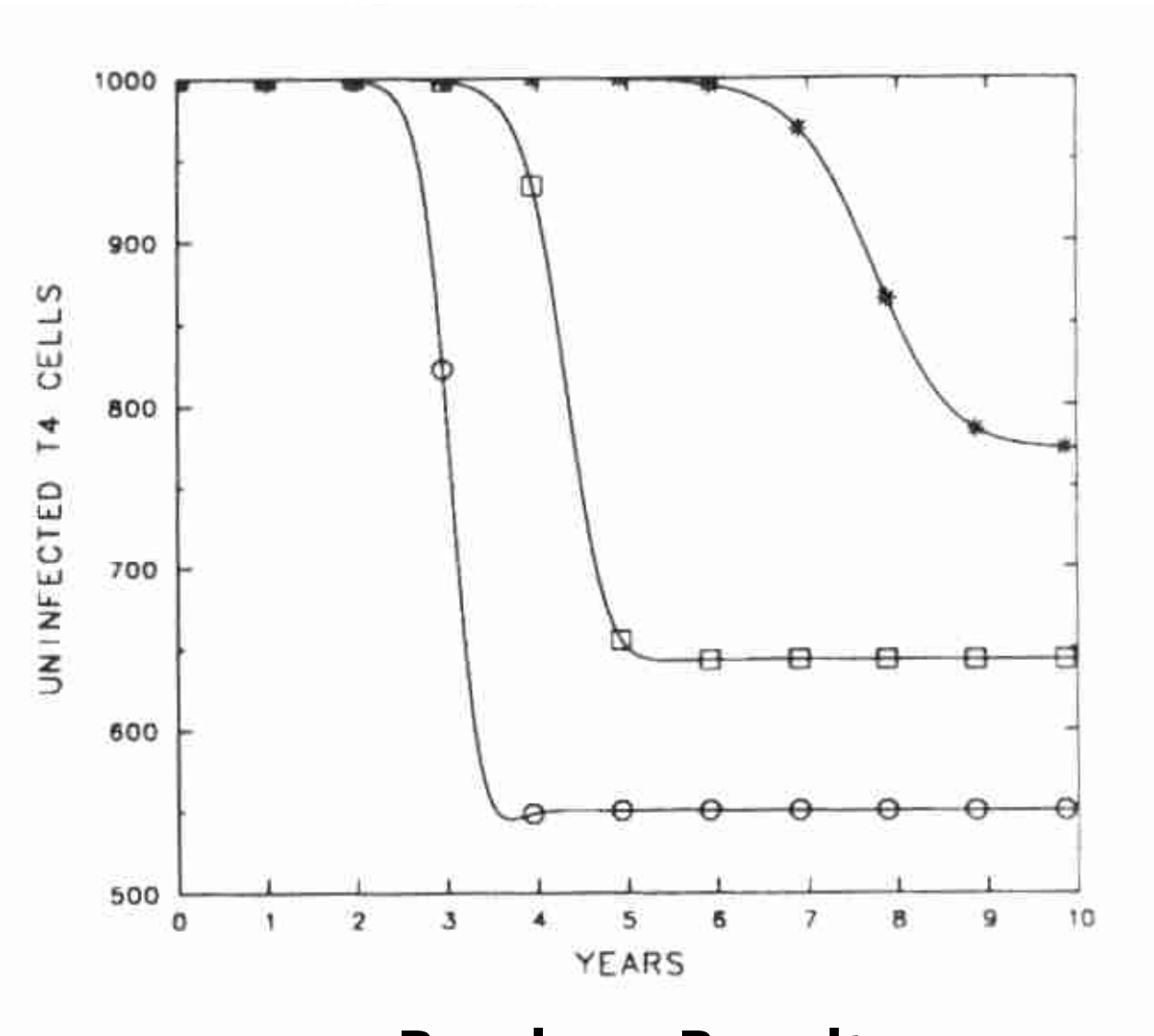


# Reproduction of Simulation

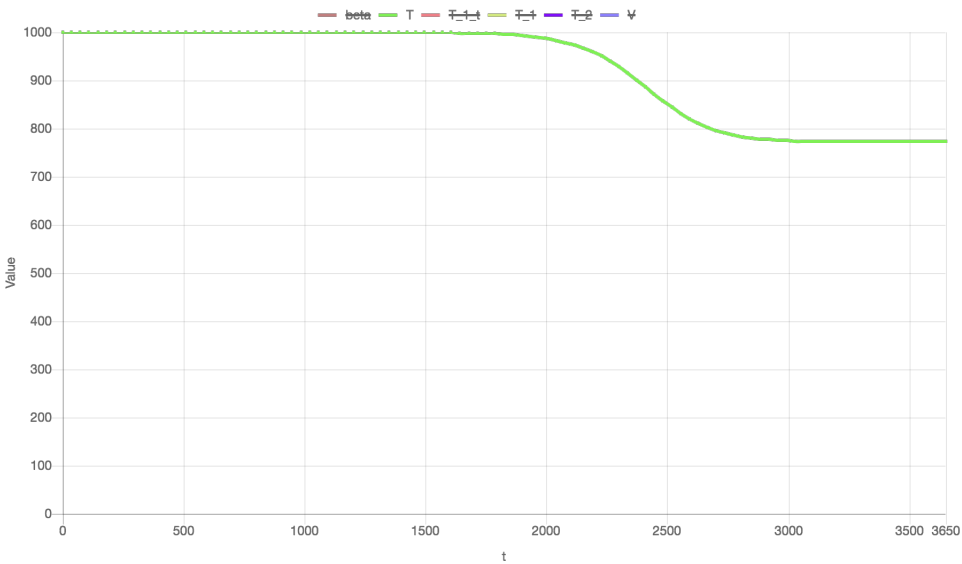
Reproduction of the analysis (Simulation) : Figure 2, T



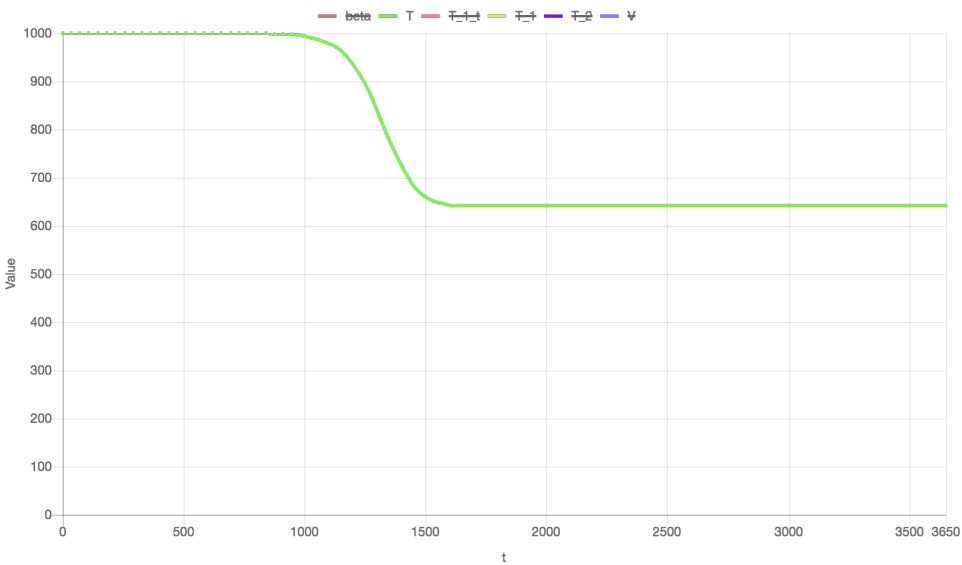
Perelson Result

$N = 1000$  (\*),  $N = 1200$  (□), and  $N = 1400$  (○).

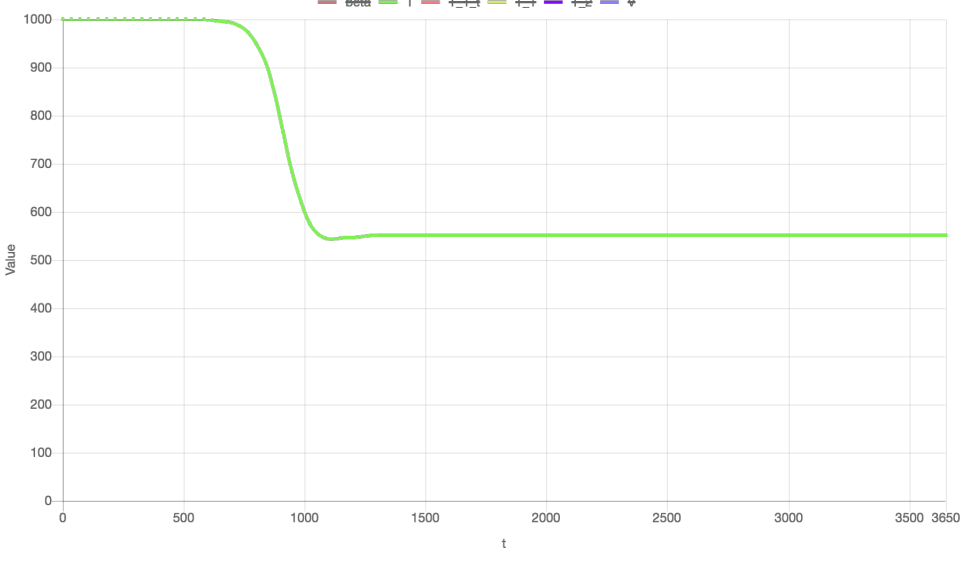
$N = 1000$



$N = 1200$

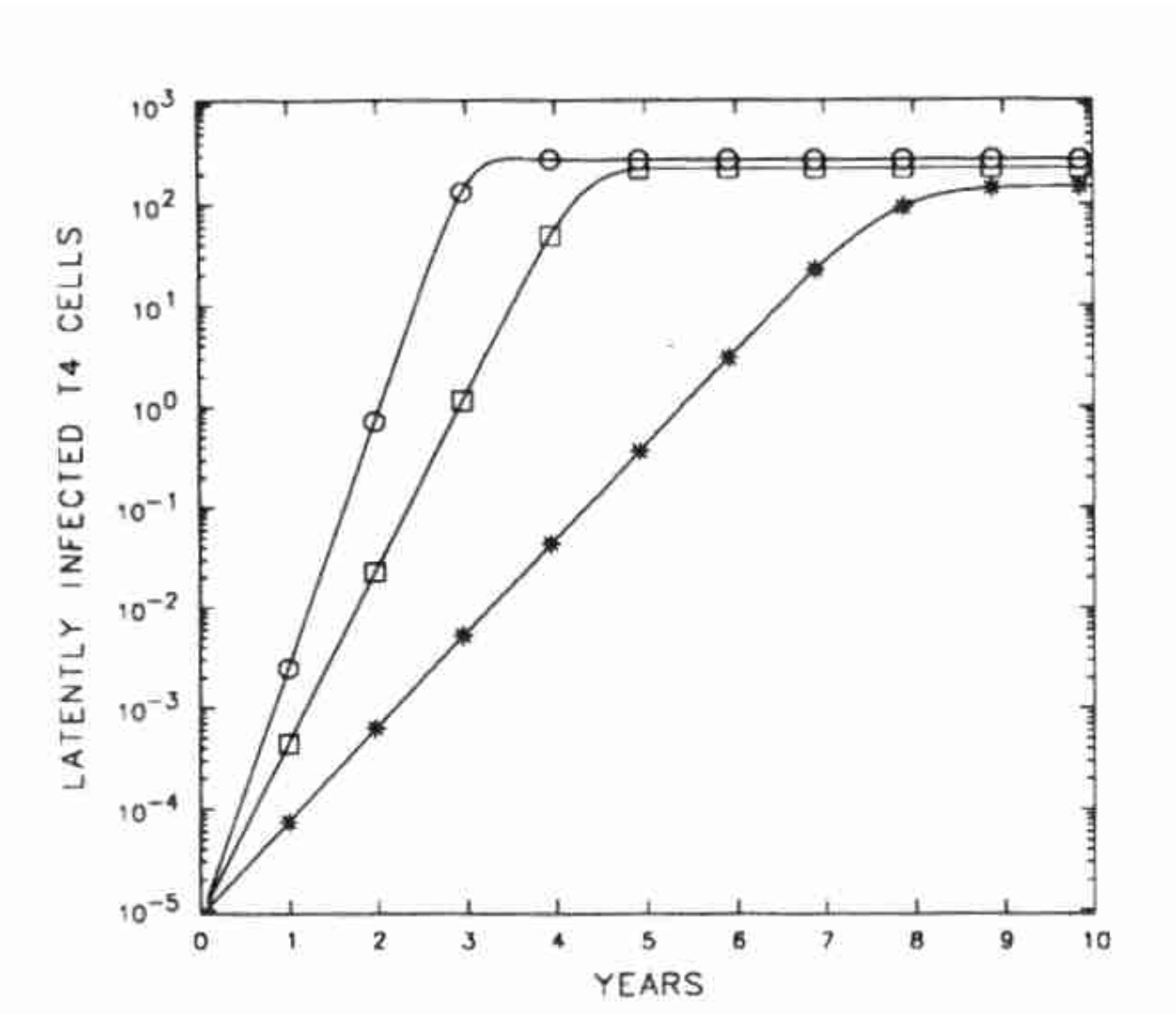


$N = 1400$



SBMLWebApp Results

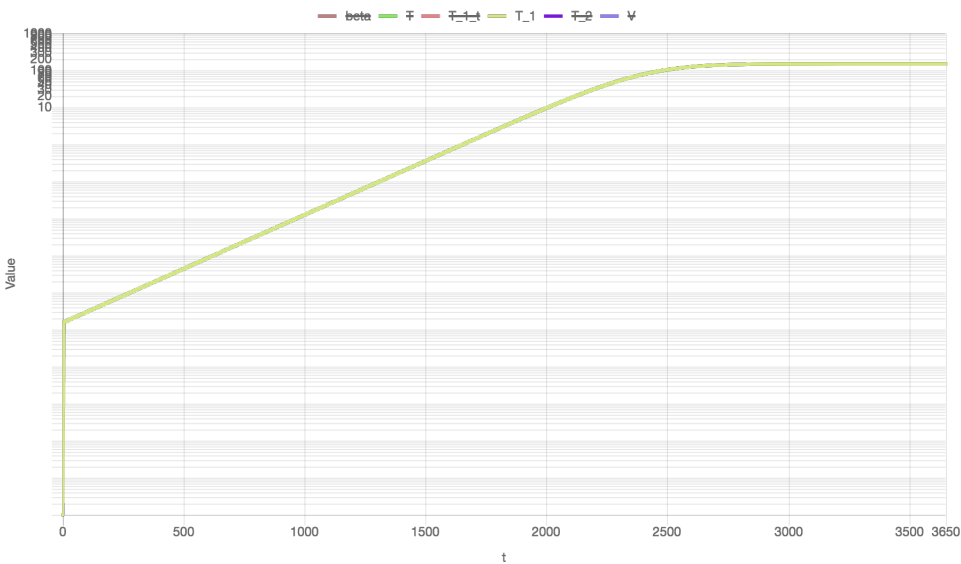
# Reproduction of the analysis (Simulation) : Figure 2, Tstar



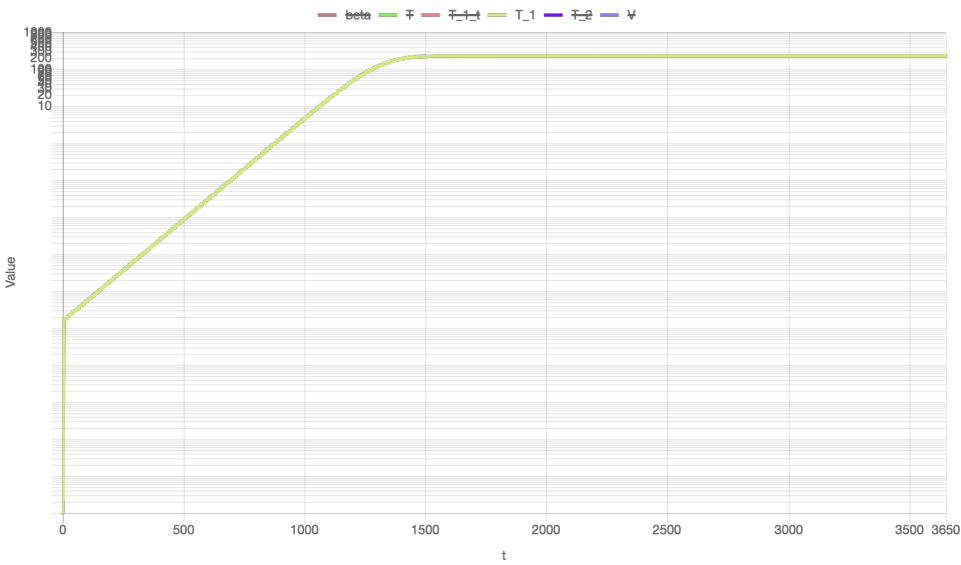
## Perelson Result

$N = 1000$  (\*),  $N = 1200$  (□), and  $N = 1400$  (○).

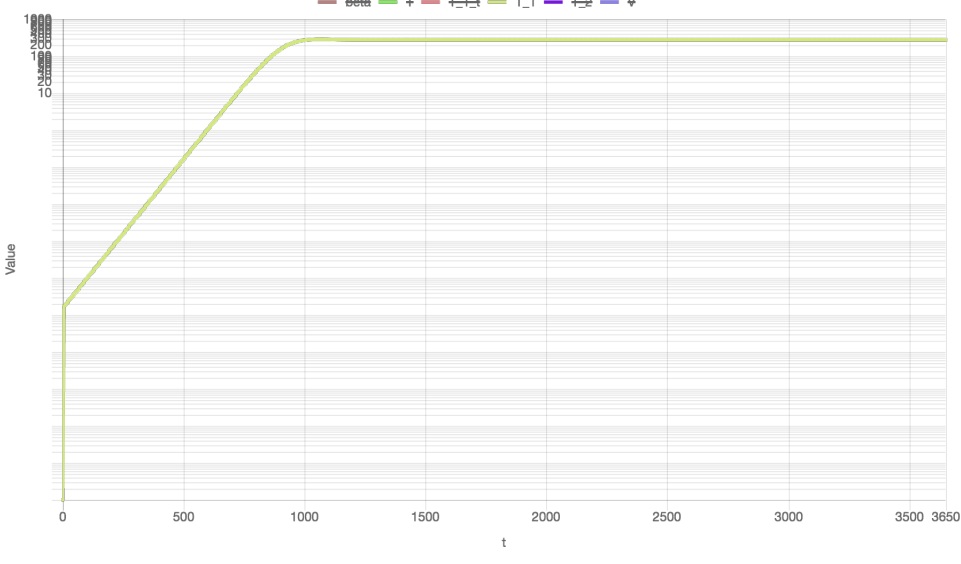
$N = 1000$



$N = 1200$

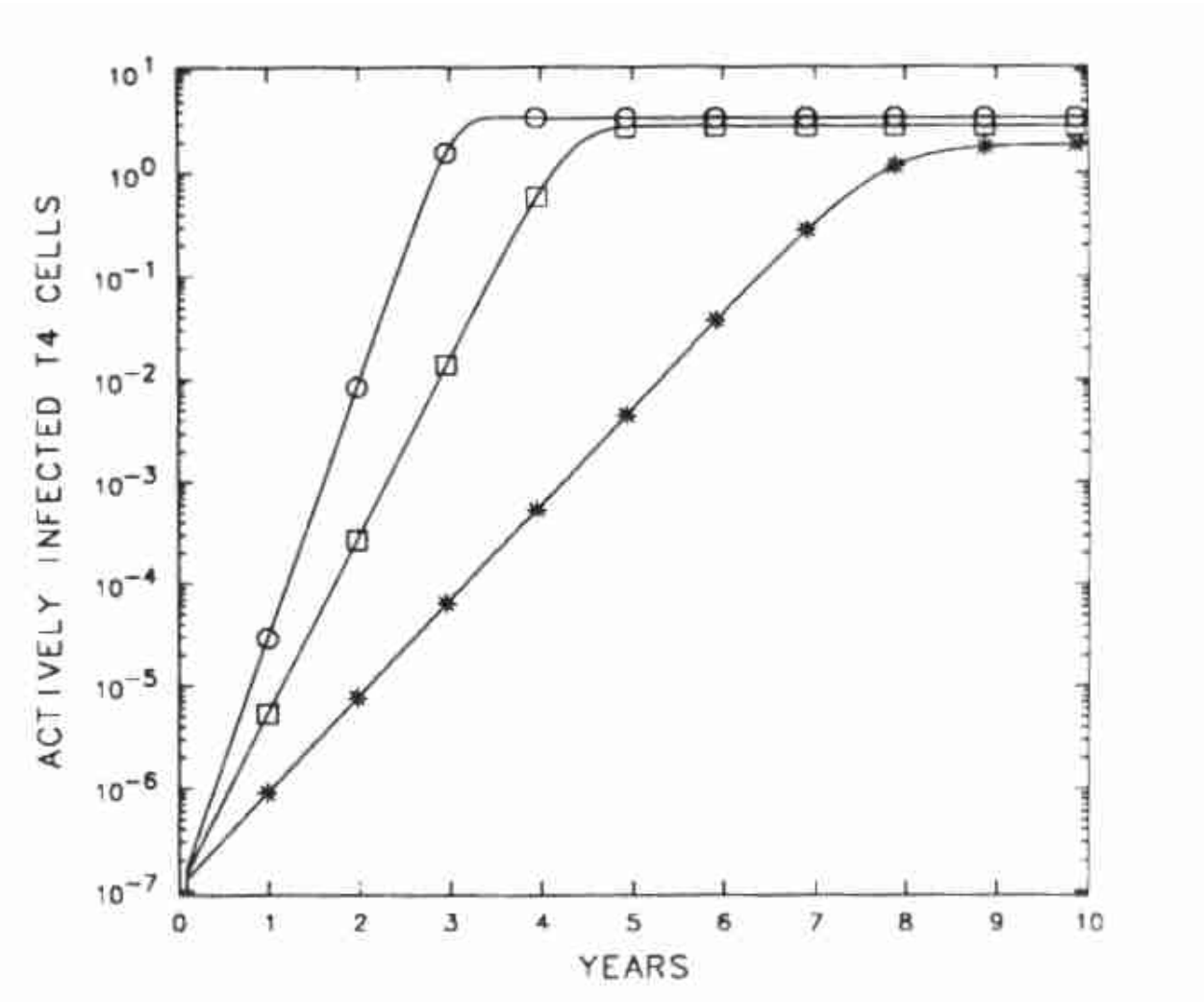


$N = 1400$



## SBMLWebApp Results

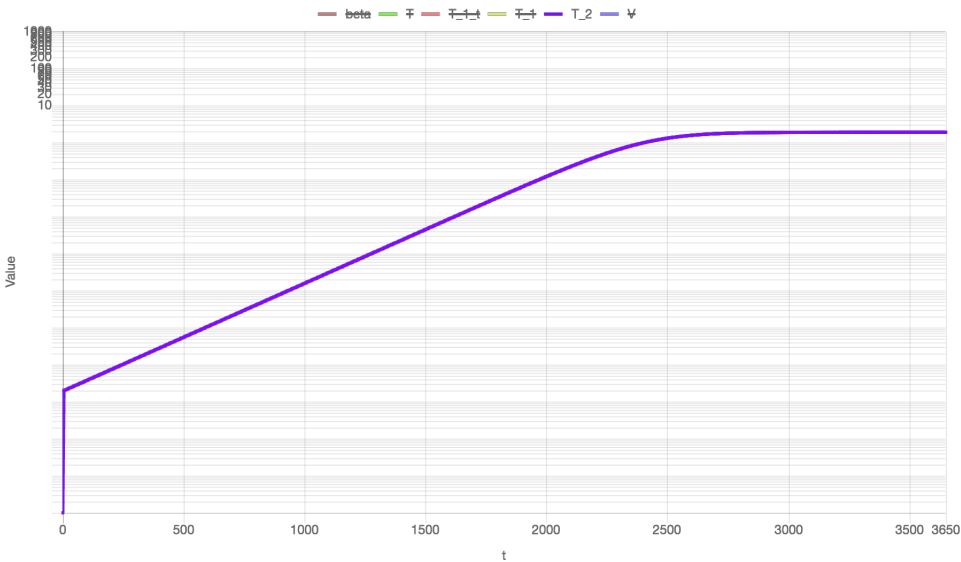
Reproduction of the analysis (Simulation) : Figure 2, Tstarstar



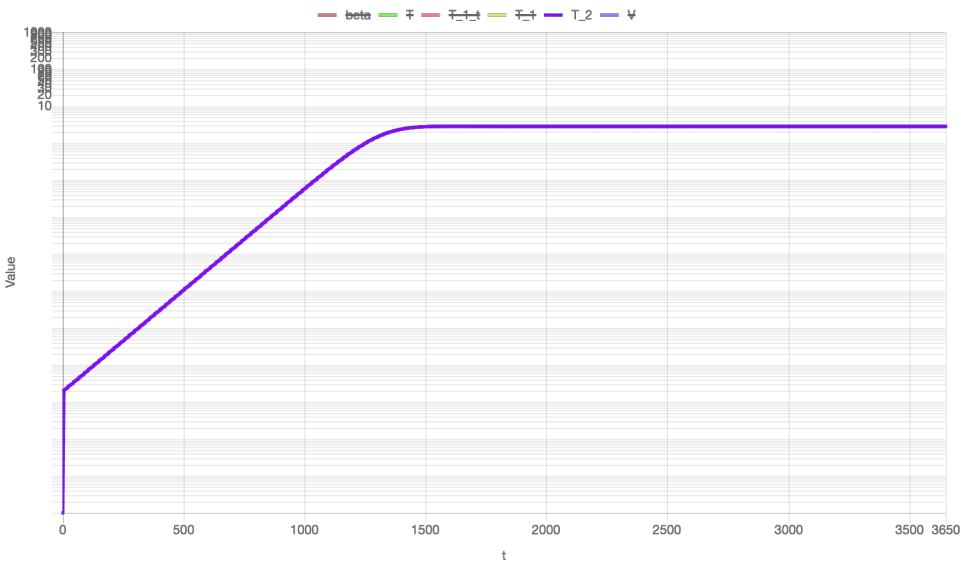
Perelson Result

$N = 1000$  (\*),  $N = 1200$  ( $\square$ ), and  $N = 1400$  ( $\circ$ ).

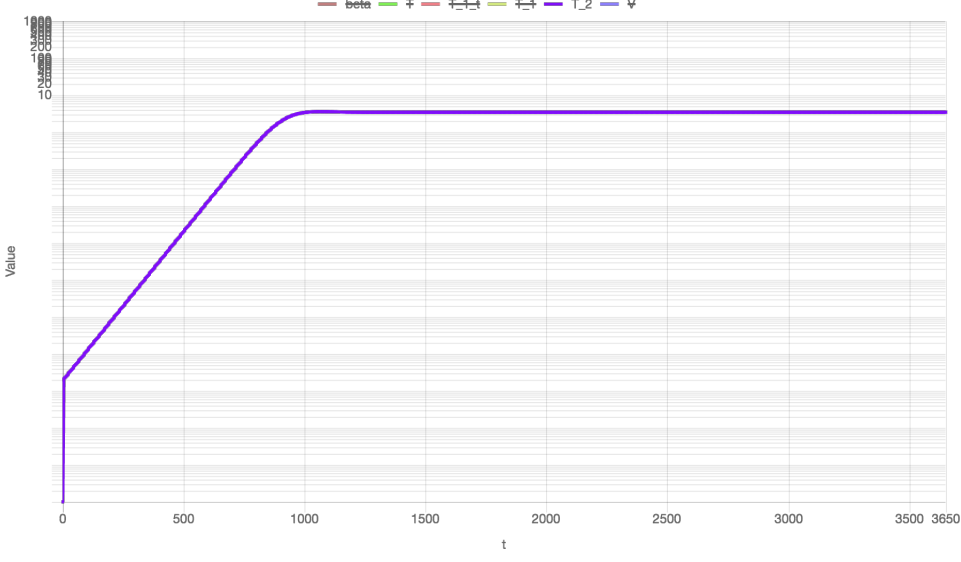
$N = 1000$



$N = 1200$



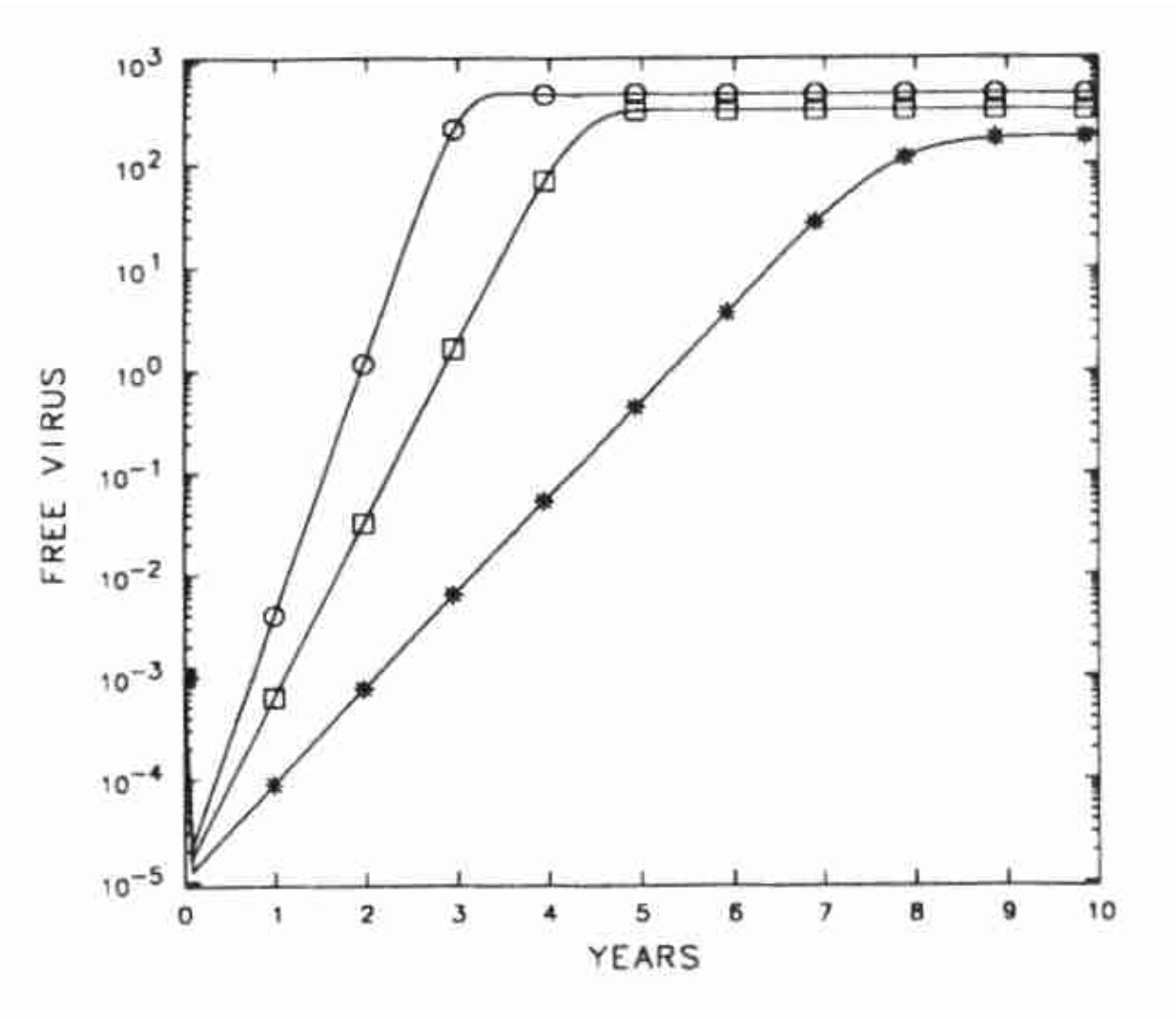
$N = 1400$



SBMLWebApp Results



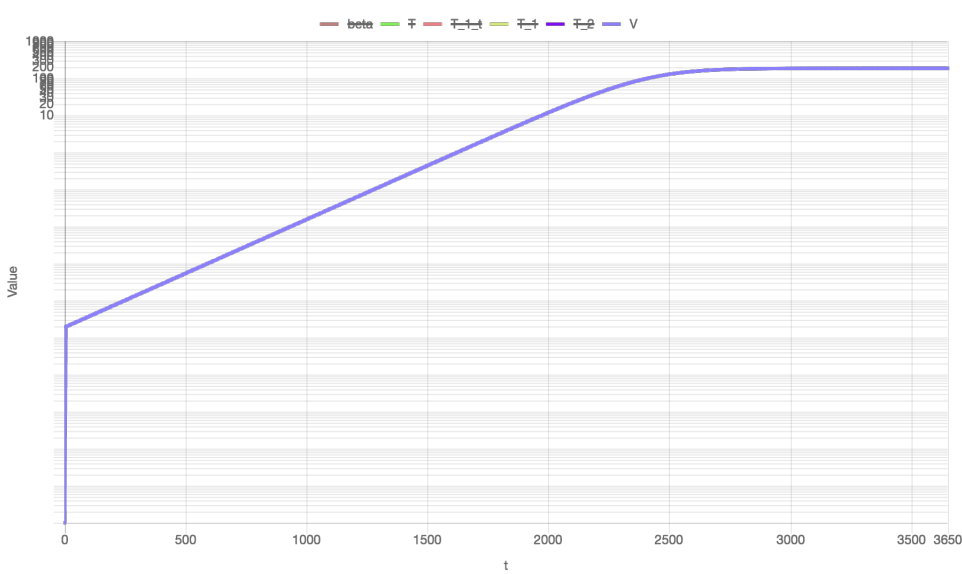
Reproduction of the analysis (Simulation) : Figure 2, V



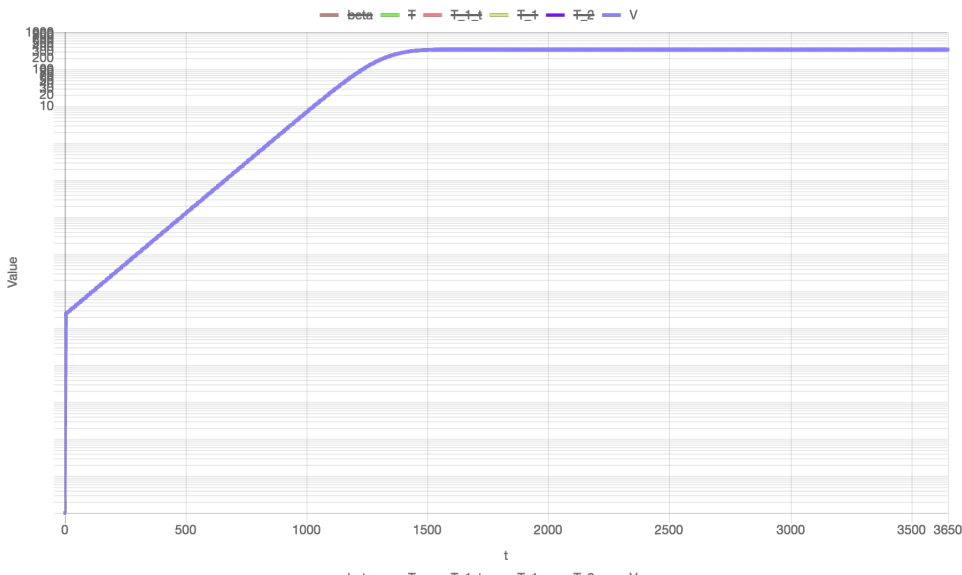
Perelson Result

$N = 1000$  (\*),  $N = 1200$  ( $\square$ ), and  $N = 1400$  ( $\circ$ ).

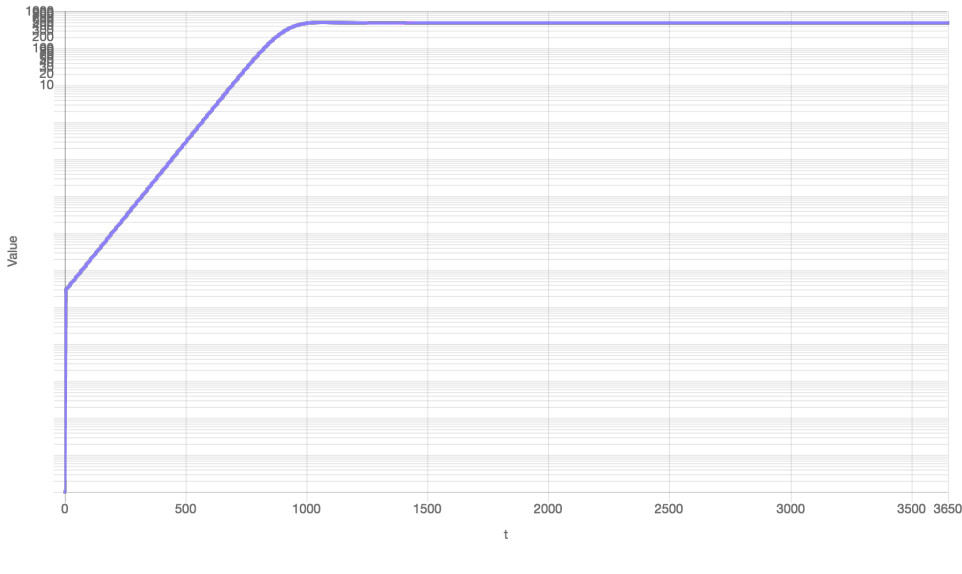
$N = 1000$



$N = 1200$

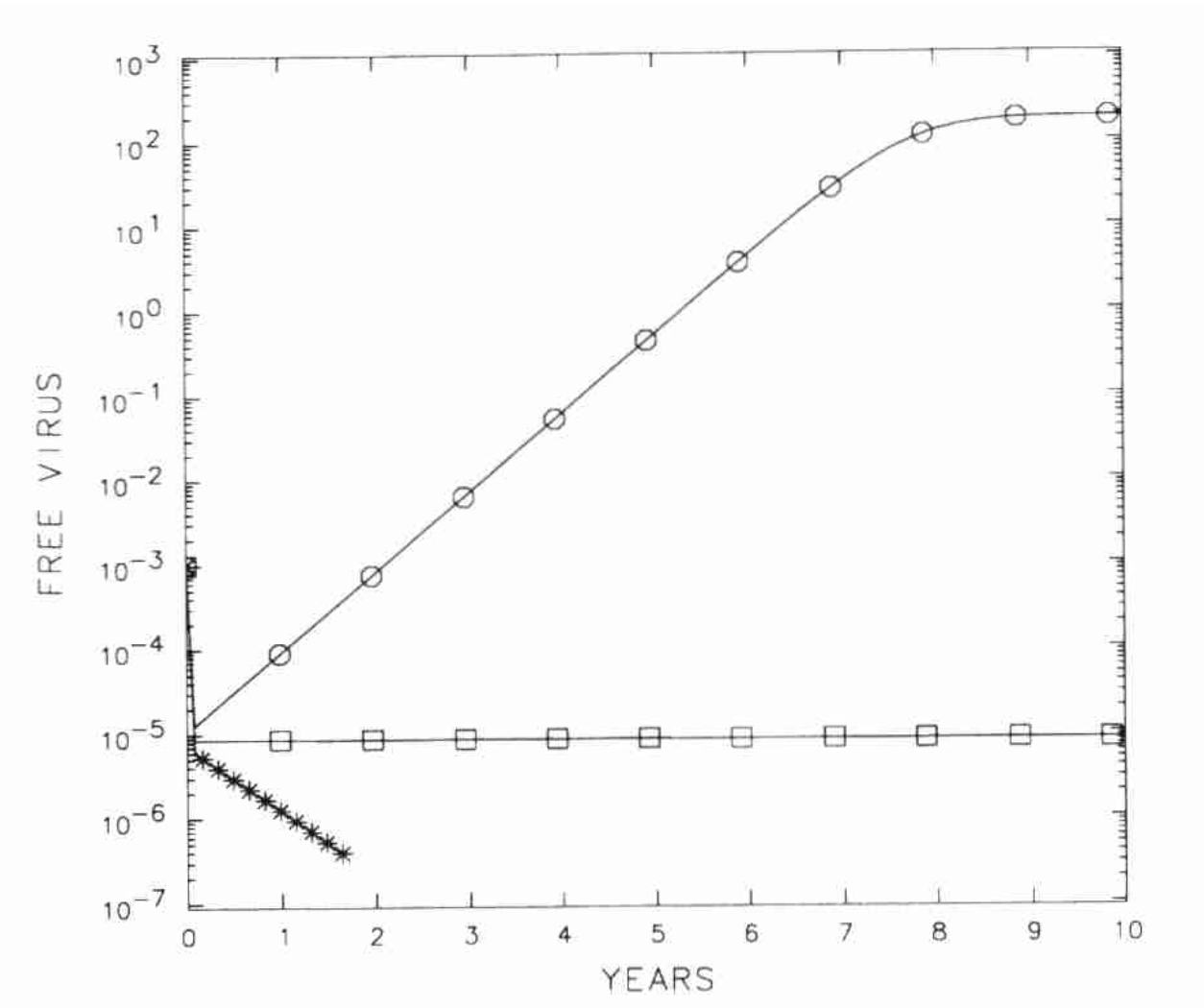


$N = 1400$



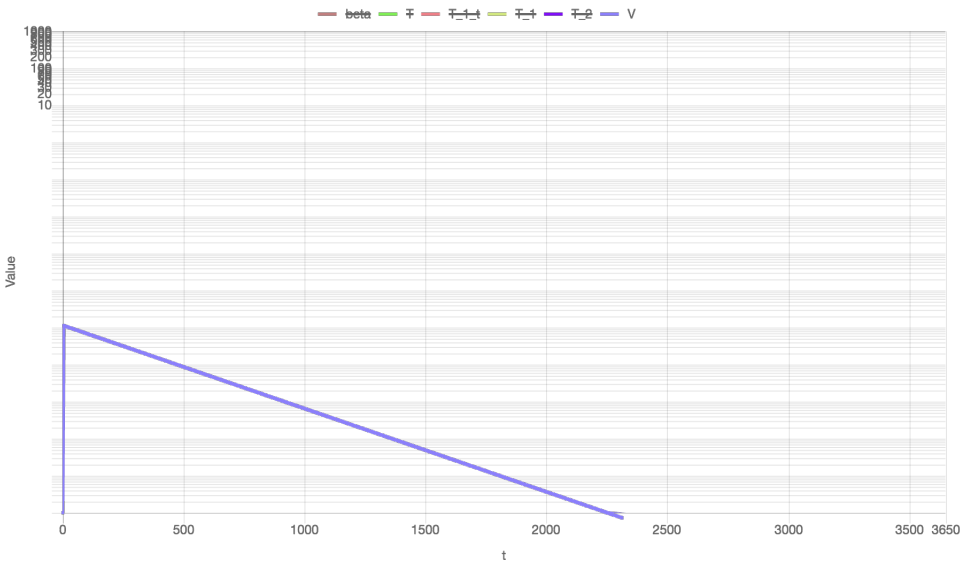
SBMLWebApp Results

Reproduction of the analysis (Simulation) : Figure 4

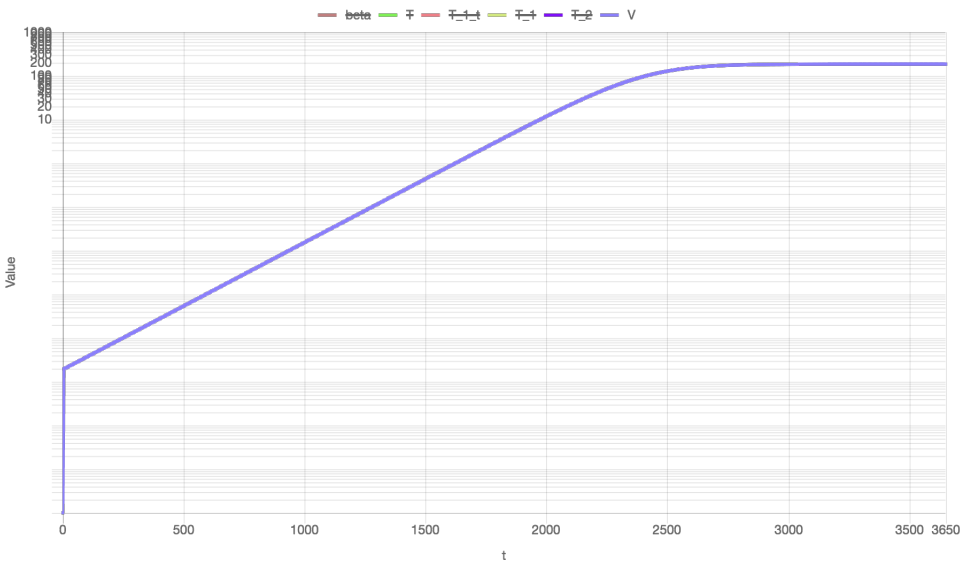


Perelson Result

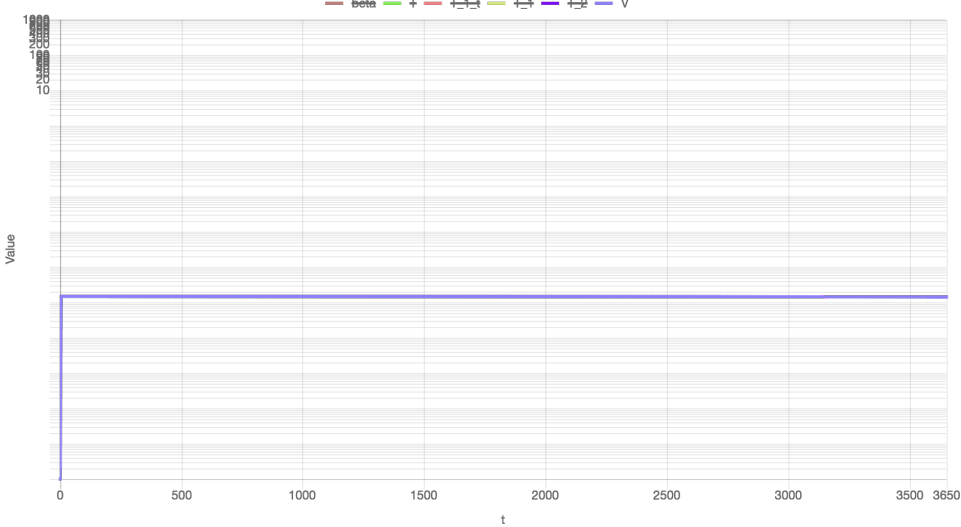
$N = 600$



$N = 1000$



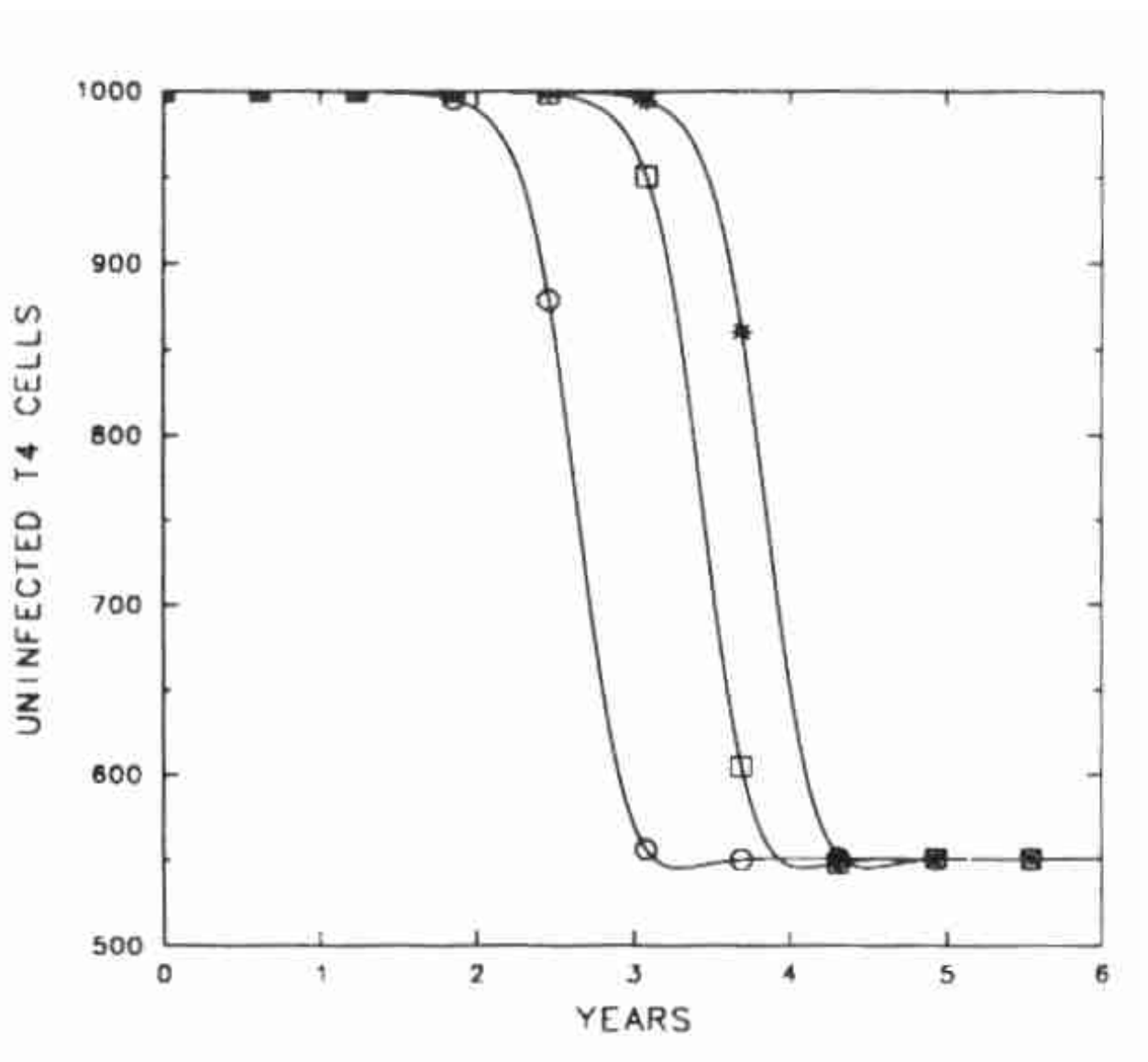
$N = 774$



SBMLWebApp Results

$N = 600 (*)$ ,  $N = 1000 (O)$ ,  $N = N_{crit} (\square) = 774$

Reproduction of the analysis (Simulation) : Figure 7, T



Perelson Result

$N = 1400$ ,  $V_0 = 10^{-6}$  (\*),  $10^{-4}$  ( $\square$ ), and  $10^{-2}$  ( $\circ$ )  $\text{mm}^{-3}$ .

$V_0 = 10^{-6}$

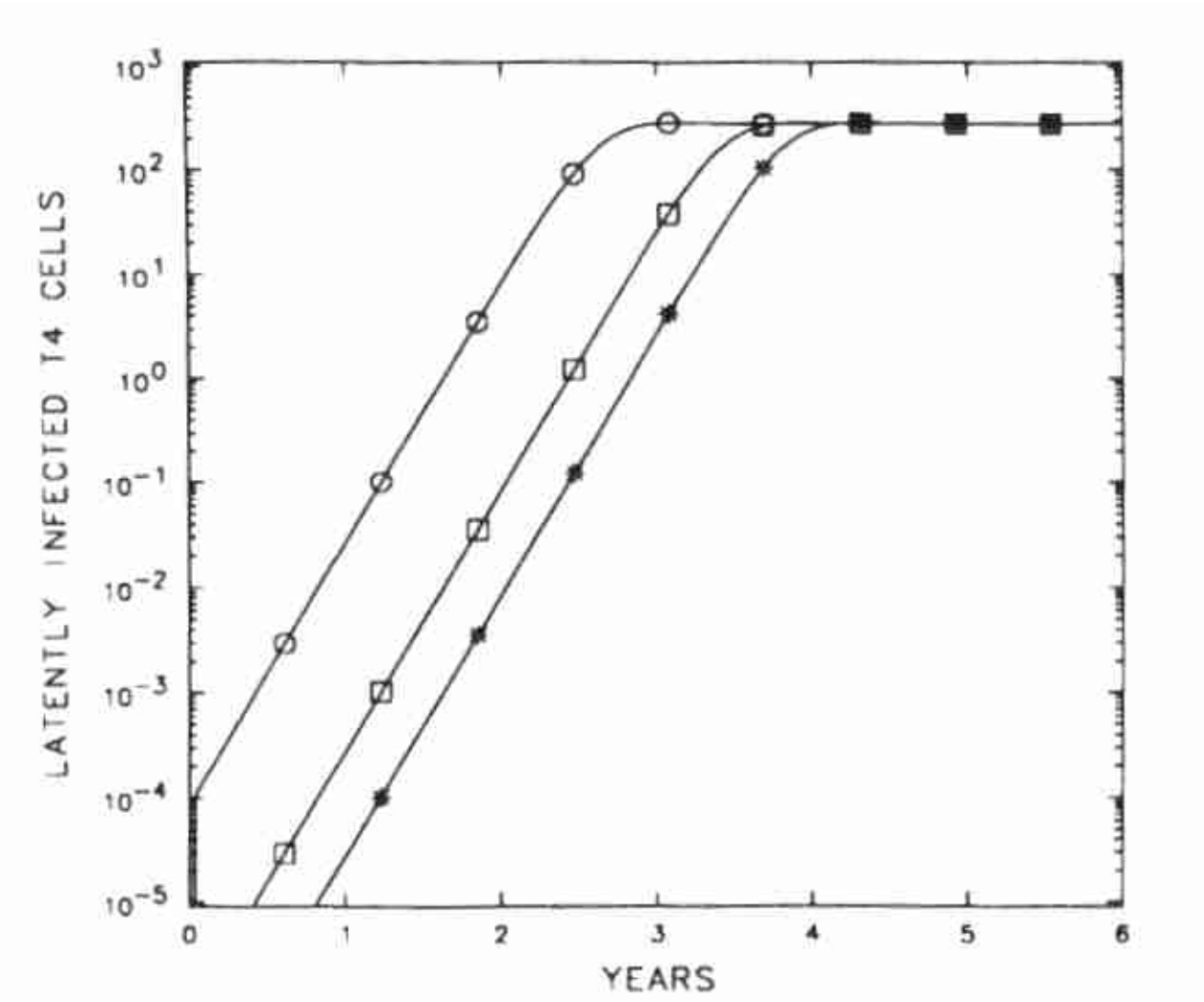
$V_0 = 10^{-4}$

$V_0 = 10^{-2}$



SBMLWebApp Results

Reproduction of the analysis (Simulation) : Figure 7, Tstar



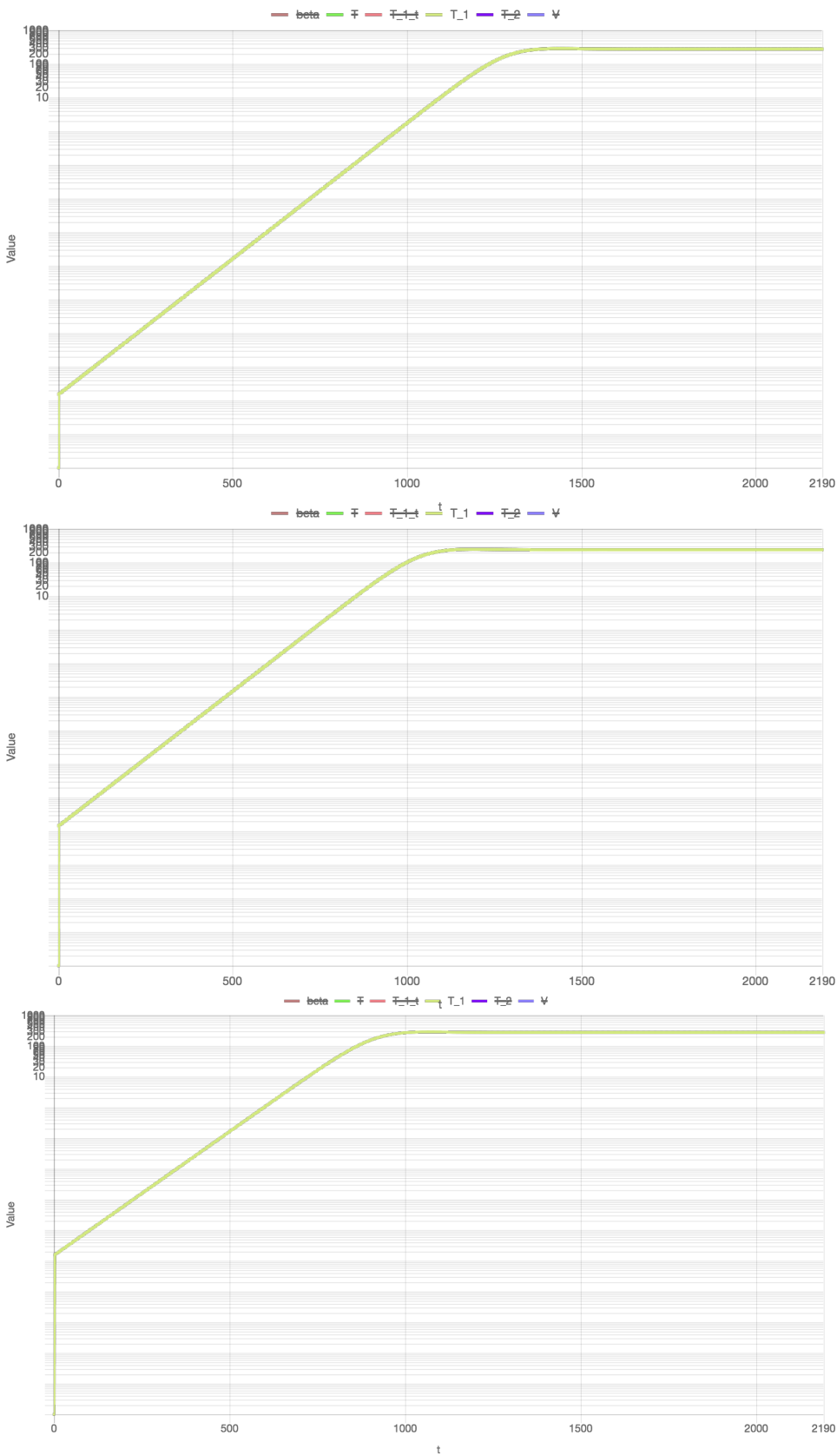
Perelson Result

$N = 1400$ ,  $V_0 = 10^{-6}$  (\*),  $10^{-4}$  (□), and  $10^{-2}$  (○)  $\text{mm}^{-3}$ .

$V_0 = 10^{-6}$

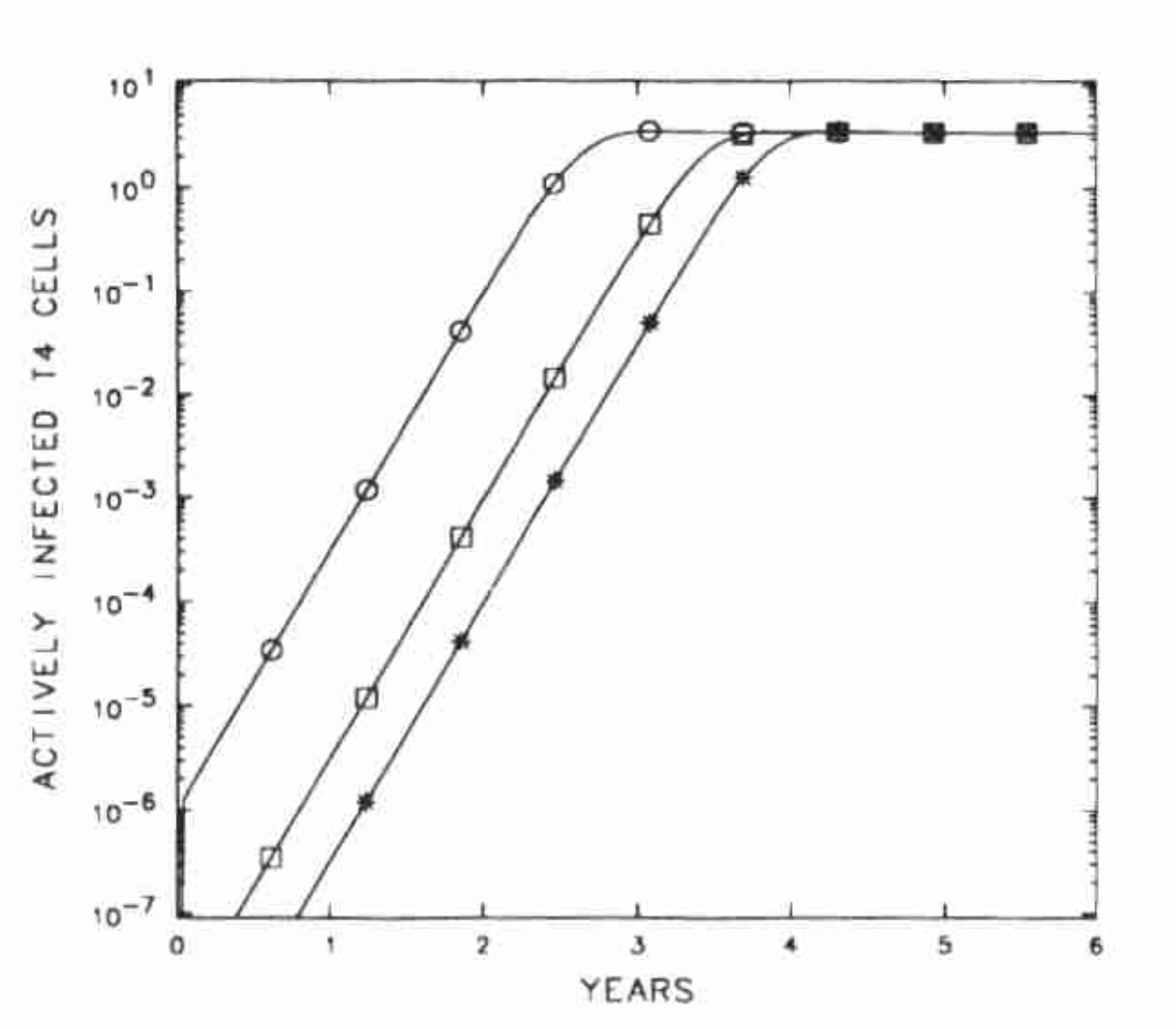
$V_0 = 10^{-4}$

$V_0 = 10^{-2}$



SBMLWebApp Results

Reproduction of the analysis (Simulation) : Figure 7, Tstarstar



Perelson Result

$N = 1400$ ,  $V_0 = 10^{-6}$  (\*),  $10^{-4}$  ( $\square$ ), and  $10^{-2}$  ( $\circ$ )  $\text{mm}^{-3}$ .

$V_0 = 10^{-6}$

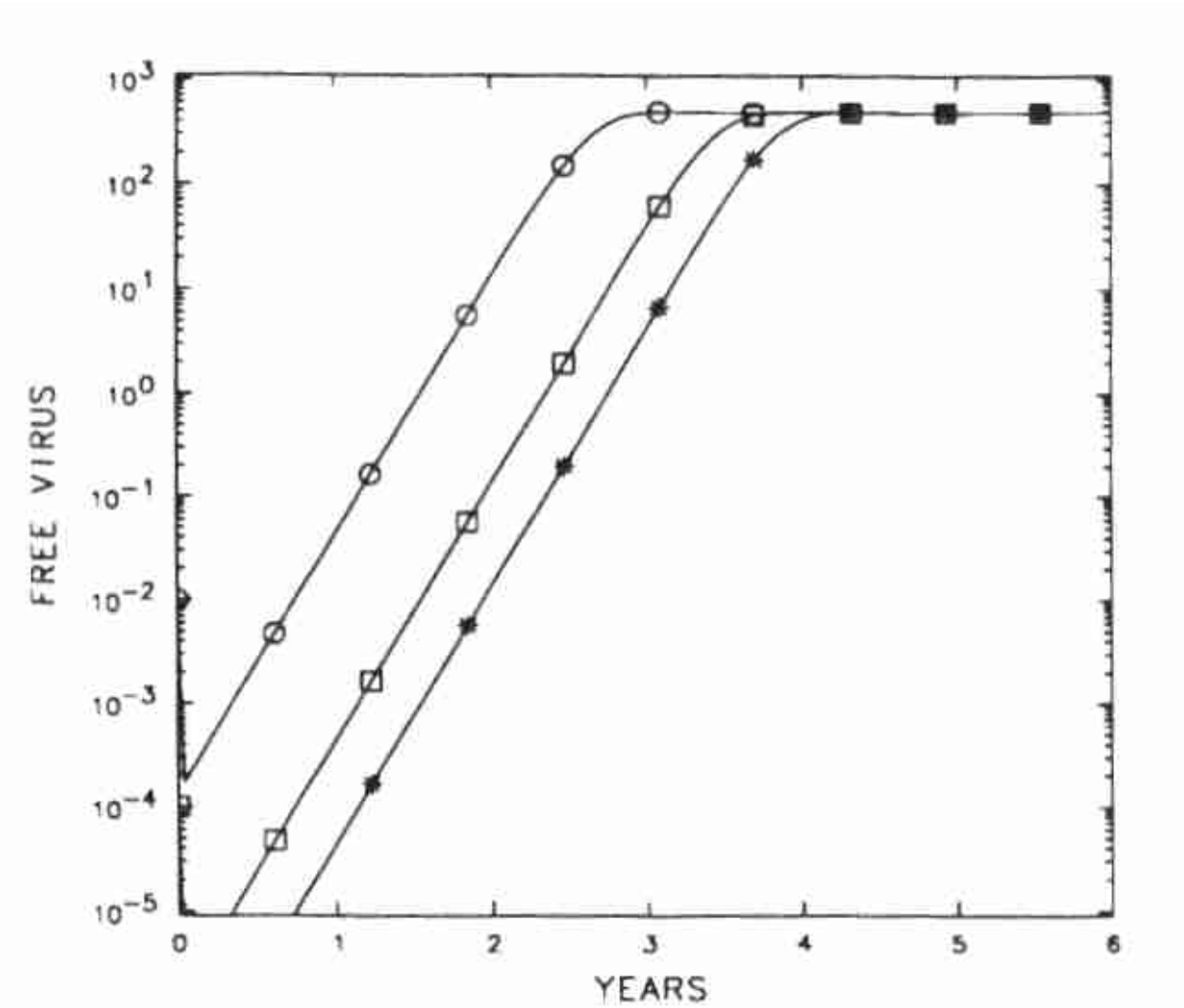
$V_0 = 10^{-4}$

$V_0 = 10^{-2}$



SBMLWebApp Results

Reproduction of the analysis (Simulation) : Figure 7, V



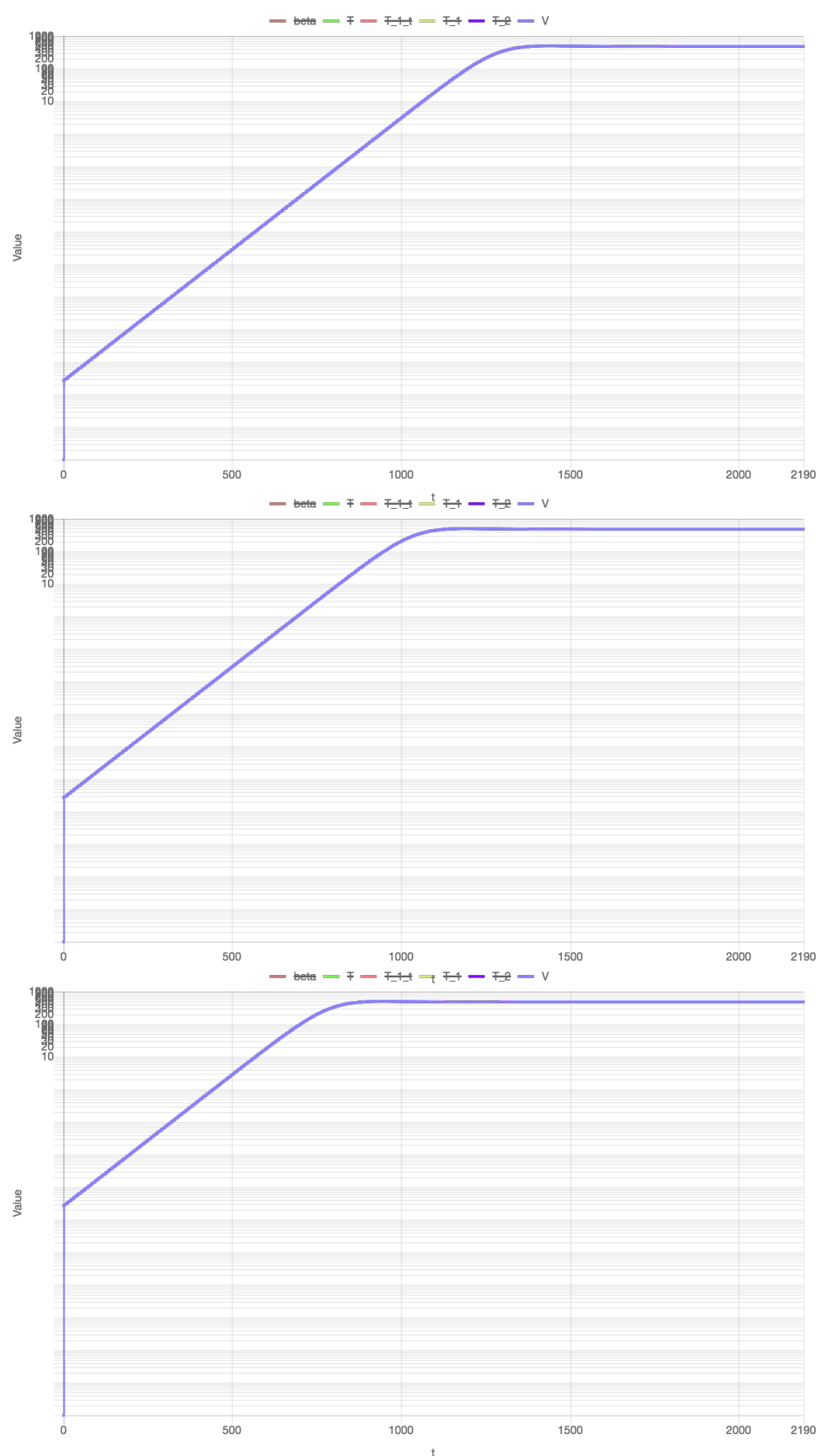
Perelson Result

$N = 1400$ ,  $V_0 = 10^{-6}$  (\*),  $10^{-4}$  ( $\square$ ), and  $10^{-2}$  ( $\circ$ )  $\text{mm}^{-3}$ .

$V_0 = 10^{-6}$

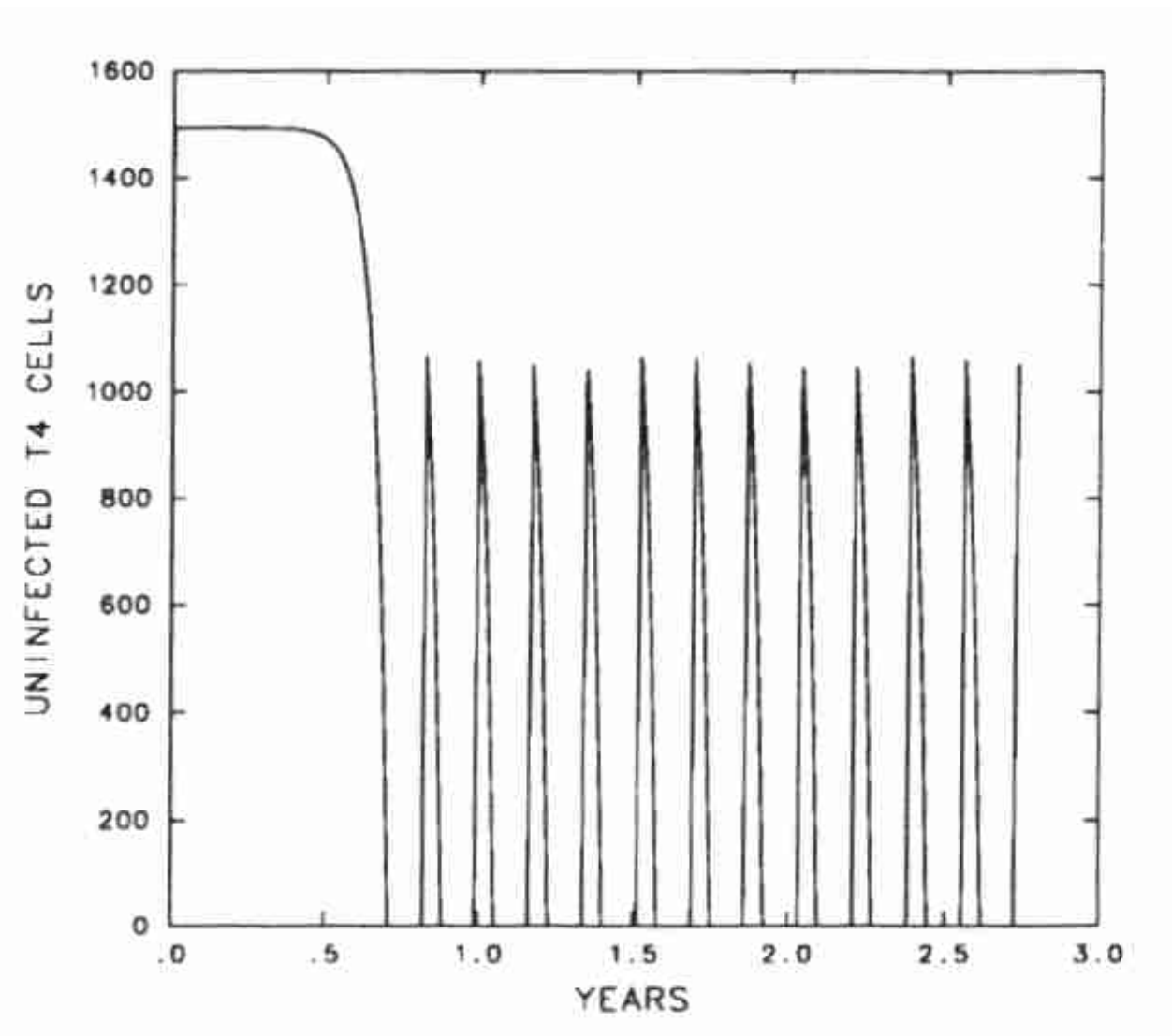
$V_0 = 10^{-4}$

$V_0 = 10^{-2}$

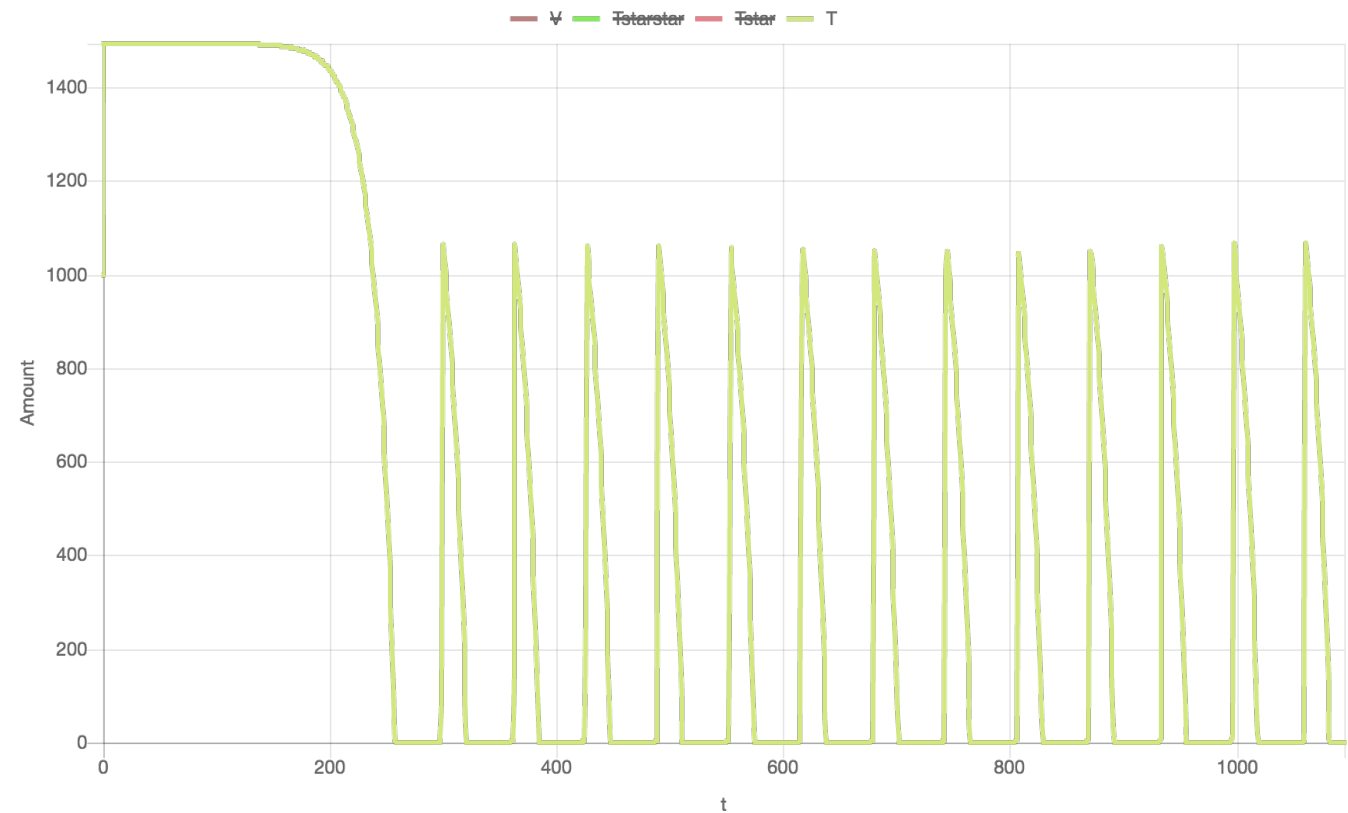


SBMLWebApp Results

Reproduction of the analysis (Simulation) : Figure 8, T



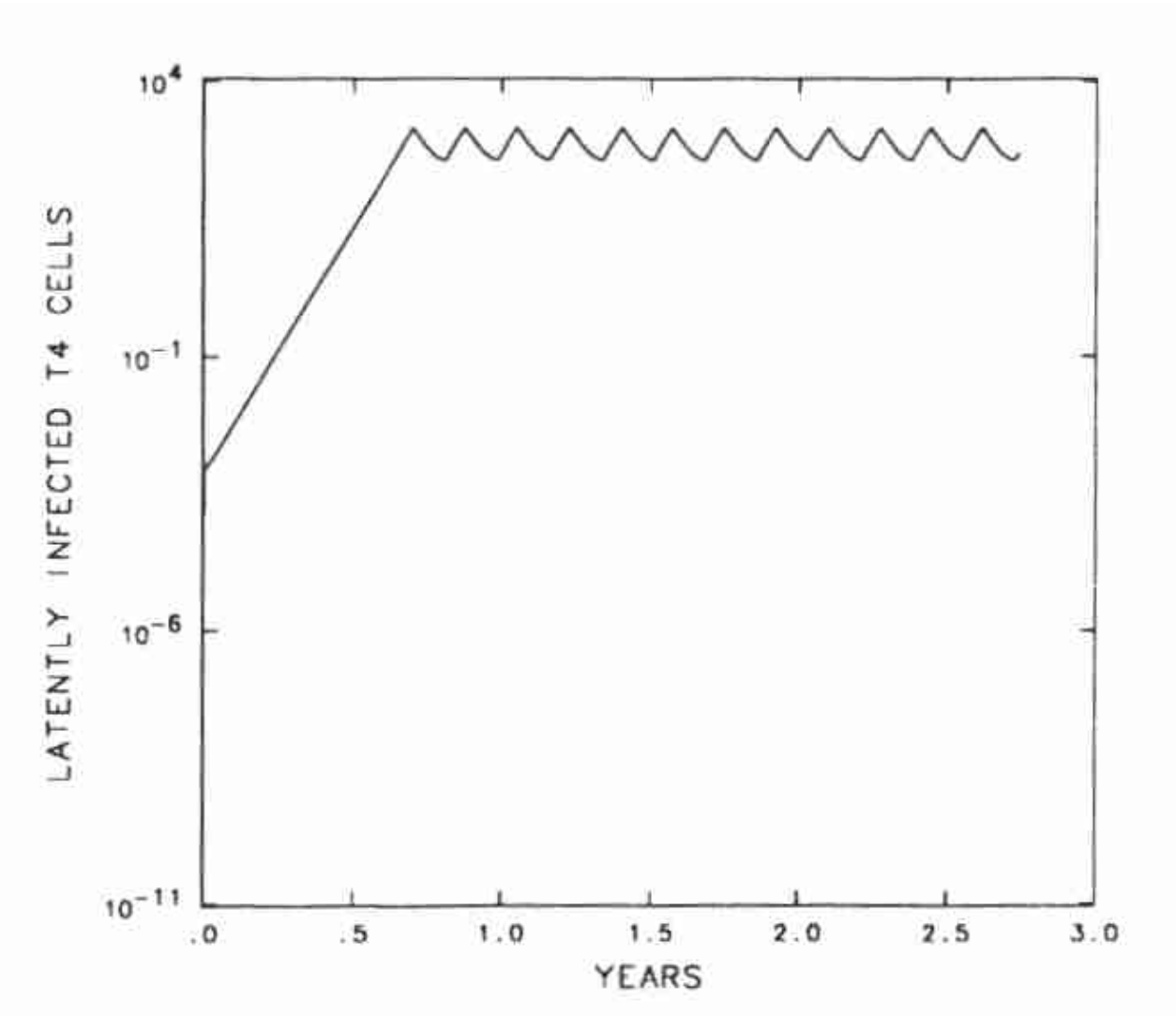
Perelson Result



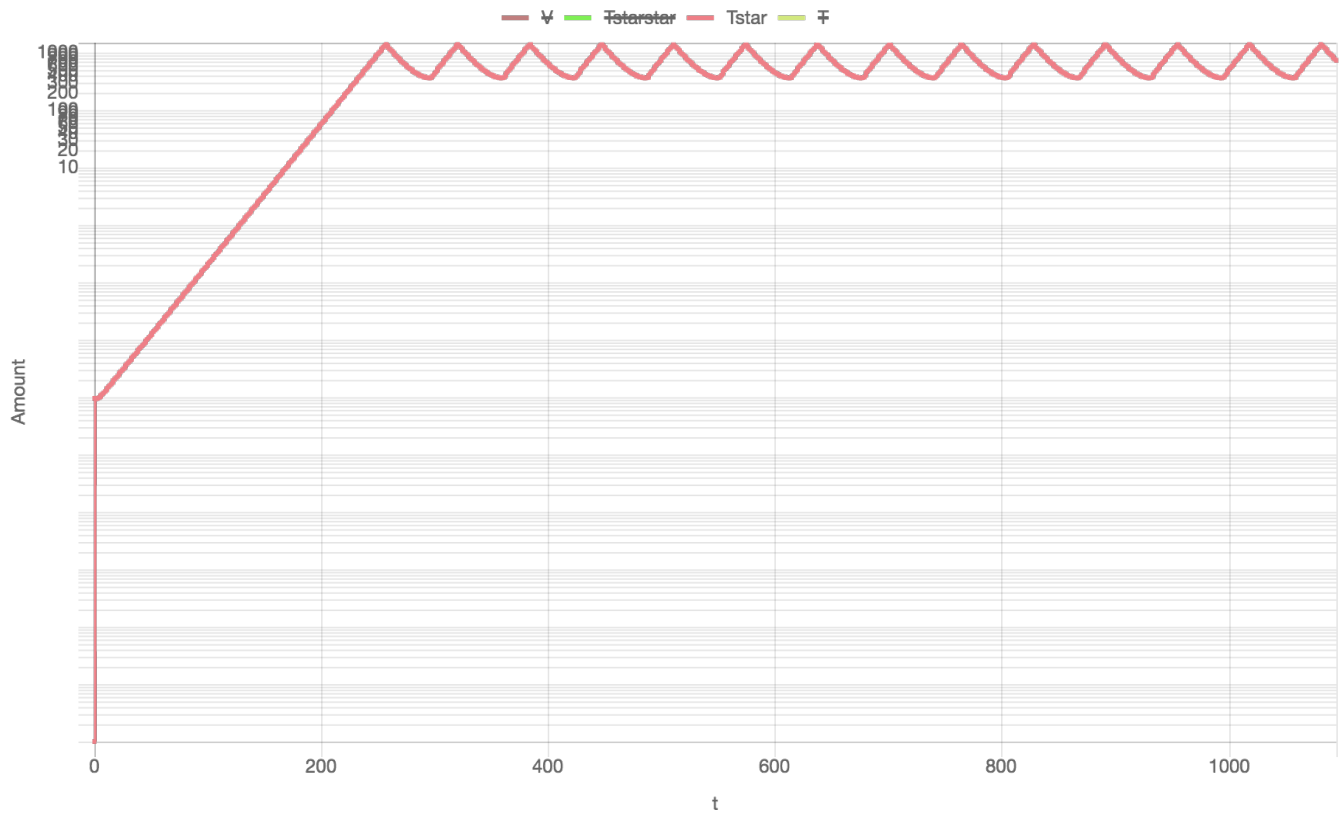
SBMLWebApp Results



Reproduction of the analysis (Simulation) : Figure 8, Tstar



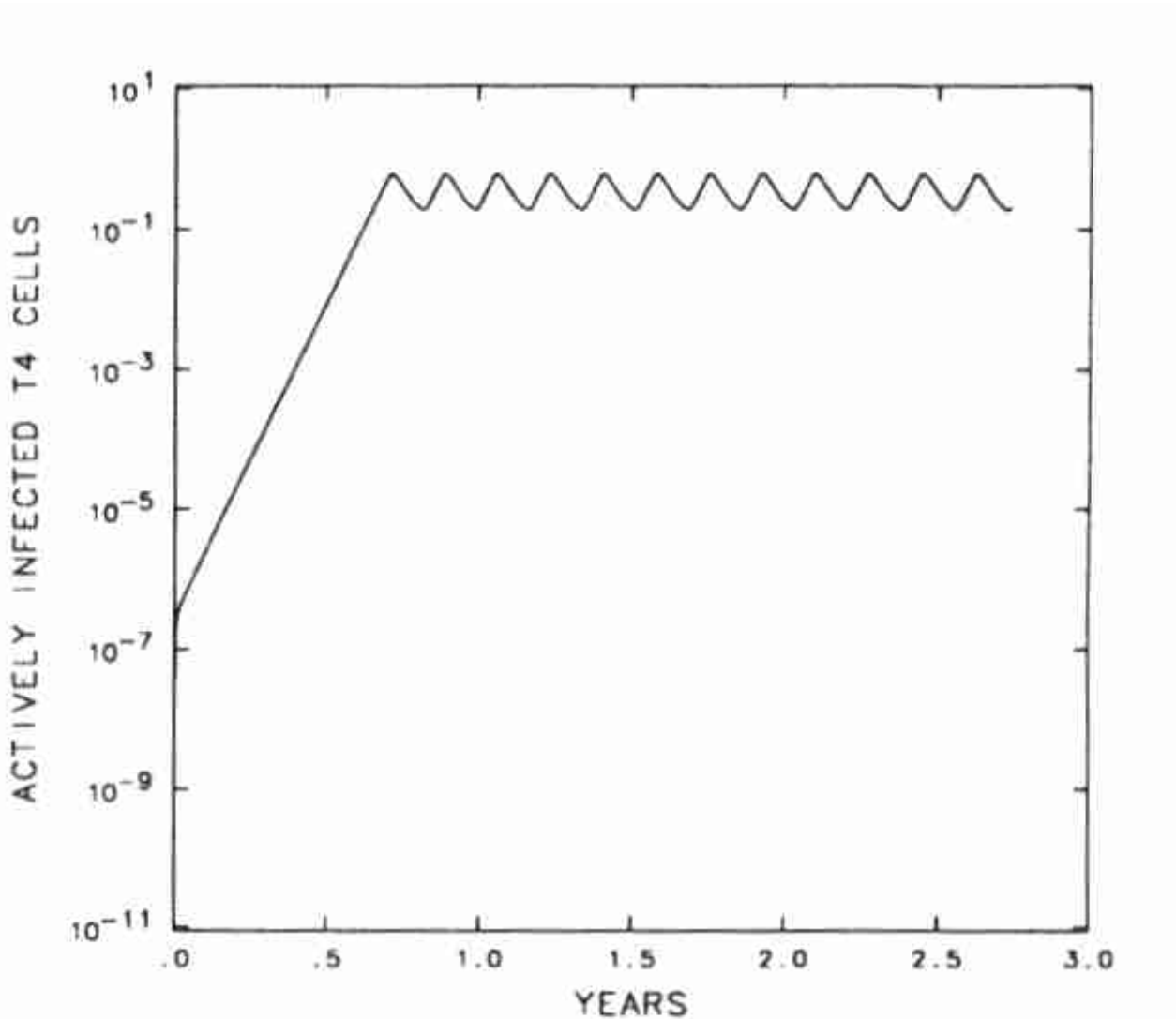
Perelson Result



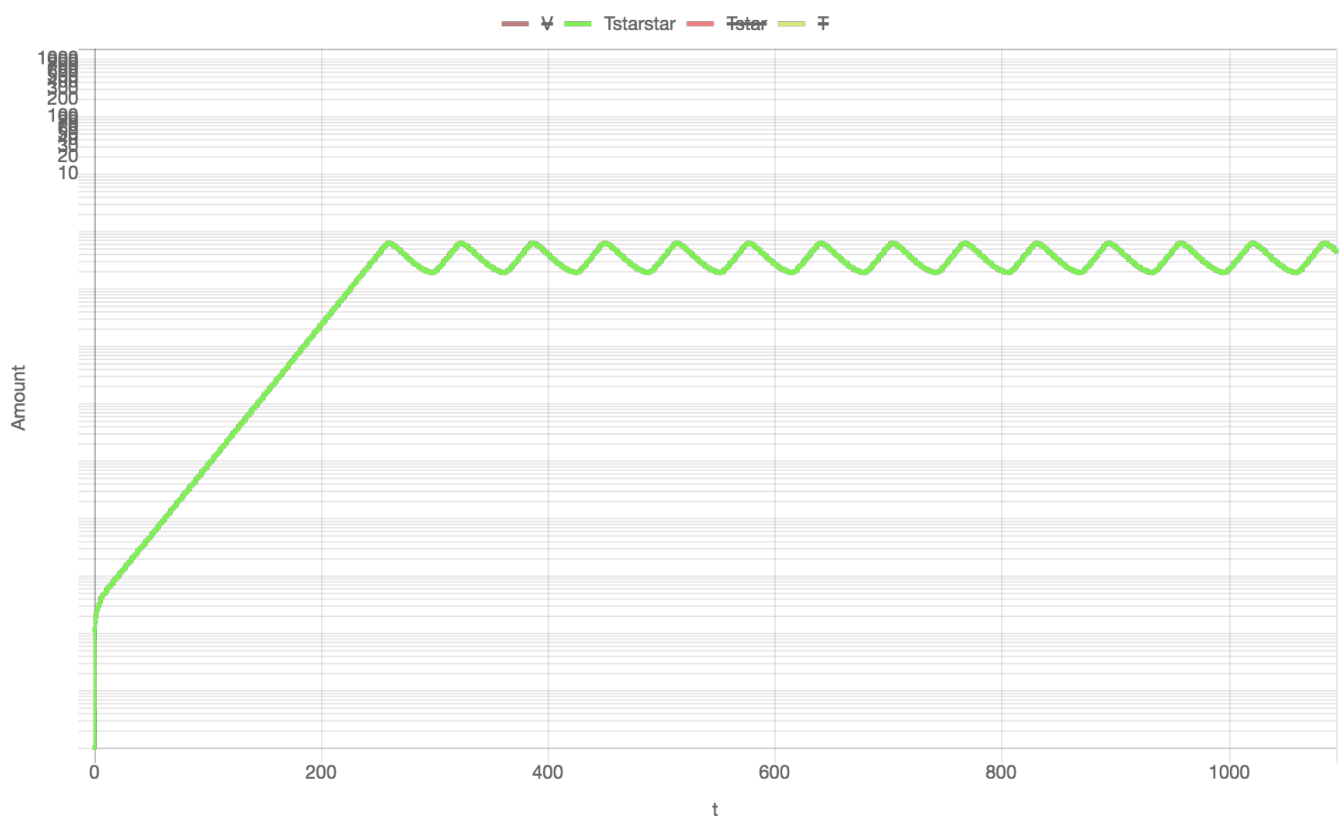
SBMLWebApp Results



Reproduction of the analysis (Simulation) : Figure 8, Tstarstar

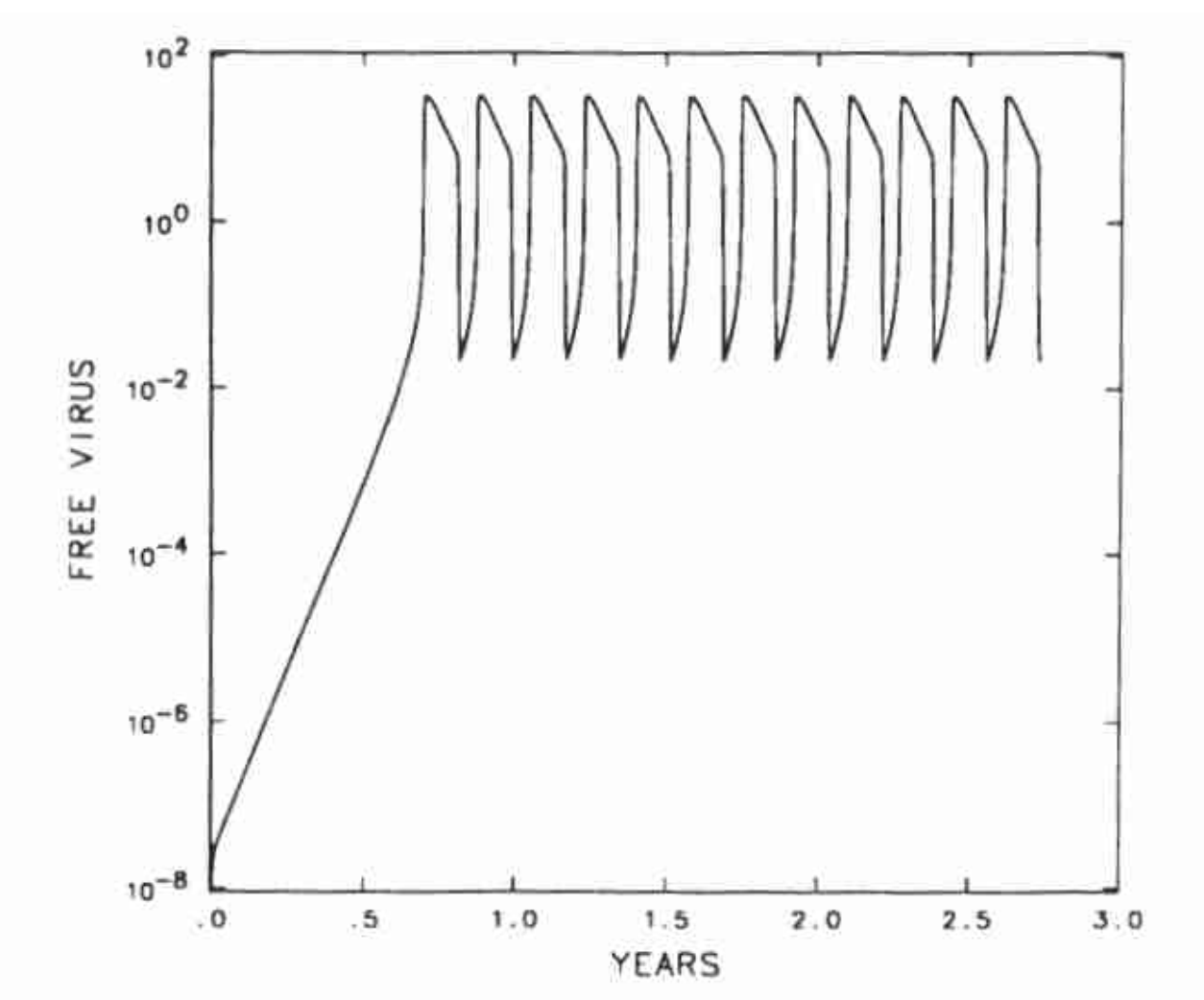


Perelson Result

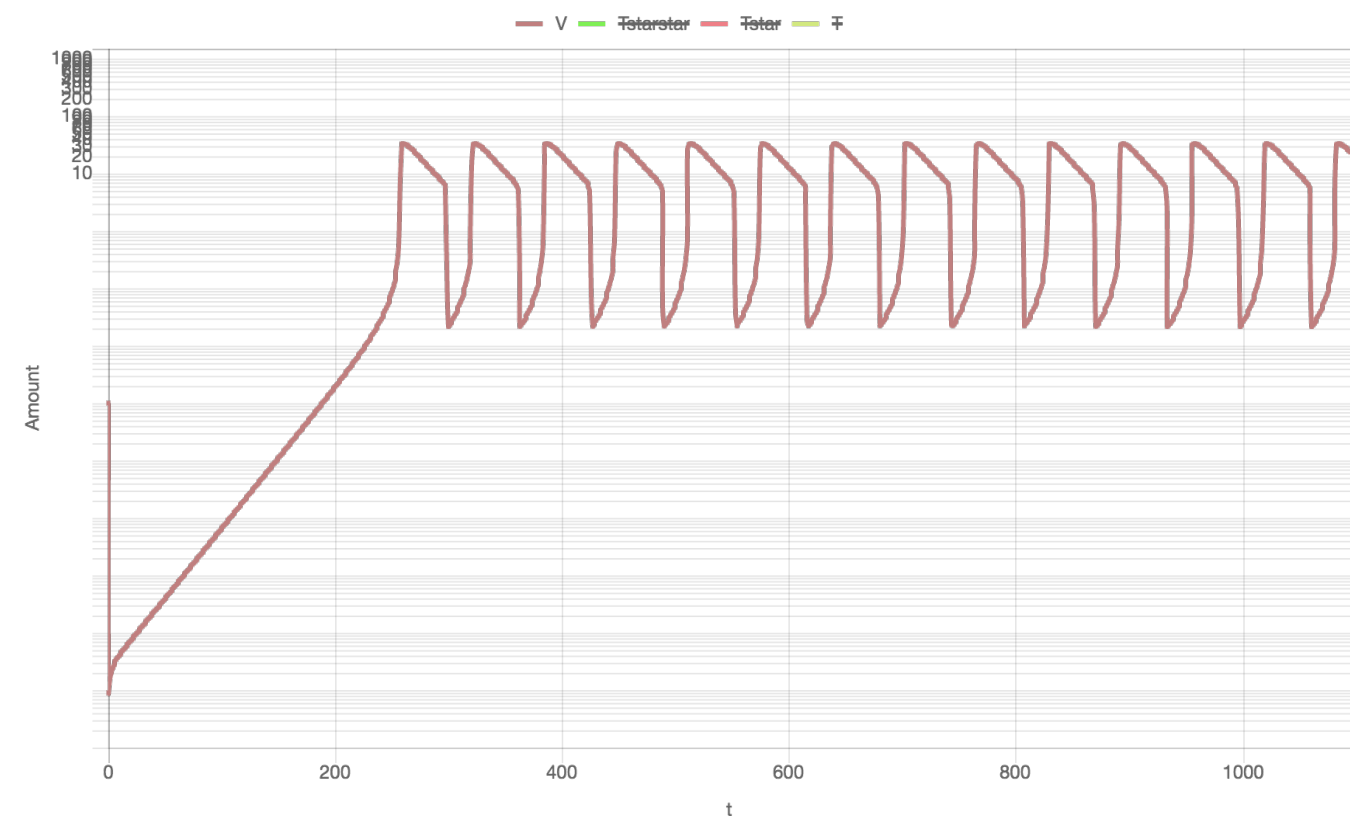


SBMLWebApp Results

Reproduction of the analysis (Simulation) : Figure 8, V



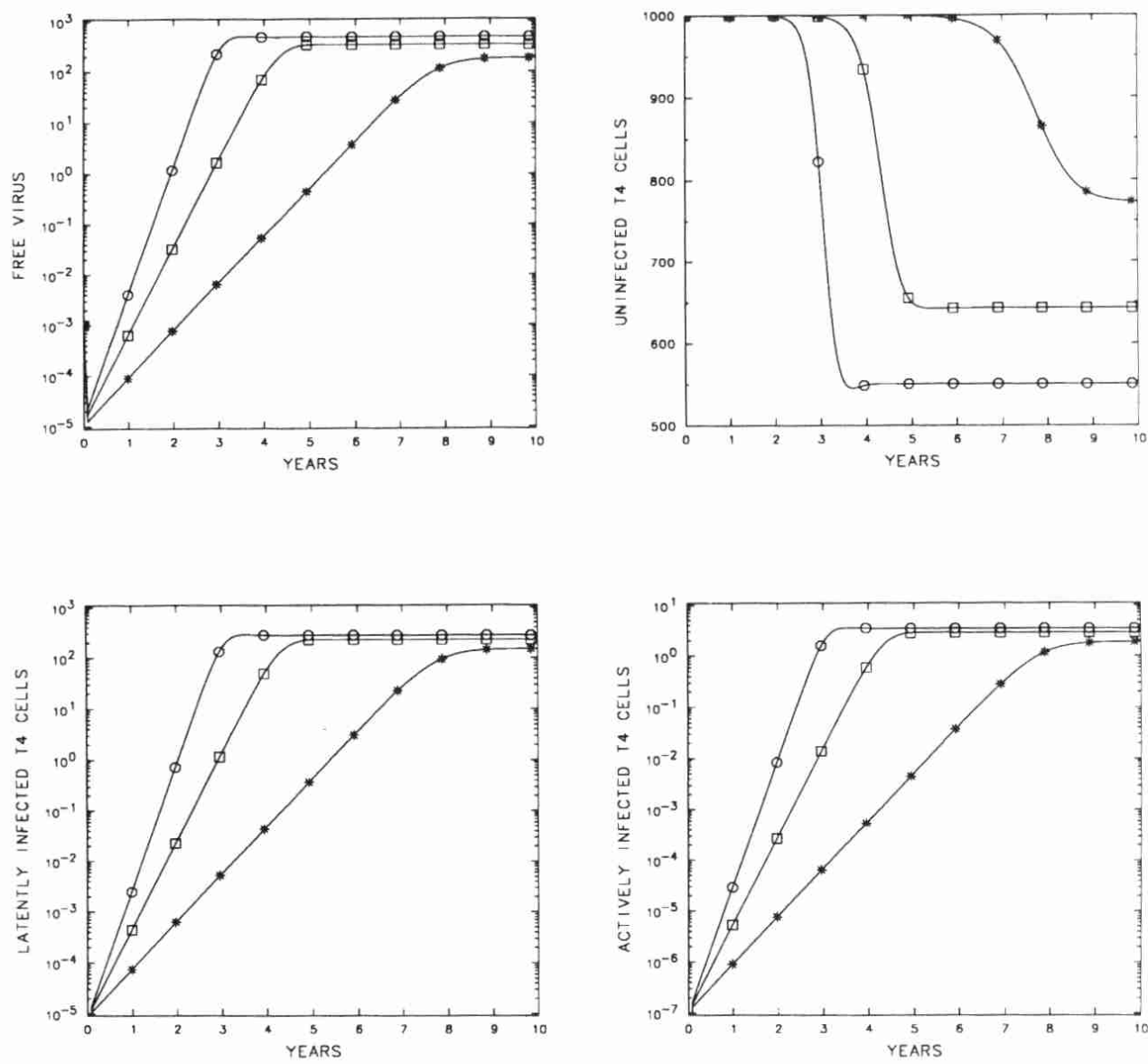
Perelson Result



SBMLWebApp Results

# Reproduction of Steady State Analysis

Reproduction of the analysis (Steady State Analysis) : In Table 1, Unstable Fixed Point



Unstable Fixed Point = 
$$\begin{cases} V = 0 \\ Tstarstar = 0 \\ Tstar = 0 \\ T = 1000 \end{cases}$$

Perelson Result

PerelsonModel\_Table1\_result\_SteadyState

Name	Type	Concentration (mol/l)	Rate (mol/l/s)	Transition Time (s)
V	REACTIONS	8.88696582051918E-23	-5.641328087473	0.1575332205948450
Tstarstar	REACTIONS	-1.45296982190835E-24	9.954254905636	4.166666666666670
Tstar	REACTIONS	-1.16237582434583E-22	4.8063361929200	24.18423883993120
T	REACTIONS	1000.0000000000000	3.5659804361829	50.00000000000000

KINETIC STABILITY ANALYSIS

The linear stability analysis based on the eigenvalues of the Jacobian matrix is only valid for steady states.

Summary:

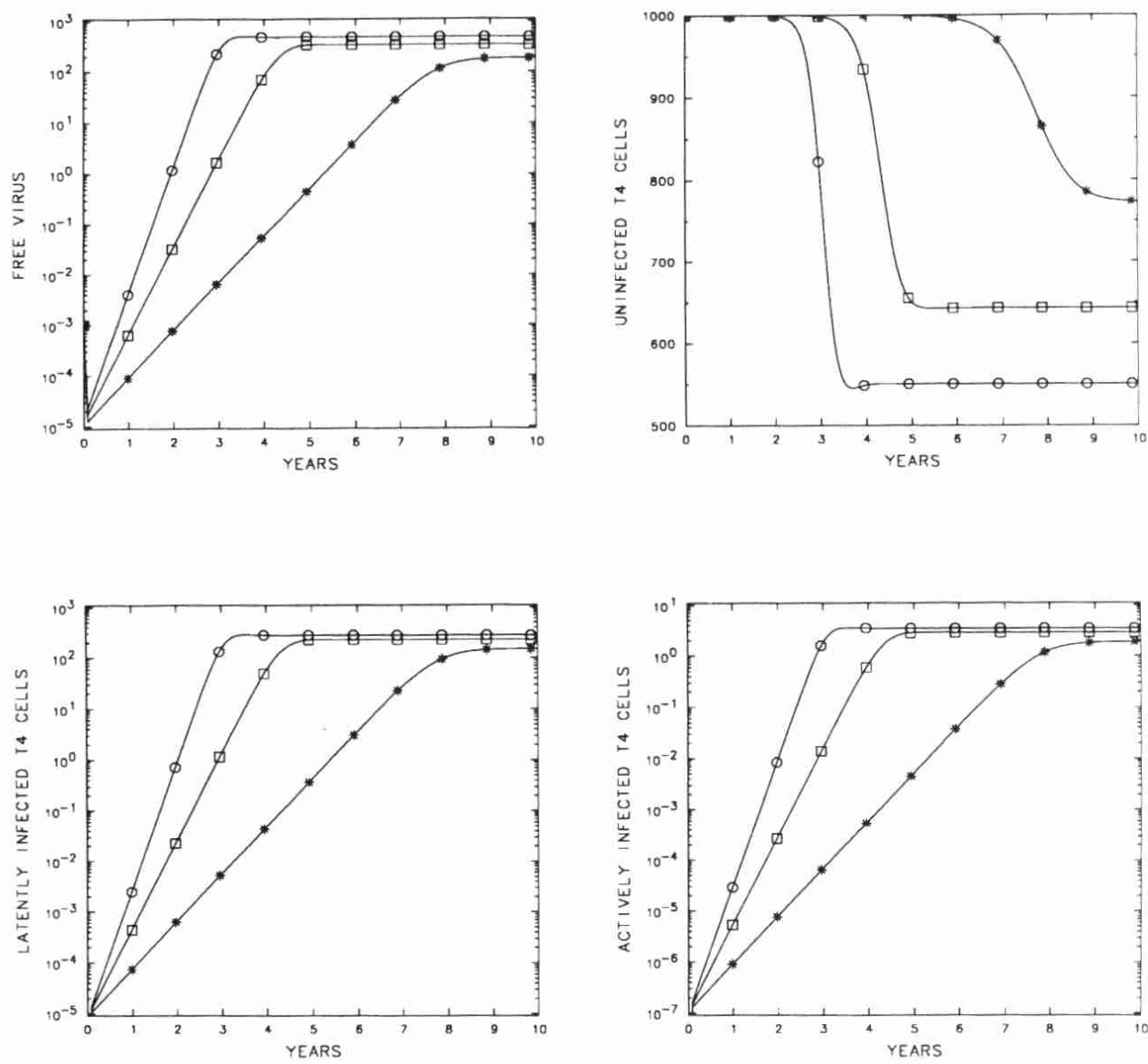
This state is unstable.

Eigenvalue statistics:

- Largest real part: 0.005917614529102015
- Largest absolute imaginary part: 0
- 4 are purely real
- 0 are purely imaginary
- 0 are complex
- 0 are equal to zero
- 1 have positive real part
- 3 have negative real part
- stiffness = 409.0660459649154
- time hierarchy = 0.758277462876047

SBMLWebApp Results

Reproduction of the analysis (Steady State Analysis) : In Table 1, Stable Fixed Point



Stable Fixed Point = 
$$\begin{cases} V = 185.7818 \\ Tstarstar = 1.872171 \\ Tstar = 149.7737 \\ T = 772.5899 \end{cases}$$

Perelson Result

SBMLWebApp Results

PerelsonModel\_Table1\_result\_SteadyState

Name	Type	Concentration (mol/l)	Rate (mol/l/s)	Transition Time (s)
V	REACTIONS	185.7818104642200	0	0.4134722222222220
Tstarstar	REACTIONS	1.8721714188534100	0	4.166666666666670
Tstar	REACTIONS	149.7737135082730	-4.45747554522868E-1	43.478260869565200
T	REACTIONS	772.5898555592880	0	40.88514131131750

KINETIC STABILITY ANALYSIS

The linear stability analysis based on the eigenvalues of the Jacobian matrix is only valid for steady states.

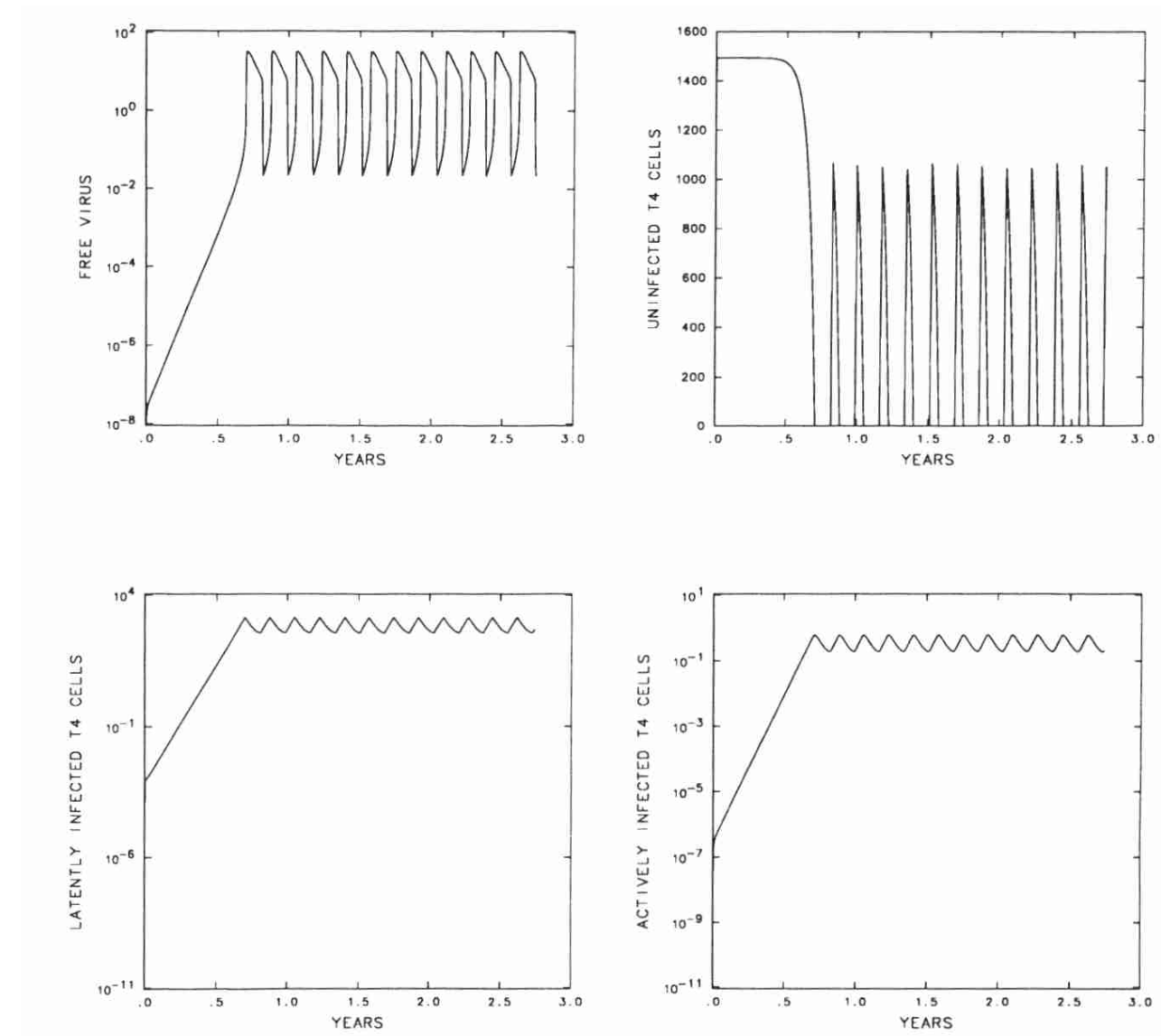
Summary:

This state is asymptotically stable.

Eigenvalue statistics:

- Largest real part: -0.007580073808920534
- Largest absolute imaginary part: 0
- 4 are purely real
- 0 are purely imaginary
- 0 are complex
- 0 are equal to zero
- 0 have positive real part
- 4 have negative real part
- stiffness = 318.73143300999254
- time hierarchy = 0.6165738196777563

# Reproduction of the analysis (Steady State Analysis) : In Table 8, Unstable Fixed Point (With Oscillation)



Unstable Fixed Point  
(With Oscillation)

=

$$\begin{cases} V = 6.47353 \\ Tstarstar = 0.1929402 \\ Tstar = 385.8805 \\ T = 1.493205 \end{cases}$$

Perelson Result

PerelsonModel\_CalibratedForReproductionOfFigure8\_result\_SteadyState

Name	Type	Concentration (mol/l)	Rate (mol/l/s)	Transition Time (s)
V	REACTIONS	6.473530498547430	7.13196087236589E-1	0.1165
Tstarstar	REACTIONS	0.1929402270668640	0	4.166666666666670
Tstar	REACTIONS	385.88045413372900	-3.56598043618295E-	16.633399866932800
T	REACTIONS	1.4932045779685300	3.56598043618295E-1	0.06411705950442200

## KINETIC STABILITY ANALYSIS

The linear stability analysis based on the eigenvalues of the Jacobian matrix is only valid for steady states.

### Summary:

This state is unstable.  
Transient states in its vicinity have oscillatory components.

### Eigenvalue statistics:

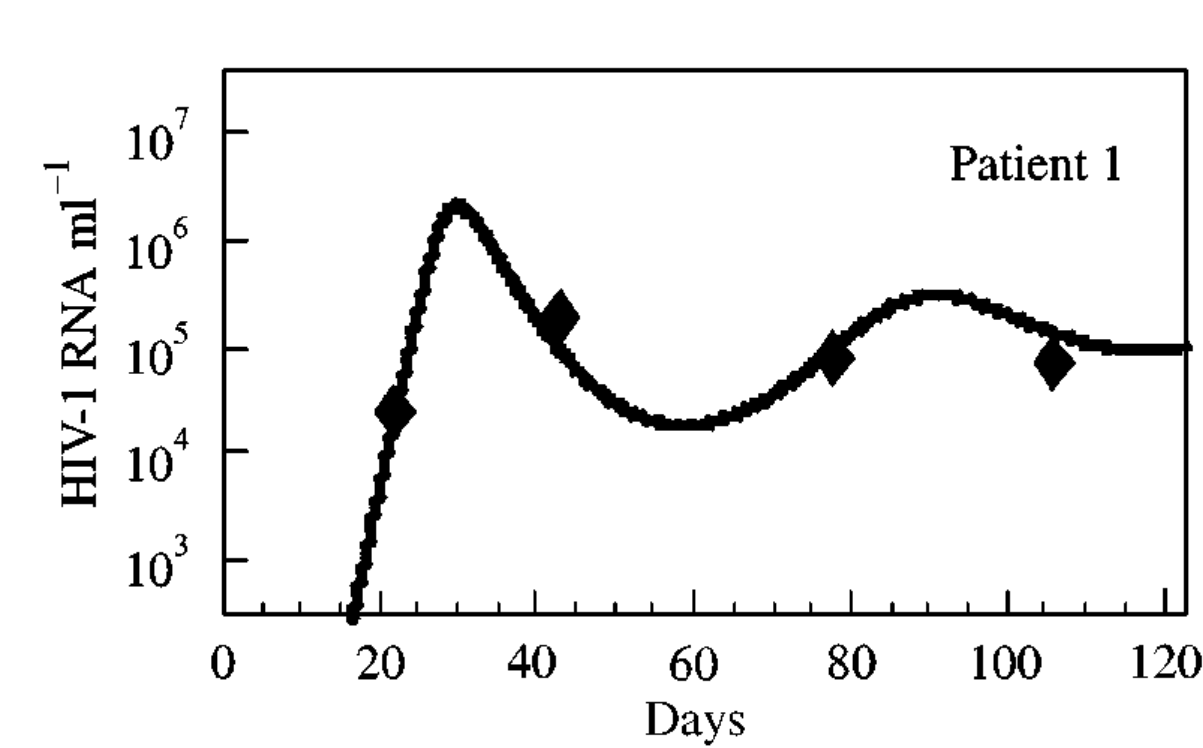
- Largest real part: 0.055057250755708095
- Largest absolute imaginary part: 0.3994090482034272
- The complex eigenvalues with the largest real part are: 0.055057250755708095+I-0.3994090482034272 i
- 2 are purely real
- 0 are purely imaginary
- 2 are complex
- 0 are equal to zero
- 2 have positive real part
- 2 have negative real part
- stiffness = 275.30517651142844
- time hierarchy = 0.5719767225716659

SBMLWebApp Results

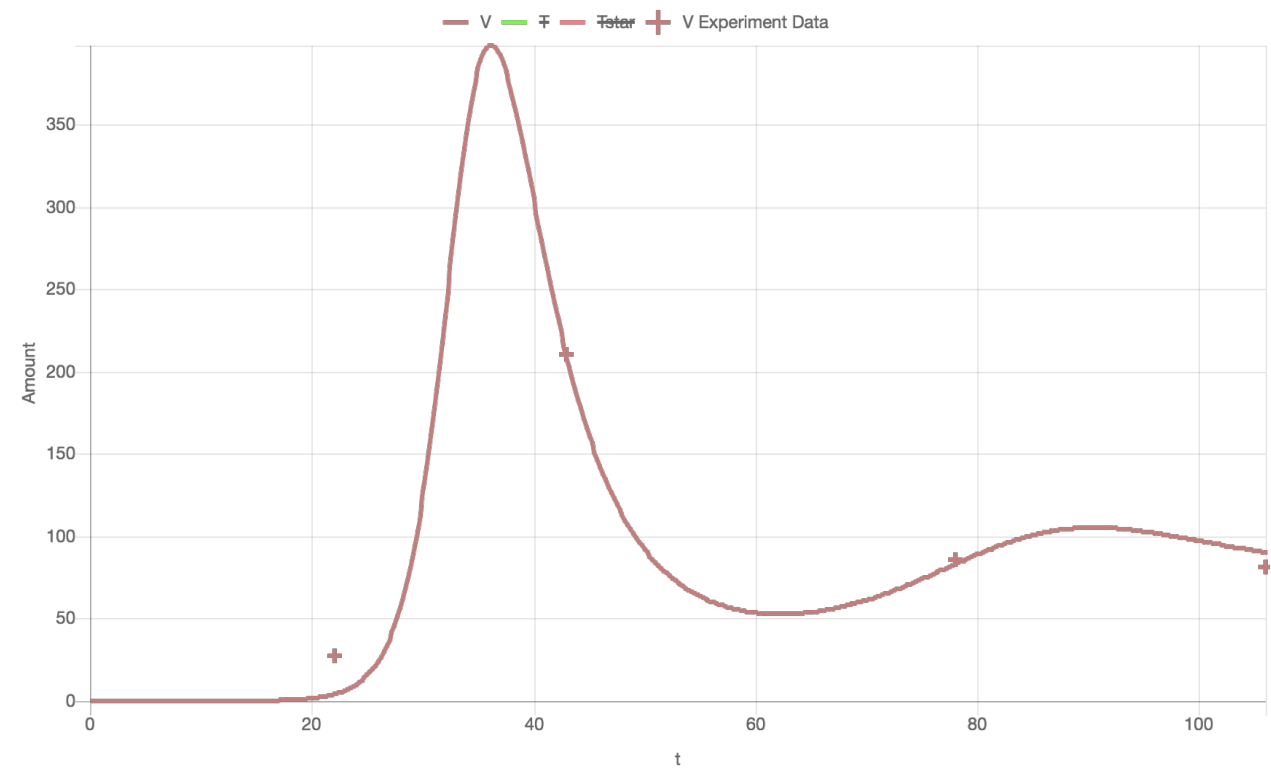
# Reproduction of Parameter Estimation



# Reproduction of the analysis (Parameter Estimation) : For Patient 1 (pt1)



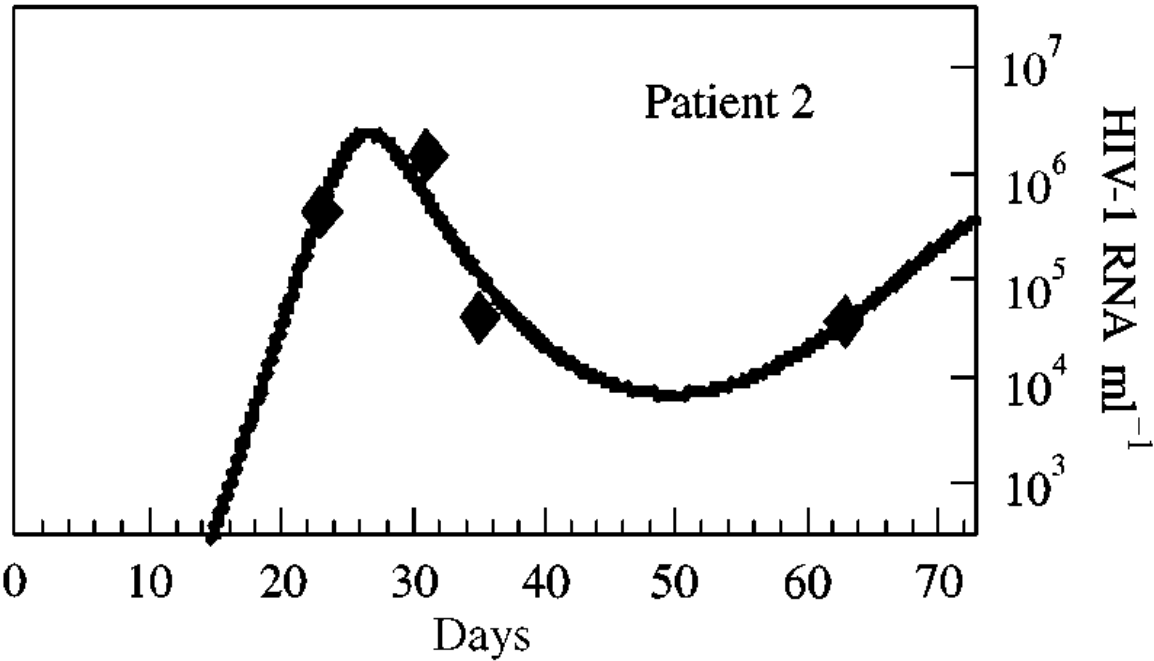
Perelson Result



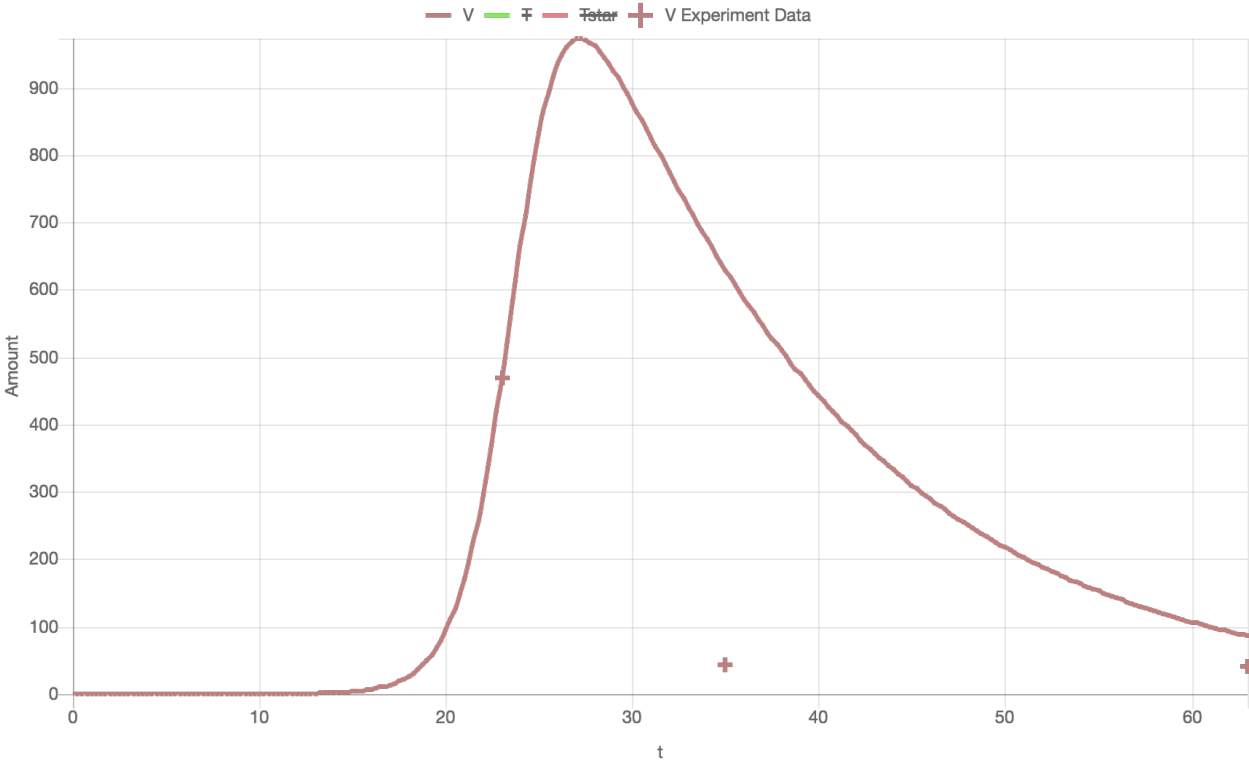
SBMLWebApp Results



# Reproduction of the analysis (Parameter Estimation) : For Patient 2 (pt2)

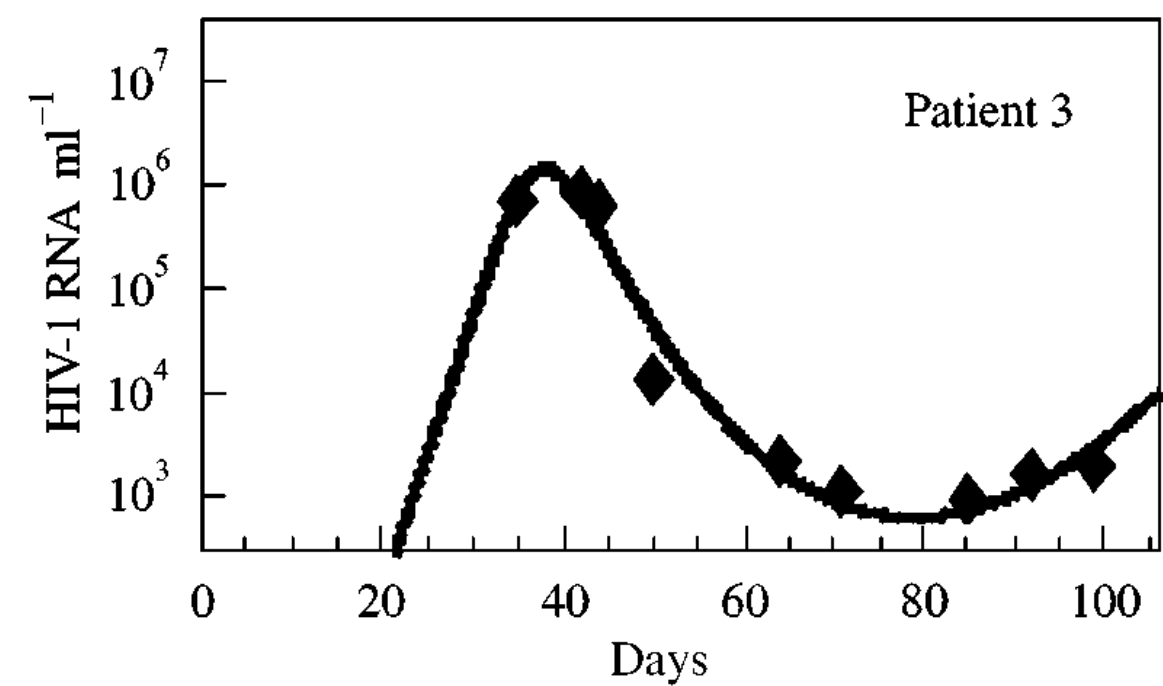


Perelson Result

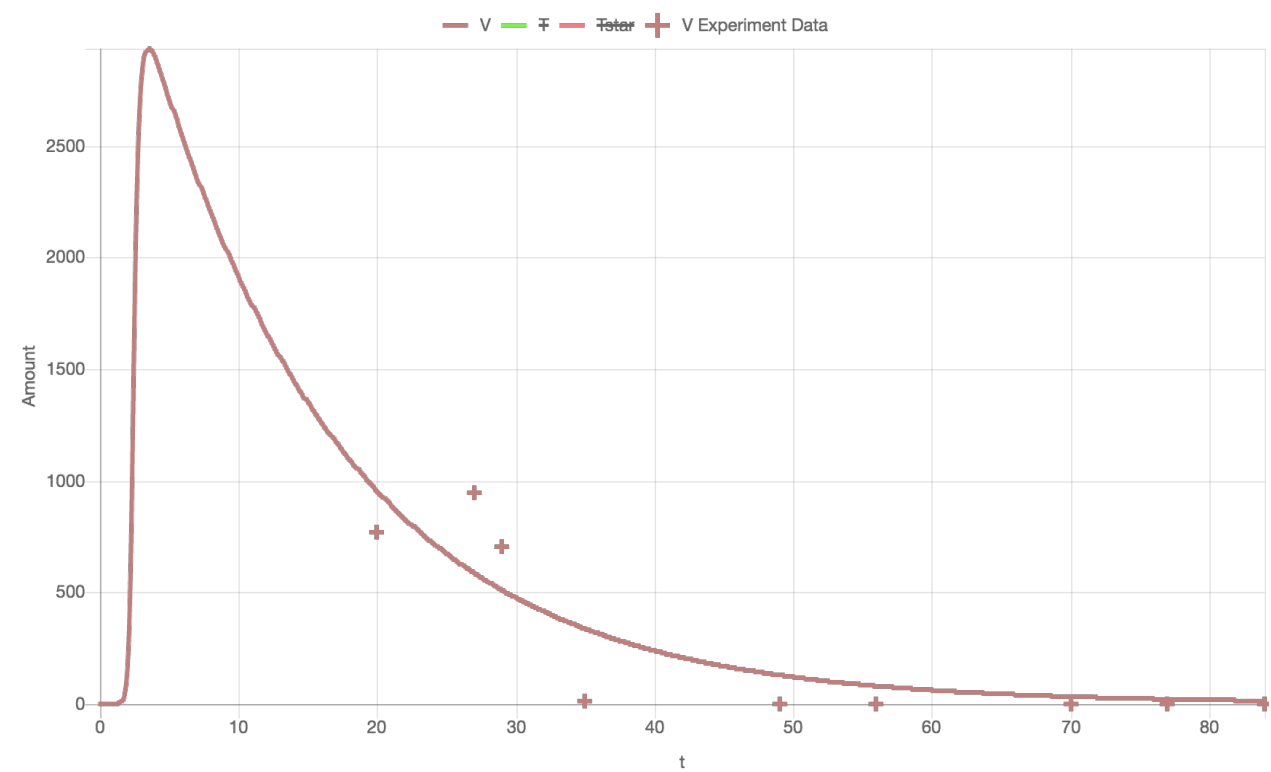


SBMLWebApp Results

# Reproduction of the analysis (Parameter Estimation) : For Patient 3 (pt3)

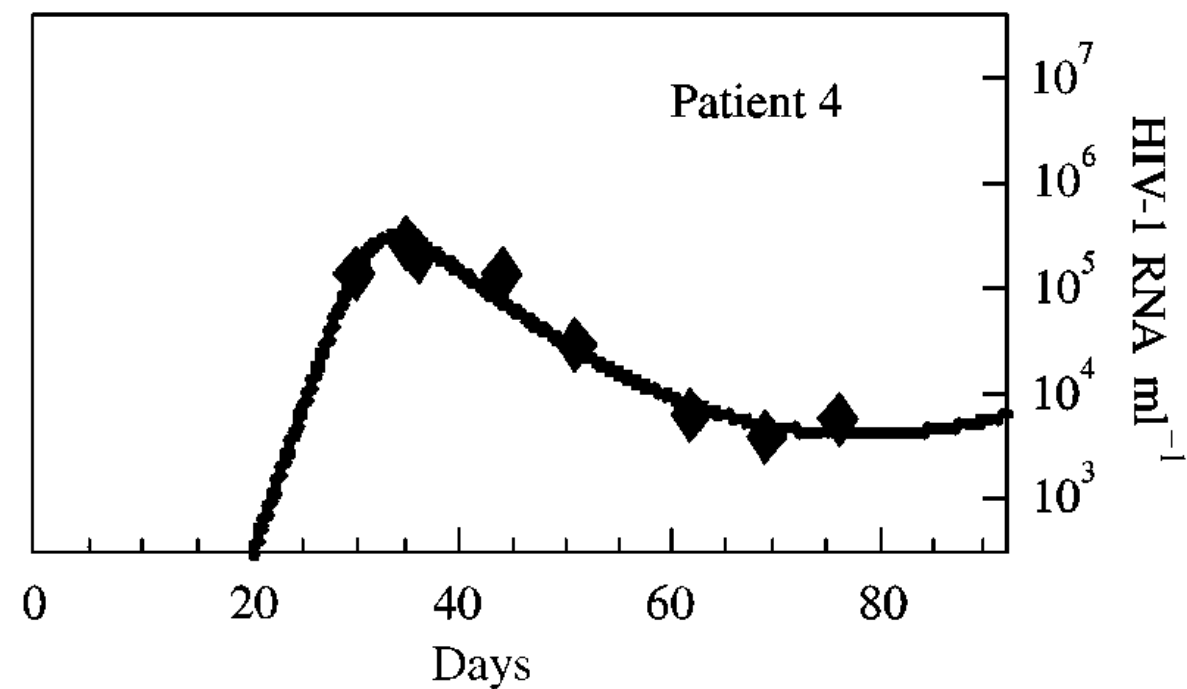


Perelson Result

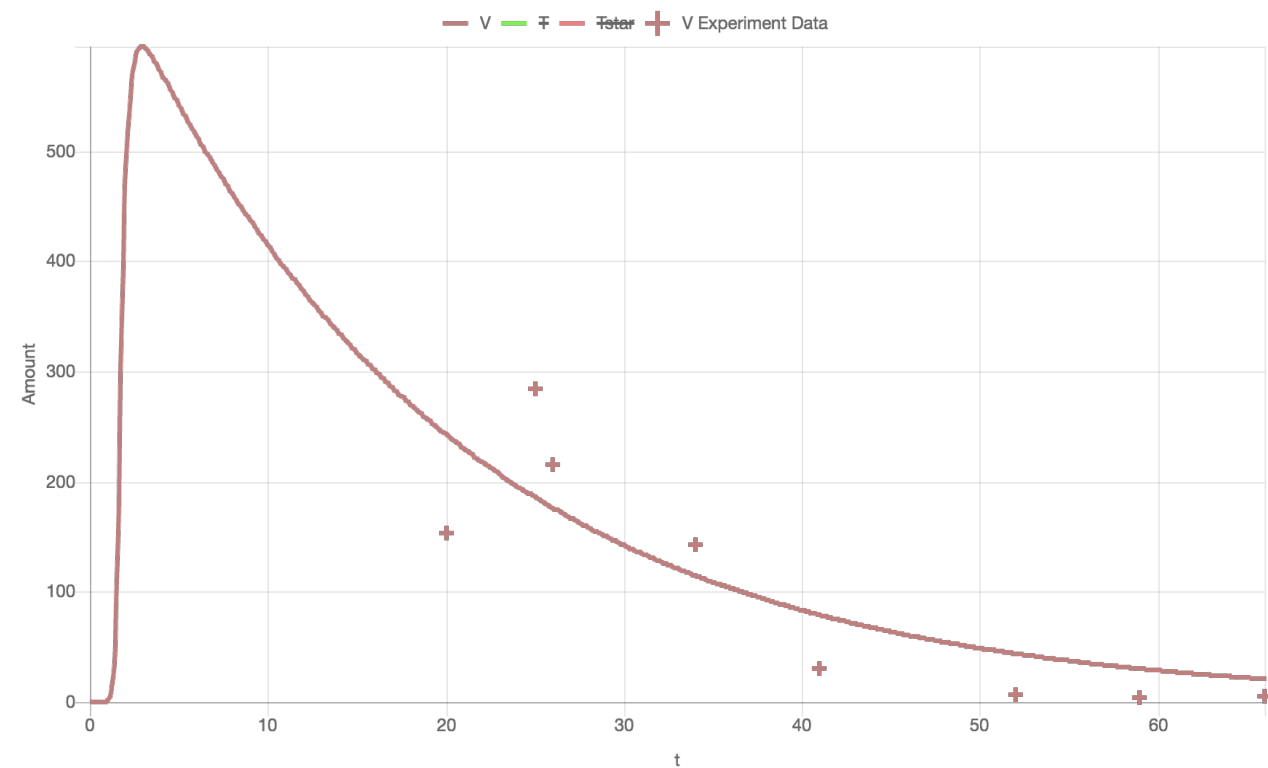


SBMLWebApp Results

# Reproduction of the analysis (Parameter Estimation) : For Patient 4 (pt4)

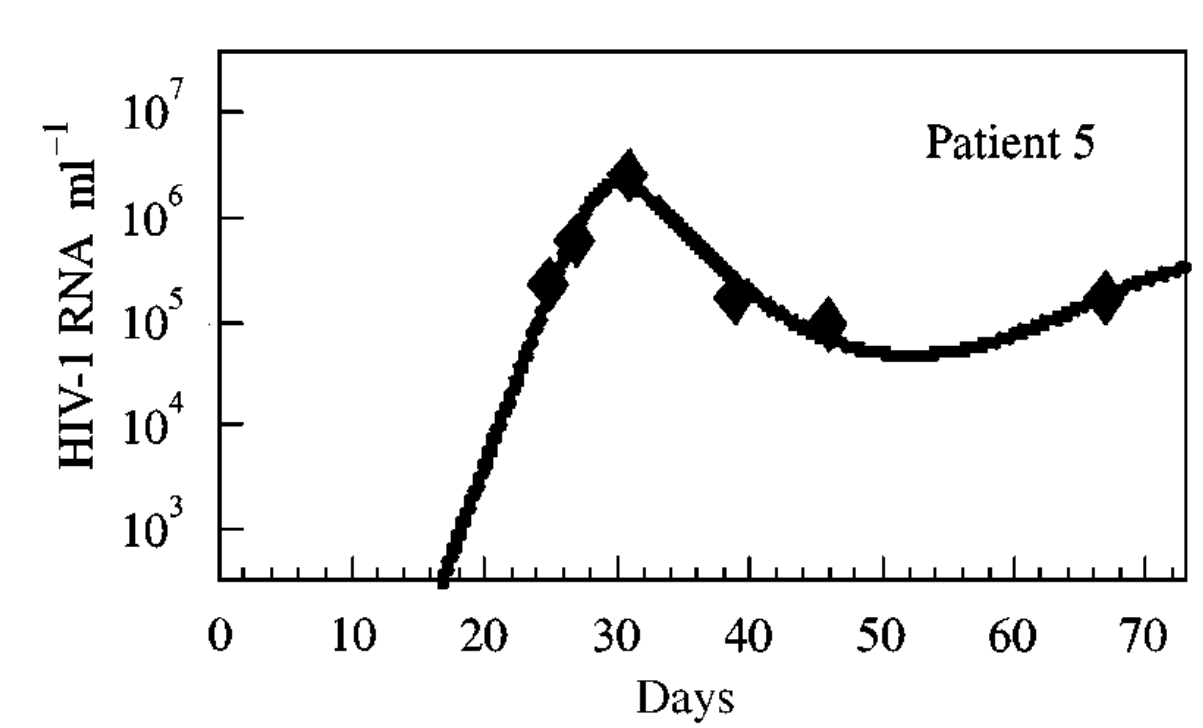


Perelson Result

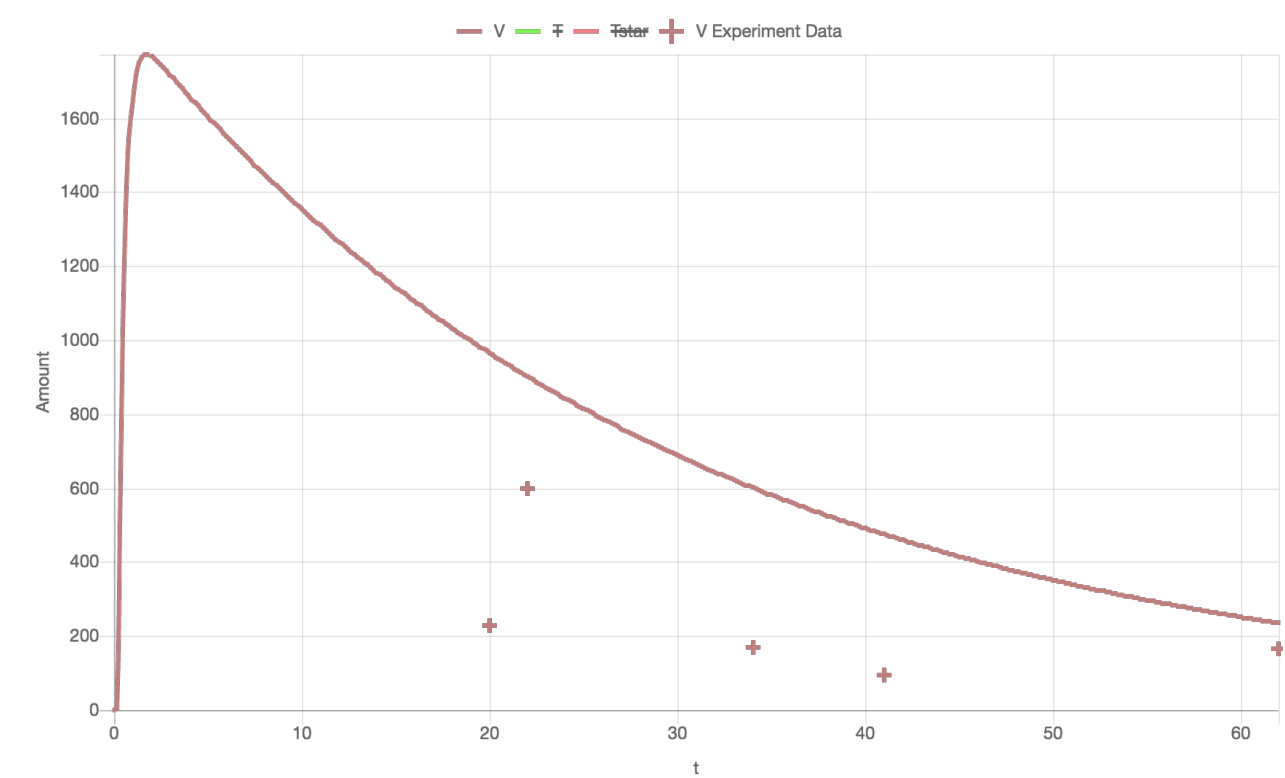


SBMLWebApp Results

# Reproduction of the analysis (Parameter Estimation) : For Patient 5 (pt5)

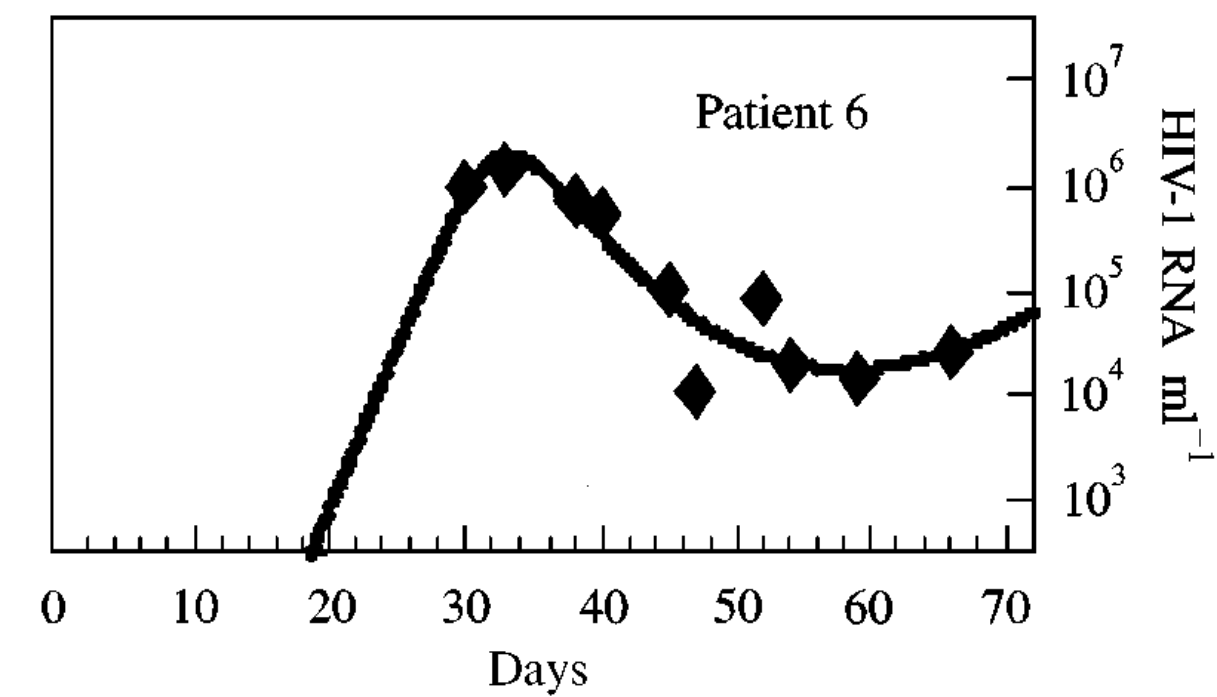


Perelson Result

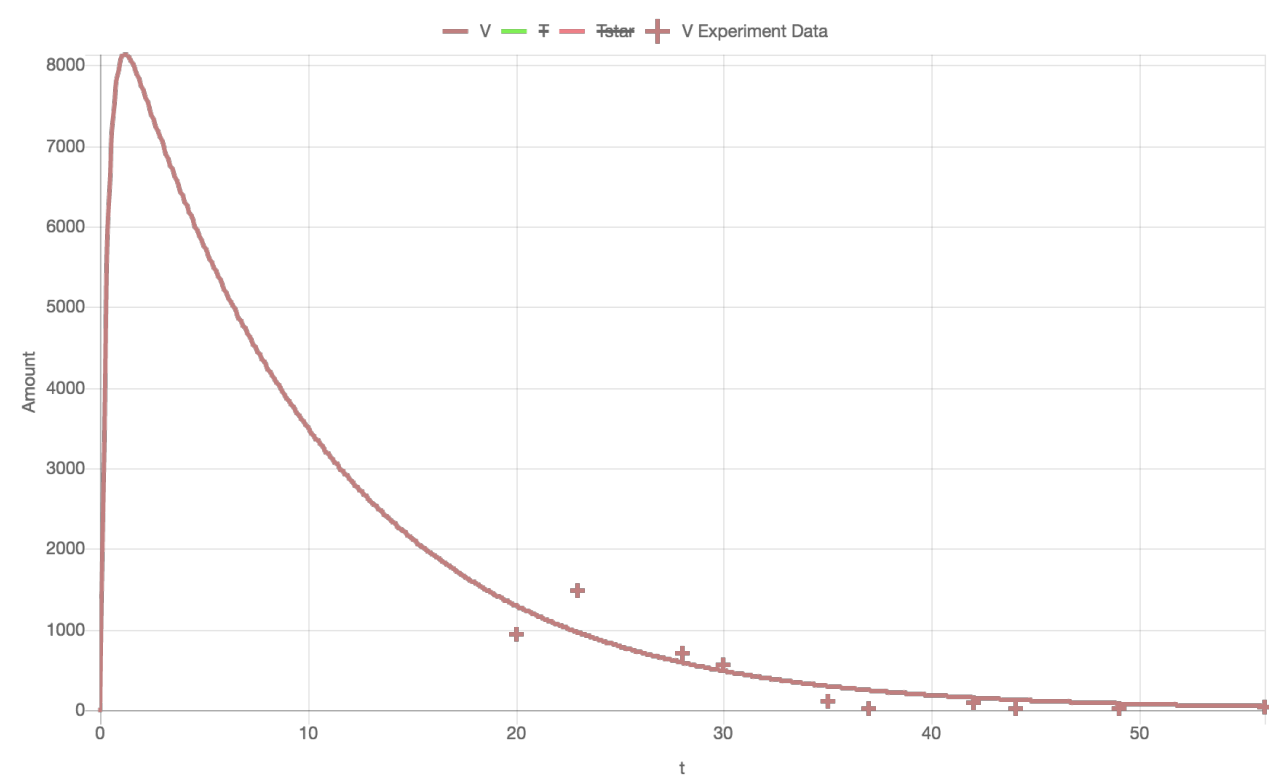


SBMLWebApp Results

# Reproduction of the analysis (Parameter Estimation) : For Patient 6 (pt6)

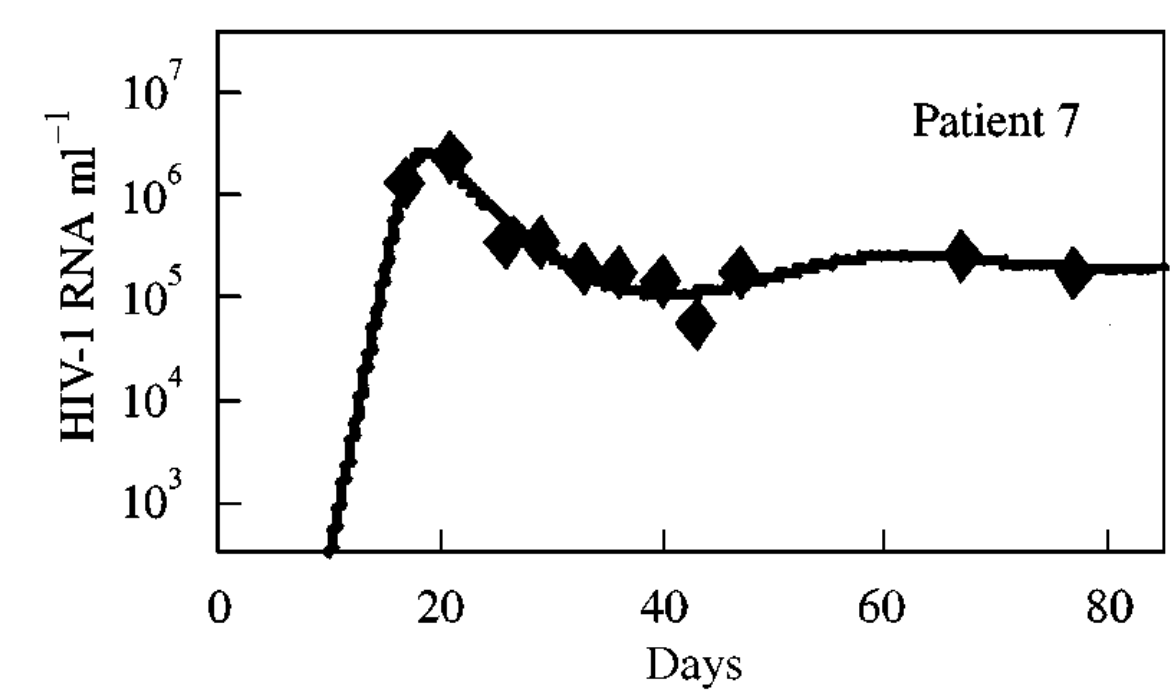


Perelson Result

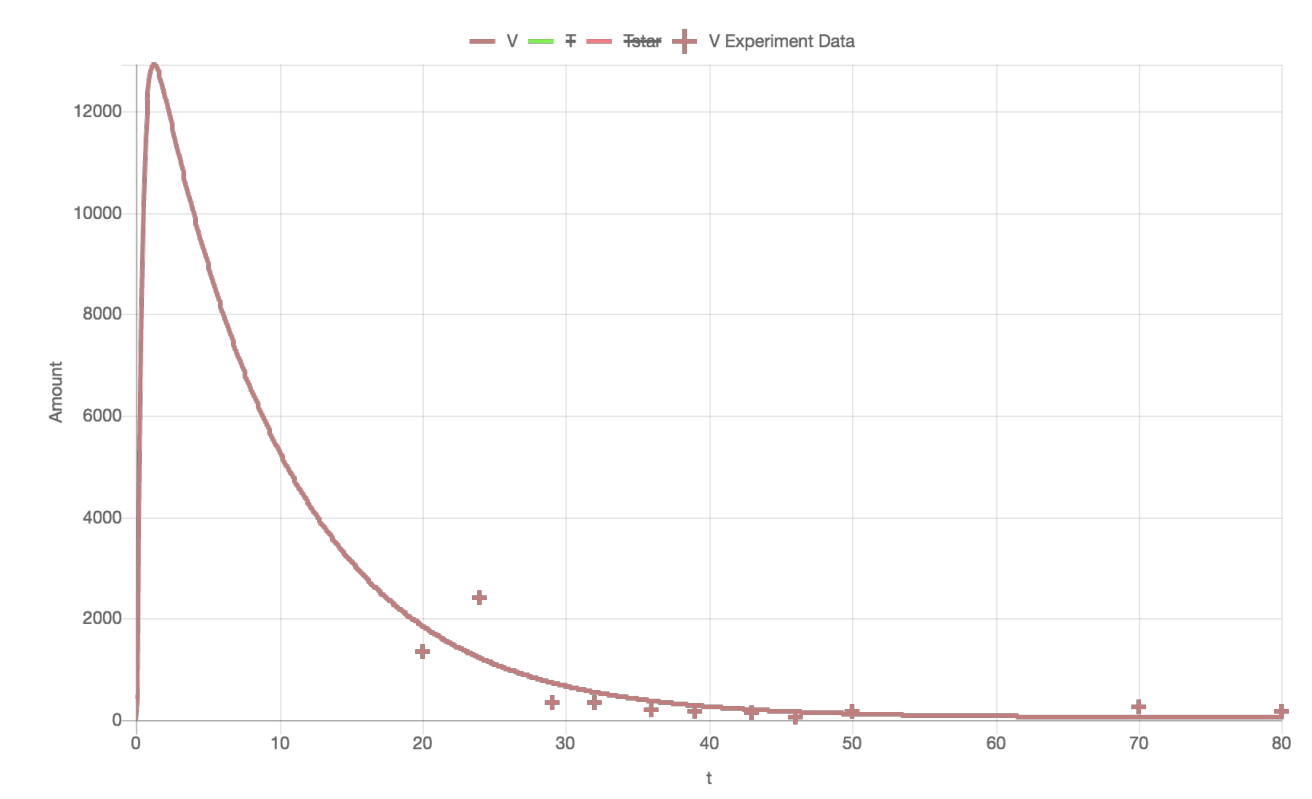


SBMLWebApp Results

# Reproduction of the analysis (Parameter Estimation) : For Patient 7 (pt7)

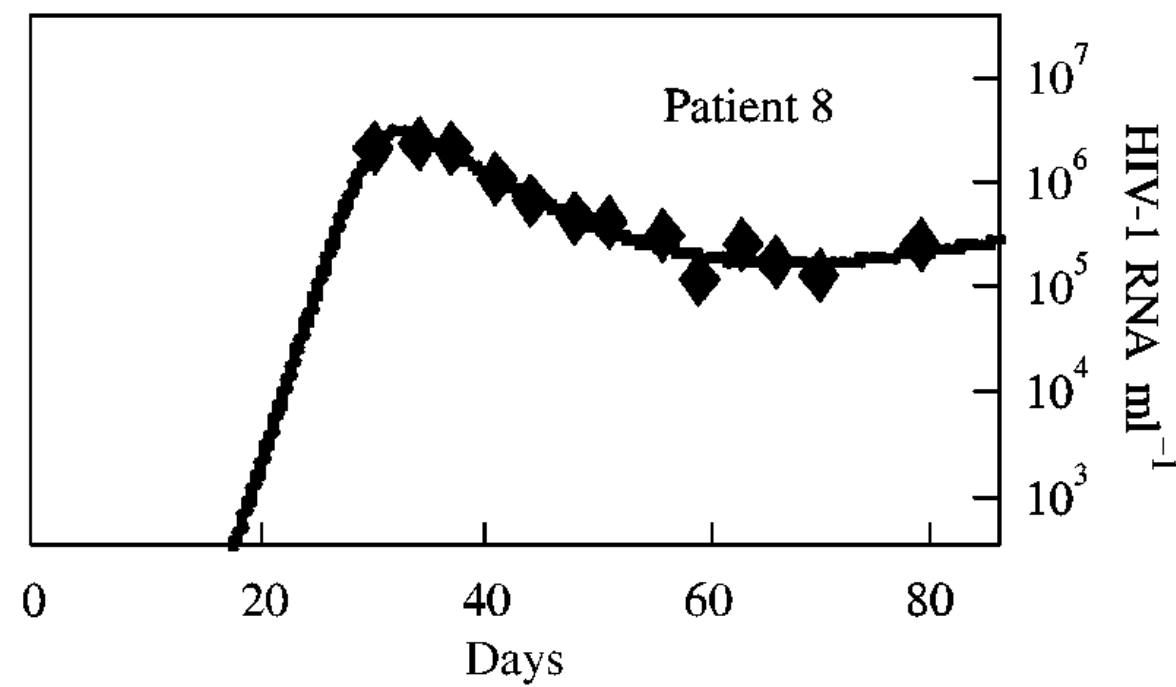


Perelson Result

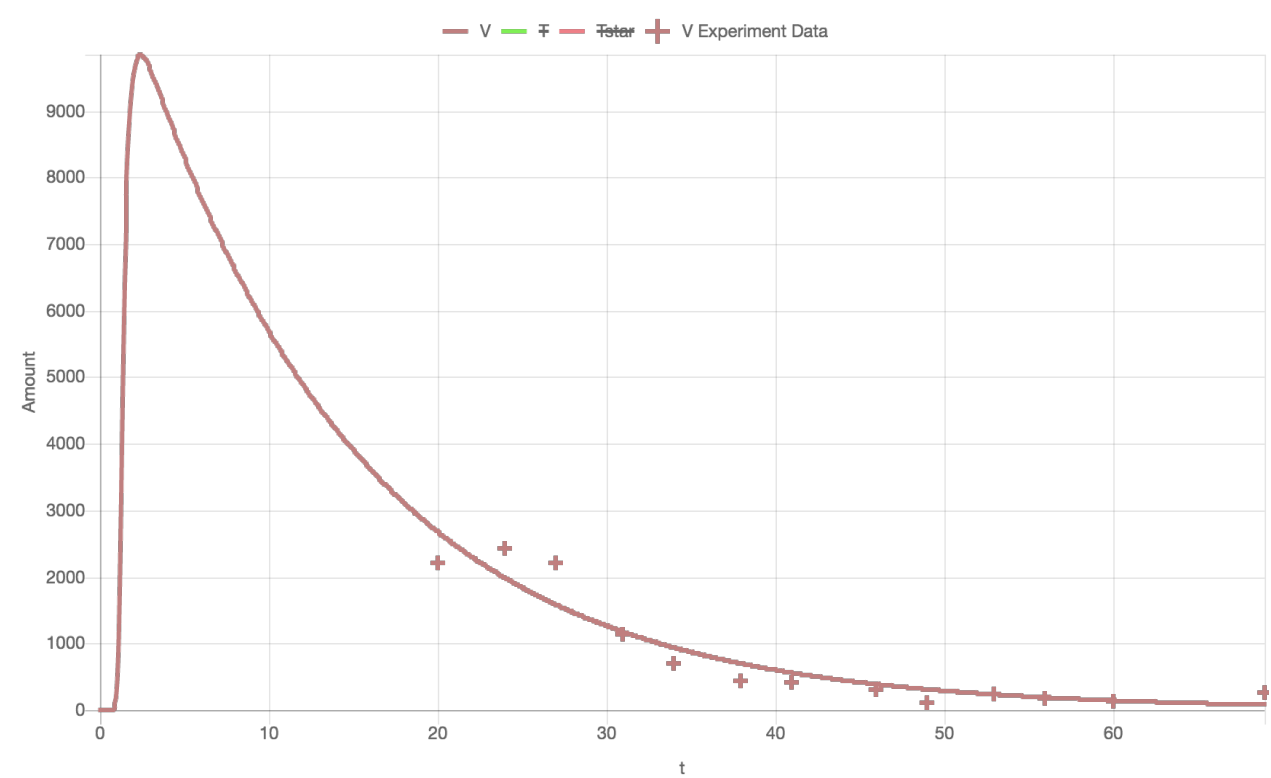


SBMLWebApp Results

# Reproduction of the analysis (Parameter Estimation) : For Patient 8 (pt8)

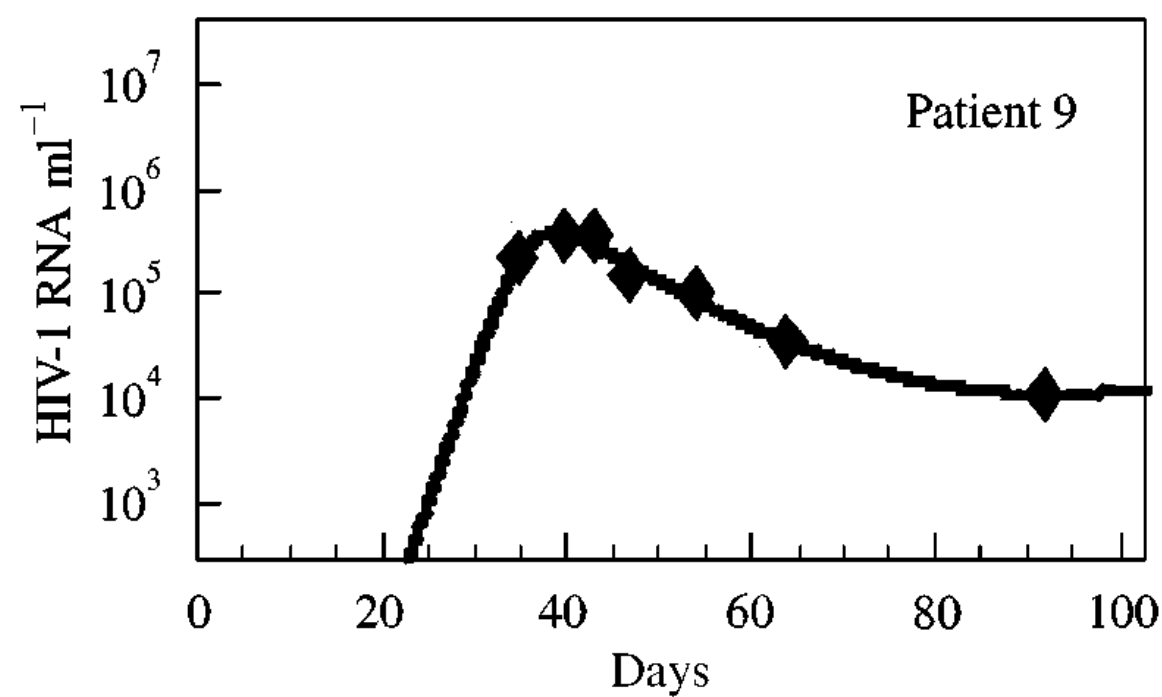


Perelson Result

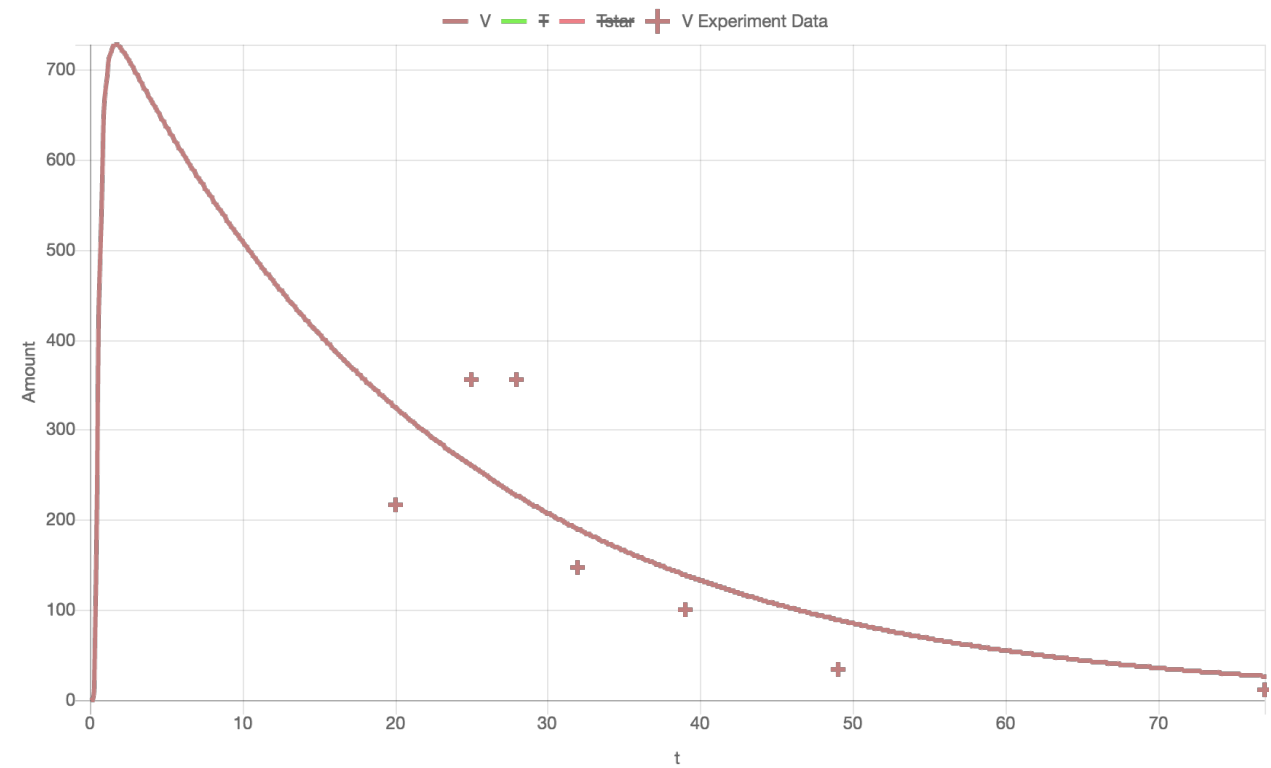


SBMLWebApp Results

# Reproduction of the analysis (Parameter Estimation) : For Patient 9 (pt9)



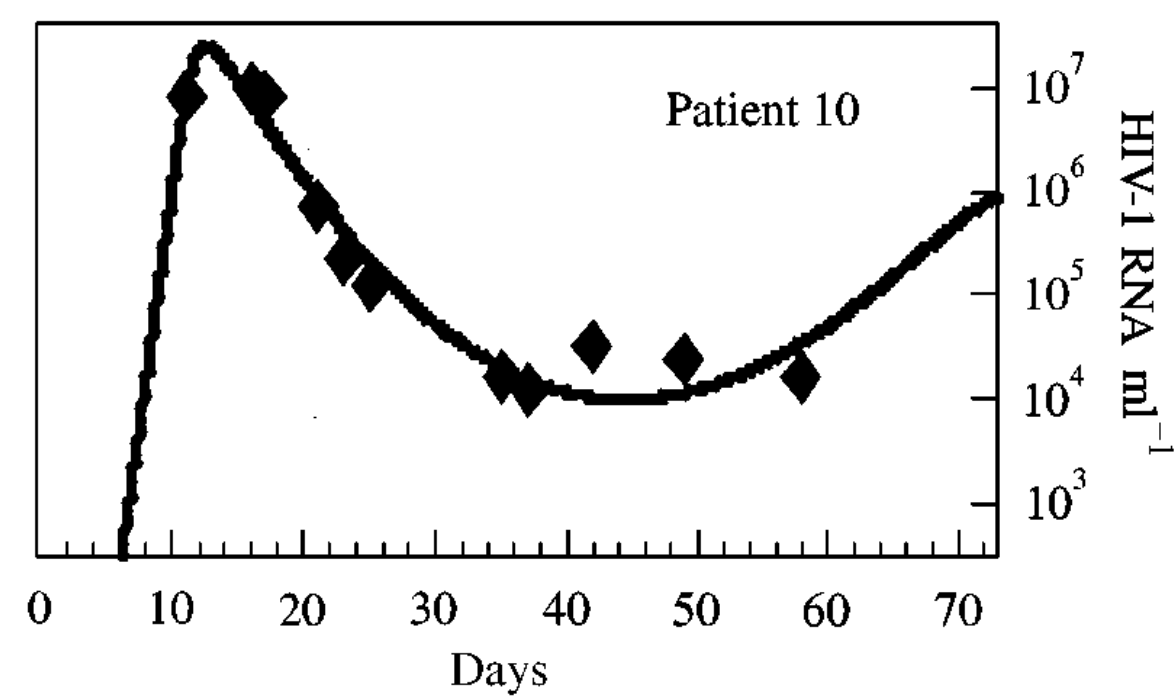
Perelson Result



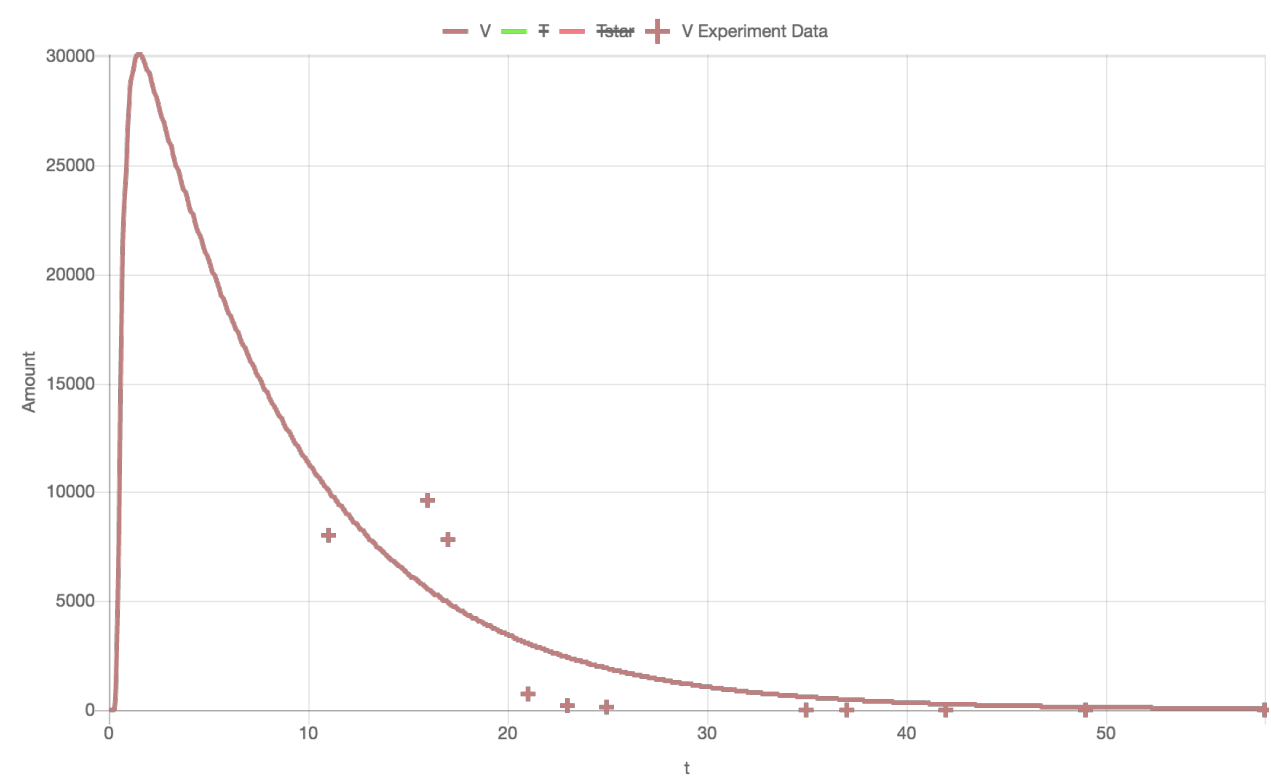
SBMLWebApp Results



# Reproduction of the analysis (Parameter Estimation) : For Patient 10 (pt10)



Perelson Result



SBMLWebApp Results