/1.73m<sup>2</sup> and 47.3 mL/min.
- Pathology:** ICU - pseudomonas infection.
- Population Parameters:**

Population	tobramycin [tobramycin_icu_C1]		
CL	2.71 L/h	t <sub>1/2</sub>	5.07 h
V	19.80 L		
fe	0.9268		

The bottom of the screen shows a navigation bar with options: Login/Patient, Status, Case, History, Simulation, Fitting, Dosing, Users, Settings, About. A "Sim" button is visible in the bottom left corner.

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
V	Volume of distribution
fe	Fraction excreted unchanged
t <sub>1/2</sub>	Elimination half-life

Select appropriate renal function:

MwPharm++

File Model Chart Macro Object Help

Name: Type:

Model Results Notes MwPharm

**STATUS**

**Weight** 60.0 kg      **Bsa** 1.68 m<sup>2</sup>  
**Height** 168 cm      **Bmi** 21.3 kg/m<sup>2</sup>

**Sex** Male      **Lbm** 60.0 kg  
**Race** Caucasian      **Lbmc** 60.0 kg

**RF Weight Measure** Lbm      **Ffm** 49.3 kg  
**RF Schwartz Constant k** 0.55      **Age** 58 years

**Renal Function**  
 Jelliffe II - 1 serum creatinine level  
 Cockcroft & Gault  
 Jelliffe I  
 Jelliffe II - 1 serum creatinine level  
 Jelliffe II - 2 serum creatinine levels  
 MDRD  
 MDRD revised IDMS (175)  
 CKD-EPI  
 Lund-Malmö Revised

**Serum Creatinine**

**Creatinine Clearance**  
 48.7 mL/min/1.73m<sup>2</sup>  
 47.3 mL/min

**Pathology**  
 ICU - pseudomonas infection

R

**Renal Function (mL/min)** **!CASUS 003 (21-08-1936)**

Patient	Renal Function (mL/min)
Pat	~48
Opt	~80
Std	~95
P20	~135
P30	~125
P40	~110
P50	~100
P60	~90
P70	~80
P80	~70
P90	~60

Reference Patients

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

**CL** 2.71 L/h      **t½** 5.07 h

**V** 19.80 L

**fe** 0.9268 -

Login Patient Status Case History Simulation Fitting Dosing Users Settings About

Sim

## CASE SCREEN

To administer a drug to the patient select appropriate one from the left column (1). In the middle column will show the drug for specific groups of patients (specific PK parameters). By selection the drug from the middle column (2) and clicking on **Insert** button (3) is the drug assigned to the patient. Application newly allows user to define its own "cases" – user can change PK parameters of the particular drug but at the same time not overwrite the original parameters of the drug. To continue to the History screen, click on **Load** button (4).

The screenshot displays the MwPharm++ software interface for the 'CASES' screen. The window title is 'MwPharm++'. The menu bar includes 'File', 'Model', 'Chart', 'Macro', 'Object', and 'Help'. The main area is titled 'CASES' and is divided into three columns. The left column (1) lists various drugs, with 'tobramycin' selected and circled in red. The middle column (2) shows a list of specific PK models for tobramycin, with '!tobramycin\_icu\_C1' selected and circled in red. The right column (3) shows the details of the selected case, including the drug name, model, and a date/time field. Below the columns are several buttons: 'Delete', 'Update', 'Insert', 'Delete', 'Default', 'Update', 'Insert', 'Delete', 'Active', 'Update', and 'Load'. The 'Load' button is circled in red and labeled with a '4.'. The top of the window shows the title 'MwPharm++' and a menu bar with 'File', 'Model', 'Chart', 'Macro', 'Object', and 'Help'. The bottom of the window shows a navigation bar with 'Login', 'Patient', 'Status', 'Case', 'History', 'Simulation', 'Fitting', 'Dosing', 'Users', 'Settings', and 'About'.

## HISTORY SCREEN

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

Moving cursor to the red triangles, the help will show.

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

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

The screenshot shows the MwPharm++ application window. The title bar reads 'MwPharm++'. The menu bar includes 'File', 'Model', 'Chart', 'Macro', 'Object', and 'Help'. Below the menu bar is a toolbar with various icons. The main window is titled 'HISTORY' and shows data for 'tobramycin [!tobramycin\_icu\_C1]' and 'ICASUS 003 (21-08-1936)'. There are buttons for 'Dose', 'Status', 'Sim', 'Sort', 'Clear', 'Store', and 'R'. The table below has the following columns: Date, Time, Roa, Value, Unit, No, Interv [h], T(inf) [h], Conc. mg/L, Weight kg, and Creat. μmol/L. A tooltip 'Creatinine level.' is visible over the Creat. column header. The table contains 13 rows of data.

Date	Time	Roa	Value	Unit	No	Interv [h]	T(inf) [h]	Conc. mg/L	Weight kg	Creat. μmol/L
24/09/1994	00:30	iv	240	mg	1	24	0.5		60	131
24/09/1994	02:00							7.7		
24/09/1994	08:30							2.9		
25/09/1994	06:00	iv	300	mg	4	24	0.5			
26/09/1994	07:05							9.7		
26/09/1994	14:00							5.6		115
28/09/1994	05:55							0.77		
28/09/1994	07:00							19.4		
29/09/1994	06:00	iv	180	mg	2	24	0.5			
30/09/1994	07:00							7.4		
30/09/1994	14:00							3		
01/10/1994	05:00							0.5		
01/10/1994	06:00	iv	240	mg	4	24	0.5			
03/10/1994	05:45							0.4		

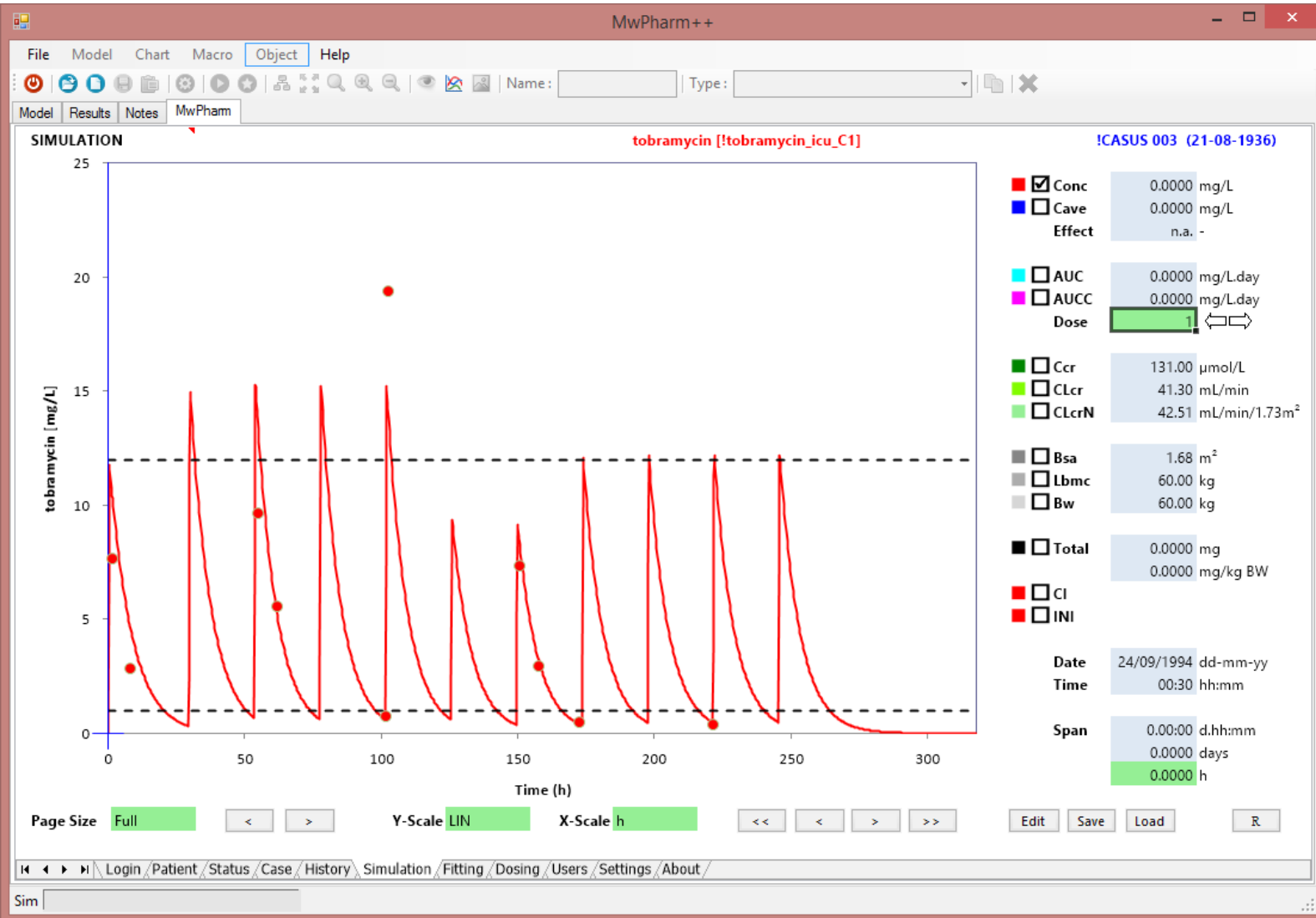
List of abbreviations (History screen):

- 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: concentration, average concentration, AUC (under every peak), AUCC (from zero to the infinity), creatinine clearance confidence interval etc.

To perform the fitting, move to the Fitting screen.

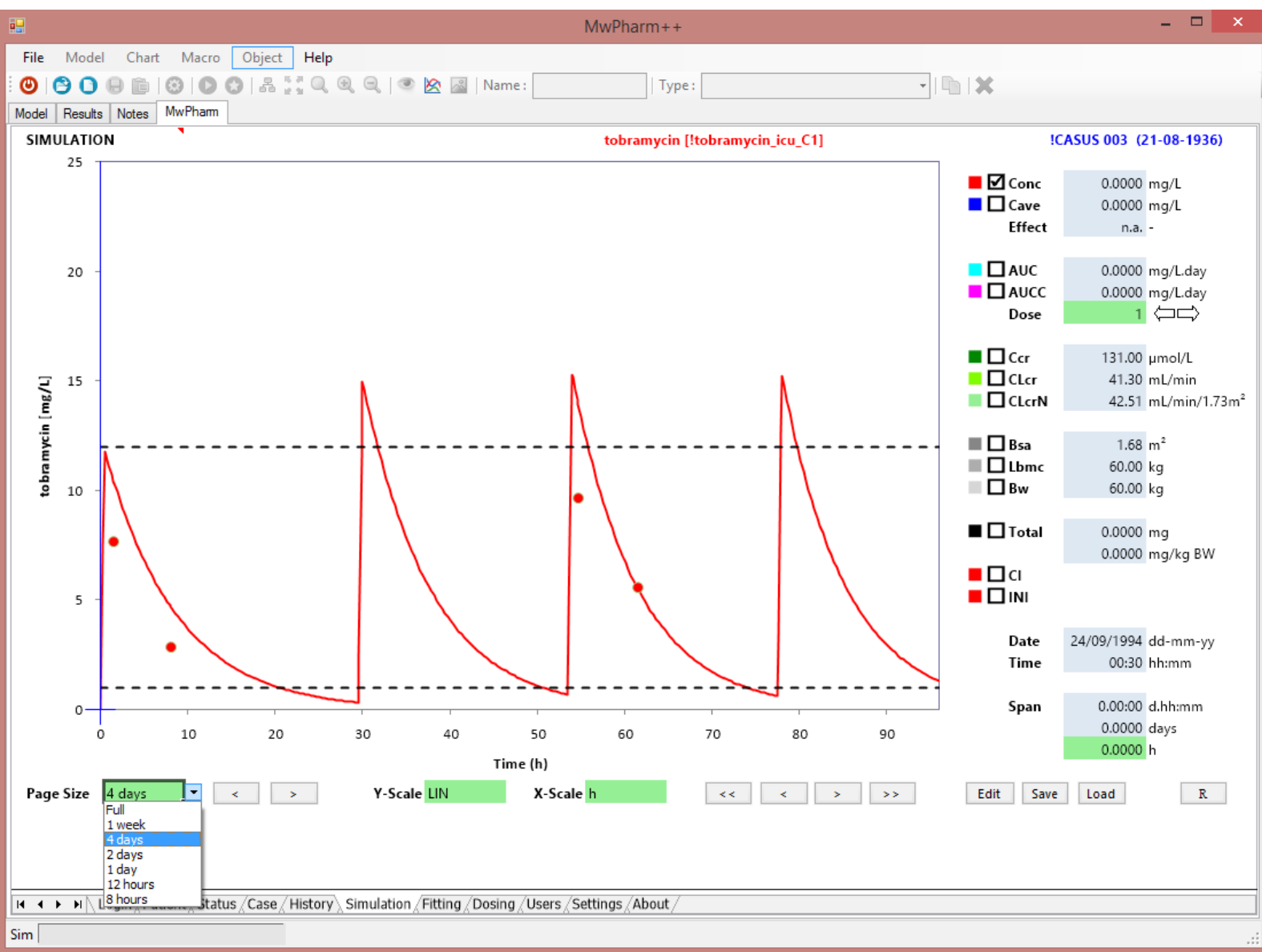


### List of abbreviations (Simulation screen):

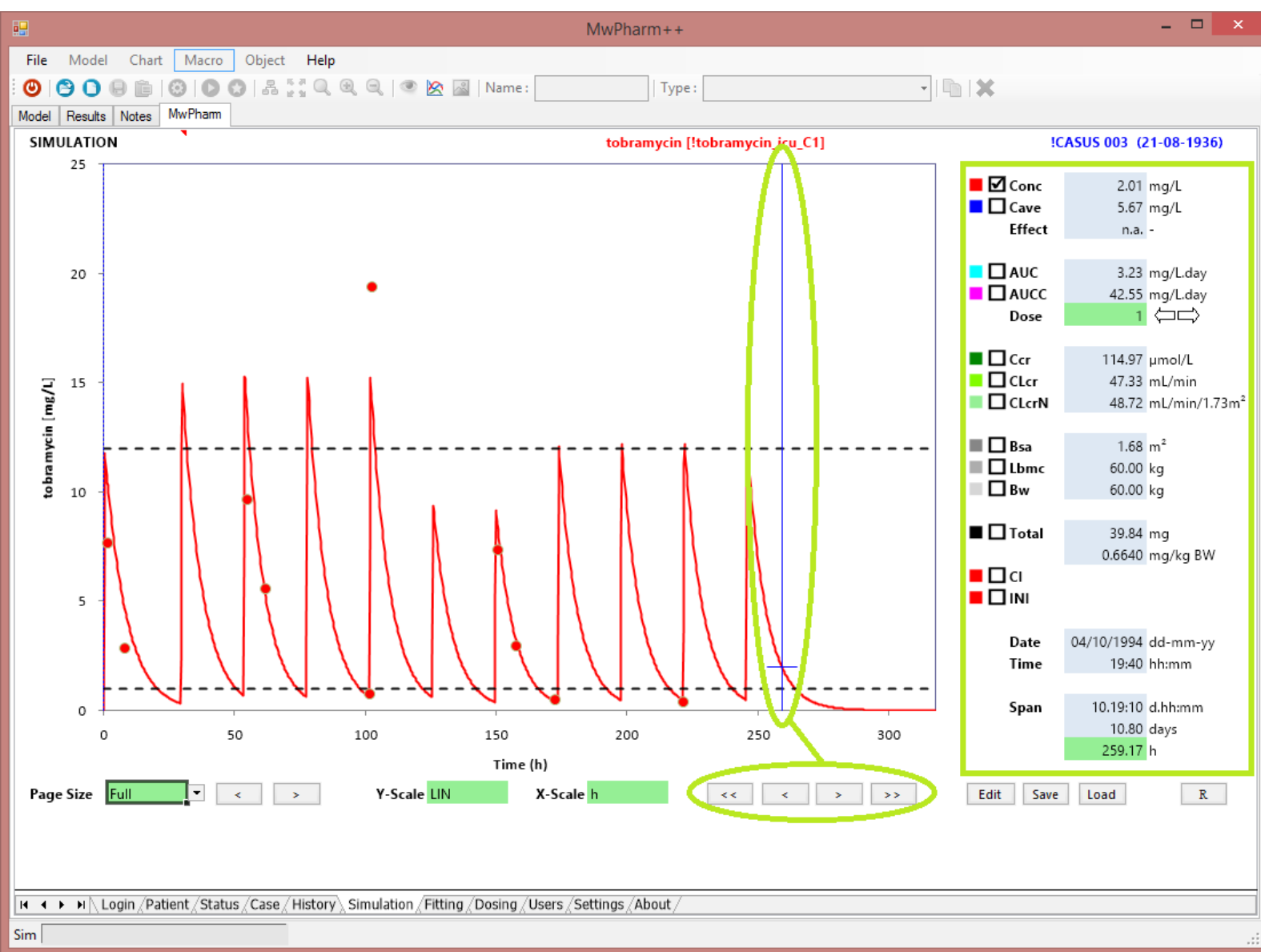
Conc	Concentration	CLcrN	Normalized creatinine clearance
Cave	Average concentration	Bsa	Body surface area
AUC	Area under curve	Lbmc	Corrected lean body mass
AUCC	Area under curve from zero to infinity	Bw	Body weight
Ccr	Creatinine concentration	CI	Confidence interval
CLcr	Creatinine clearance	INI	Initial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



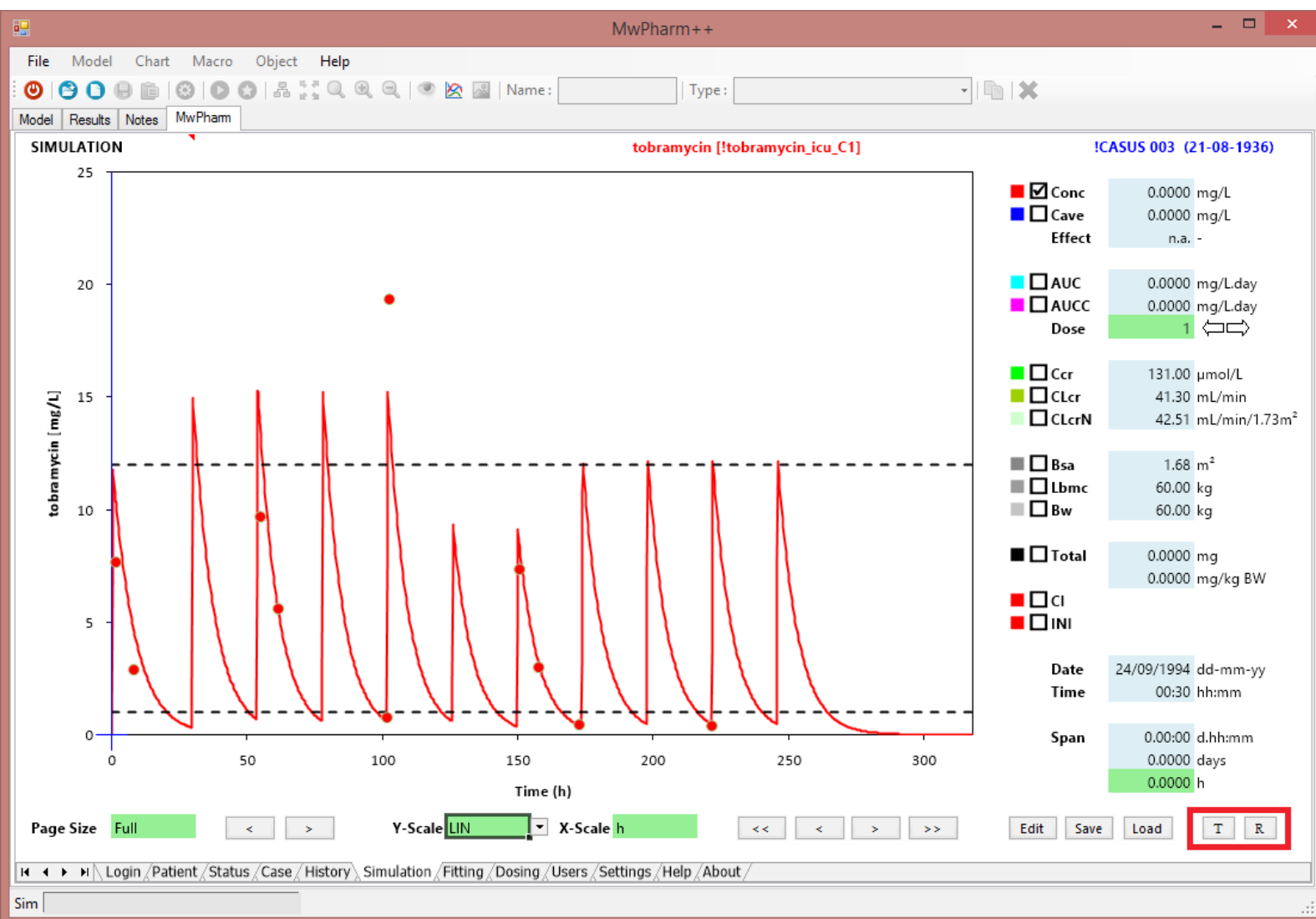
To zoom the graph, select particular time interval.



To find out exact concentration, AUC etc. use the **arrow** buttons to move the blue indicator. Values will show on the right side of the screen.



By clicking on **T** button you can add a text to the simulation graph. There is **R** button on Patient, Status, History, Simulation, Fitting and Dosing screen to print the screen.



## FITTING SCREEN

To fit the PK parameters, click on **Fit** button. To Bayes fitting, check the **Bayes** checkbox.

In case of missing Bayesian Parameters, click on **B** button to generate Bayesian Parameters and then run the fitting.

**FITTING** tobramycin [!tobramycin\_icu\_C1] !CASUS 003 (21-08-1936)

Bayes  Fit

Algorithm Marquardt

Iterations 39

WSS 179.9124833  
RMS 4.241609167  
R2 0.873148039  
Akaike -141.9547975

Generate Bayesian Parameters B

Par. Error (%) 10  
Var. Error (%) 10

Show only fitted parameters

Parameter	Unit	Population	Sd	Initial	Final	Se	Type
C01.fu	-	0.9	0.05	0.9			Fixed
C01.V	L/kgLbmc	0.33	0.16	0.33			Bayesian
HD.Eec	-	1	0	1			Fixed
HD.Eecr	-	1	0	1			Fixed
ME.k	1/h	0.01	0.005	0.01			Bayesian
P.Fd	-	0.4	0	0.4			Fixed
RE.k	1/h/(mL/min/1.73m <sup>2</sup> )	0.0026	0.0013	0.0026			Bayesian
TOT.fu	-	0	0	0			Fixed

List of abbreviations (Fitting screen):

- WSS          Weighted sum of squares
- RMS          Root mean square
- R2            Coefficient of determination

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 has a menu bar with "File", "Model", "Chart", "Macro", "Object", and "Help". Below the menu bar is a toolbar with various icons and a search field. The interface is divided into several sections:

- STATUS:** A list of patient parameters including Weight (60.0 kg), Height (168 cm), Sex (Male), Race (Caucasian), Bsa (1.68 m<sup>2</sup>), Bmi (21.3 kg/m<sup>2</sup>), Lbm (60.0 kg), Lbmc (60.0 kg), Ffm (49.3 kg), Age (58 years), RF Weight Measure (Lbm), RF Schwartz Constant k (0.55), Renal Function (Jelliffe II - 1 serum creatinine level), Serum Creatinine (115 μmol/L, 1.30 mg/dL), Creatinine Clearance (48.7 mL/min/1.73m<sup>2</sup>, 47.3 mL/min), and Pathology (ICU - pseudomonas infection).
- Renal Function (mL/min):** A bar chart titled "Renal Function (mL/min)" for patient "ICASUS 003 (21-08-1936)". The y-axis ranges from 0 to 140 mL/min. The x-axis shows "Reference Patients" from Pat to P90. The bars are colored: Pat (red), Opt (yellow), Std (light blue), P20 (dark blue), P30 (medium blue), P40 (light blue), P50 (medium blue), P60 (light blue), P70 (medium blue), P80 (light blue), and P90 (medium blue).
- Individual PK Parameters:** A red-bordered box highlights the individual PK parameters for "tobramycin [Itobramycin\_icu\_C1]". The parameters are: CL (2.94 L/h), t<sub>1/2</sub> (5.29 h), V (22.43 L), and fe (0.8967). A "POP" button is visible next to the individual name.

At the bottom of the window, there is a navigation bar with buttons for "Login", "Patient", "Status", "Case", "History", "Simulation", "Fitting", "Dosing", "Users", "Settings", and "About". A "Sim" button is also present in the bottom left corner.

## DOSING SCREEN

On Dosing screen it is possible to show different dosing regimens by checking to boxes.

**DOSE CALCULATOR** tobramycin [!tobramycin\_icu\_C1] C01.C (mg/L) !CASUS 003 (21-08-1936)

**Profile**

	User	Exact	P1	P2	P3	P4
Load	278.1	278.1	240	240	240	240
Dose	256.4	256.4	140	160	200	240
Tint	19.45	19.45	12	12	24	24
Ndos	2	2	4	3	2	2
Max	12.00	12.00	7.65	8.78	9.07	10.80
Min	1.00	1.00	1.69	1.94	0.42	0.50
Tmax	0.50	0.50	0.50	0.50	0.50	0.50
Tmin	19.45	19.45	12.00	12.00	24.00	24.00
Ave	4.48	4.48	3.98	4.57	2.85	3.39
pSS	100	100	100	101	101	100

**Targets**

Target	Value	Unit
Max	12.00	mg/L
Min	1.00	mg/L
Ave	6.50	mg/L
Tint	12.00	h

**Route**

Route	Input	Duration
IV	0.50	h

**Reference**

Reference	Levels	Variable
R01	C01.C	

**Method**

Method	Target	Algorithm	Speed
MIN_MAX	EXP	0	ms

Buttons: Add to History, R

List of abbreviations (Dosing 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.

MwPharm++

File Model Chart Macro Object Help

Model Results Notes MwPham

DOSE CALCULATOR **tobramycin [!tobramycin\_icu\_C1]** C01.C (mg/L) !CASUS 003 (21-08-1936)

Profile	User	Exact	P1	P2	P3	P4	
Load	245.8	245.8	240	240	240	240	mg
Dose	226.7	226.7	140	160	200	240	mg
Tint	18.68	18.68	12	12	24	24	h
Ndos	2	2	4	3	2	2	-
Max	12.00	12.00	8.50	9.77	10.20	12.16	mg/L
Min	1.00	1.00	1.77	2.03	0.41	0.49	mg/L
Tmax	0.50	0.50	0.50	0.50	0.50	0.50	h
Tmin	18.68	18.68	12.00	12.00	24.00	24.00	h
Ave	4.48	4.48	4.32	4.97	3.10	3.69	mg/L
pSS	100	100	100	101	101	100	%

**Targets**

Max  12.00 mg/L

Min  1.00 mg/L

Ave  6.50 mg/L

Tint  12.00 h

**Route** Input IV 0.50 h

Duration 0.50 h

Single Infusion

**Reference** Levels R01

Variable C01.C

**Method** Target MIN\_MAX

Algorithm EXP

Speed 34 ms

Add to History

R

Sim

Clicking on the **P\*** buttons, it is possible to load practical regiments to the User regiment to adjust 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.

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

**Profile**

	User	Exact	P1	P2	P3	P4	
Load	240.0	278.1	240	240	240	240	mg
Dose	160.0	256.4	140	160	200	240	mg
Tint	12.00	19.45	12	12	24	24	h
Ndos	3	2	4	3	2	2	-
Max	8.78	12.00	7.65	8.78	9.07	10.80	mg/L
Min	1.94	1.00	1.69	1.94	0.42	0.50	mg/L
Tmax	0.50	0.50	0.50	0.50	0.50	0.50	h
Tmin	12.00	19.45	12.00	12.00	24.00	24.00	h
Ave	4.57	4.48	3.98	4.57	2.85	3.39	mg/L
pSS	101	100	100	101	101	100	%

**Targets**

Max  12.00 mg/L  
 Min  1.00 mg/L  
 Ave  6.50 mg/L  
 Tint  12.00 h

**Route** Input IV  
 Duration 0.50 h  
 Single Infusion

**Reference** Levels R01  
 Variable C01.C

**Method** Target MIN\_MAX  
 Algorithm EXP  
 Speed 0 ms

Add to History

!CASUS 003 (21-08-1936)

Log Scale

URR, EXA, P1, P2, P3, P4

1. 2.

File Model Chart Macro Object Help

Name: Type:

Model Results Notes MwPham

MwPharm++

Sim