

# **eLearning in Pharmacology**

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# eLearning platforms.

Department of Pharmacology and Toxicology



Flash + JavaScript



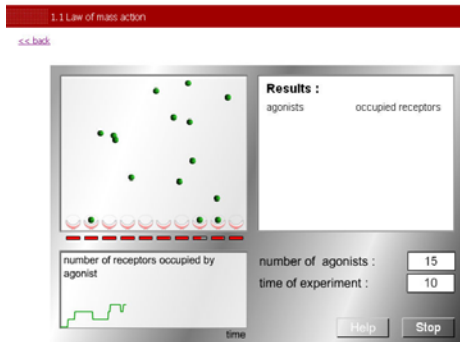
PHP

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**Programming:** JavaScript + Flash

## Template



## Files on server

flash simulation

flash simulation

flash simulation

flash simulation

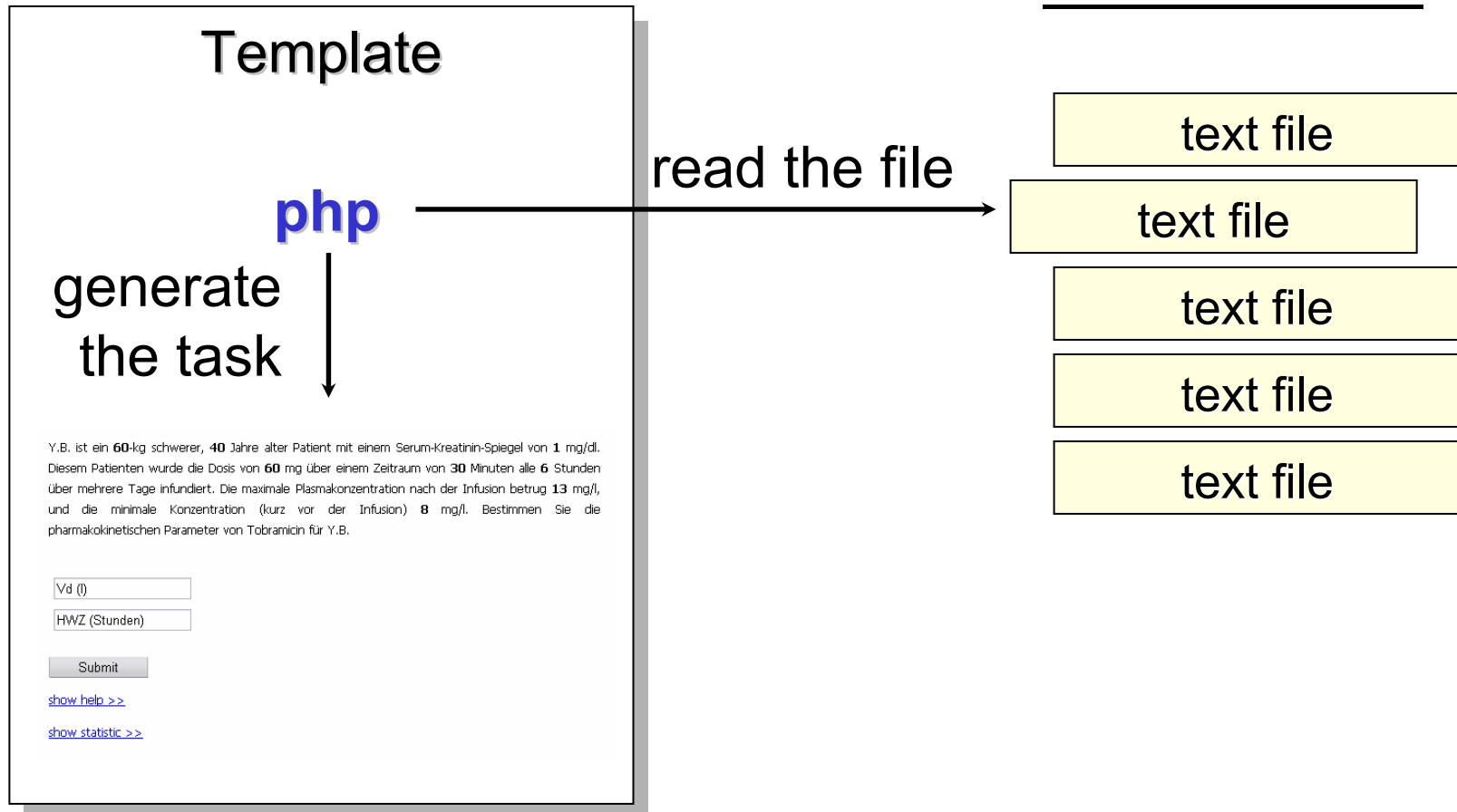
flash simulation

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## Programming: PHP

### Files on server



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THANK YOU!



<http://www.univie.ac.at/ptox/eLearning/main.html>

## eLearning basics of pharmacology

Institute of Pharmacology and Toxicology

[\[main\]](#) [\[requirements\]](#) [\[deutsche Version\]](#)

Welcome to the eLearning platform of the Department of Pharmacology and Toxicology. Our course is part of the teaching program in "General Pharmacology". It illustrates the principles of receptor function, pharmacokinetics and how ion channels work.

We combine traditional teaching (lectures, tutorials, laboratory classes) with eLearning (illustrations, self-testing and games).

The course was developed by Eugen Timin, Stanislav Beyl (Flash design) and Steffen Hering. Please send us your suggestions.

### eLearning platform

#### 1. Pharmacodynamics

[1.1 Law of mass action](#)

[1.2 Dose response curve](#)

[1.3 Dose response curve \(task\)](#)

[1.4 Competitive antagonism](#)

[1.5 Competitive antagonism \(dose response curves\)](#)

[1.6 Non-competitive antagonism](#)

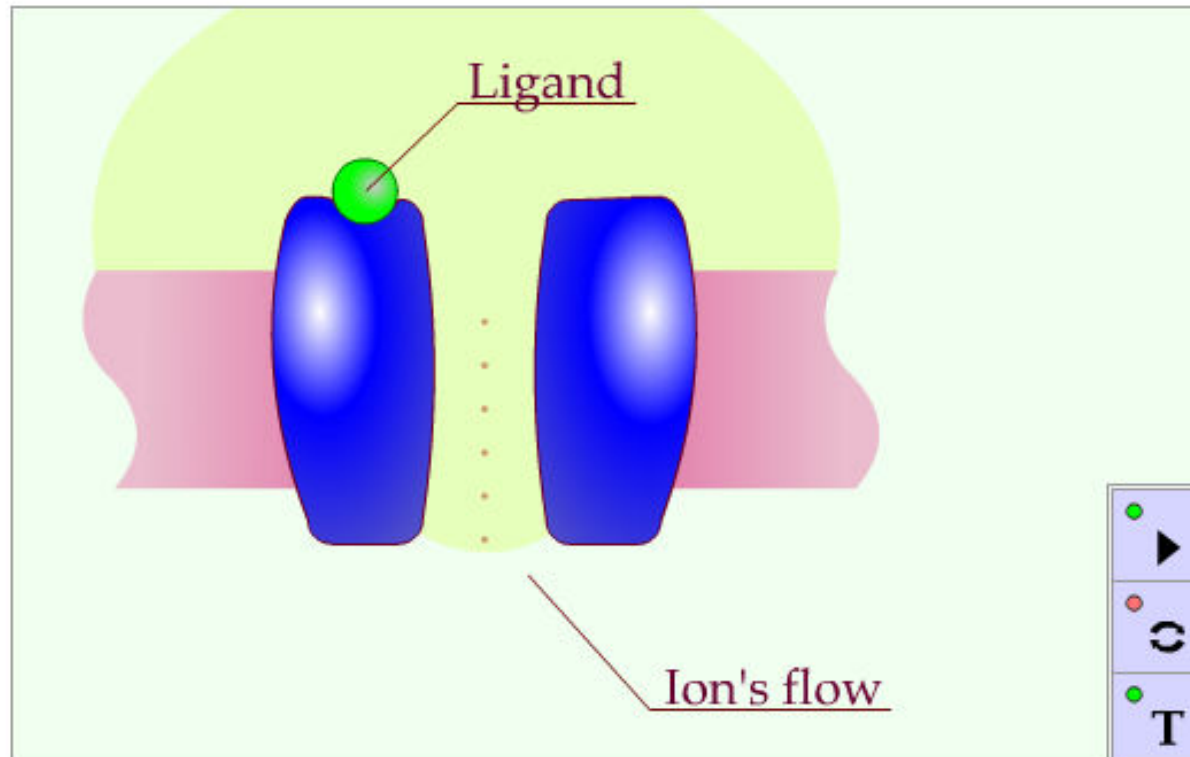
[1.7 Efficacy](#)

[1.8 Full agonist in the presence of partial agonist](#)

[1.9 Partial agonist in the presence of full agonist](#)

[<< back](#)

## Ligand-gated Channel



[<< back](#)

[<< back](#)

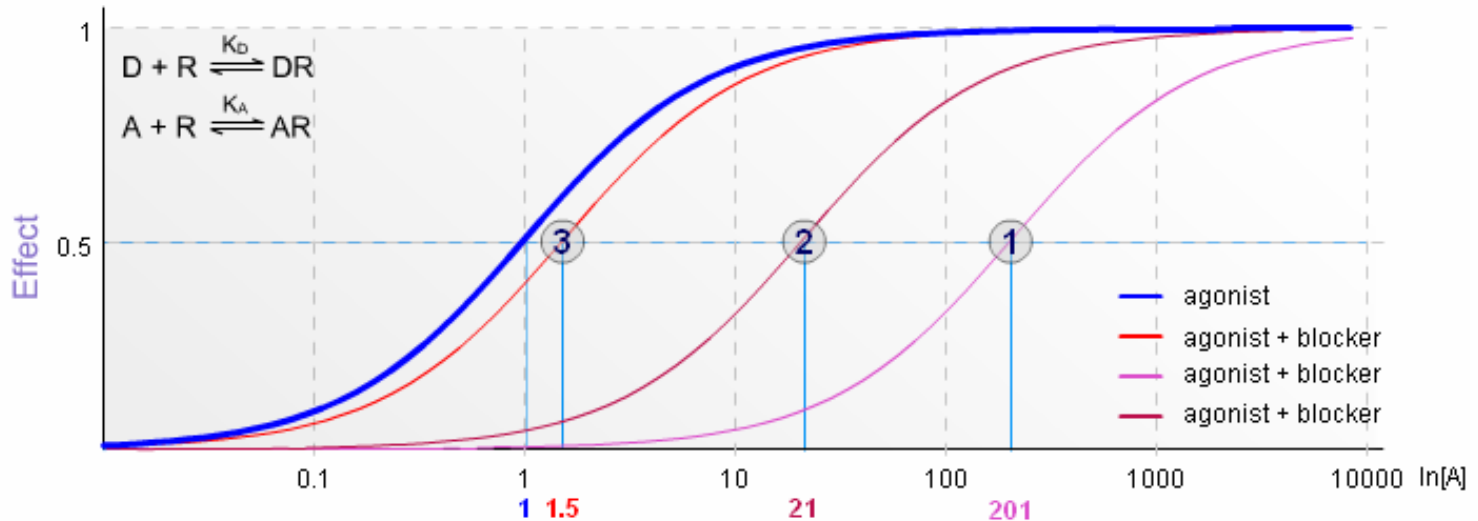
The simulation interface is divided into several sections:

- Top Left:** A large rectangular area showing a grey background with several green spheres (agonists) scattered throughout. At the bottom of this area, there is a row of ten receptors, each represented by a white semi-circle with a red crescent on its inner edge. Three of these receptors have a green sphere bound to them.
- Top Right:** A white box with the heading "Results :". Below the heading, the text "agonists" is positioned above the number "15", and "occupied receptors" is positioned above the number "3".
- Bottom Left:** A graph with the y-axis labeled "number of receptors occupied by agonist" and the x-axis labeled "time". The graph shows a green step-like line that starts at 0, increases to 1, then to 2, then to 3, and remains at 3 for a short period before decreasing to 2 and then back to 1.
- Bottom Right:** Two input fields. The first is labeled "number of agonists :" and contains the value "15". The second is labeled "time of experiment :" and contains the value "10". Below these fields are two buttons: "Help" and "Stop".

The Law of Mass Actions states that the rate of a chemical reaction is proportional to the concentrations of the reactants. Test this prediction by varying the number of agonists



[<< back](#)



Bestimmen Sie:

- $K_D$  des beta-Agonisten   $\mu\text{M}$  ✓  
 $K_A$  des beta-Blockers (1)   $\mu\text{M}$  ✗  
 $K_A$  des beta-Blockers (2)   $\mu\text{M}$  ✗  
 $K_A$  des beta-Blockers (3)   $\mu\text{M}$  ✓

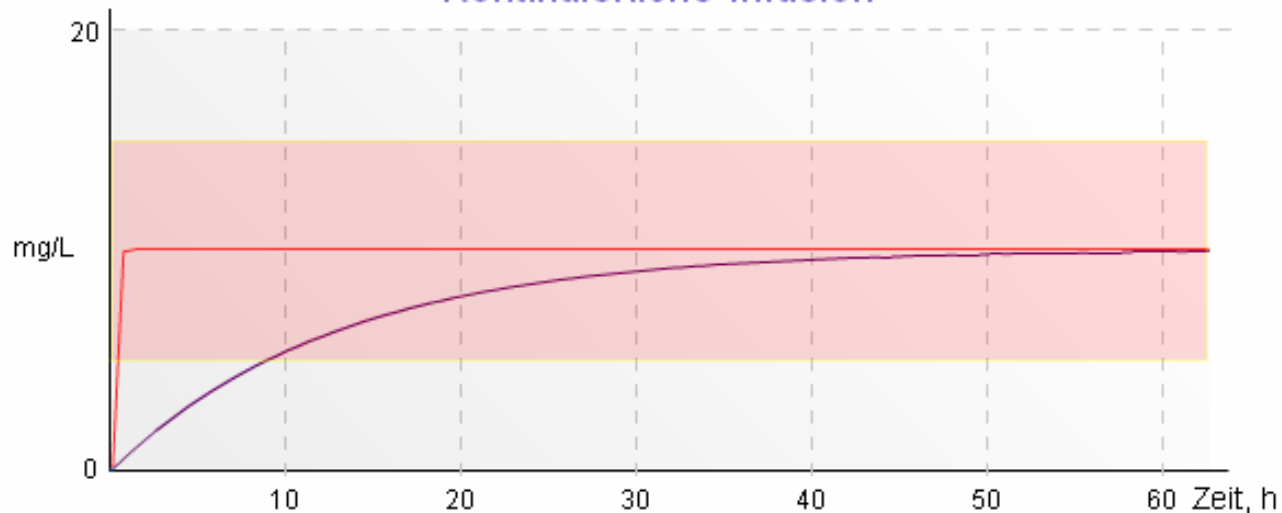
Ordnen Sie die beta-Blocker nach ihrer Affinität:

>  >  CORRECT

Estimate the affinity of ligand and affinities of all three beta blockers.

[<< back](#)

## Kontinuierliche Infusion



<b>Pharmakon:</b>	<b>Theophylline</b>			
Verteilungsvolumen:	0.5	L/kg		
Clearance:	0.65	ml/min/kg		
Therapeutischer plasmaspiegel:	10	mg/L	Loading Dosis:	<input type="text" value="?"/> mg
<b>Körpergewicht:</b>	<input type="text" value="45"/>	kg	Erhaltungsdosis:	<input type="text" value="?"/> mg/h

Start

Überprüfen

It is known, that this patient suffers from a longtime non allergic asthma. He is in bad general- and nutrition condition. You want to meliorate the patients acute aggravation of his asthma pathology and decide to treat him intravenously with Theophyllin.

<http://www.univie.ac.at/ptox/php/>

# eLearning basics of pharmacology

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[\[main\]](#) [\[requirements\]](#)

eLearning / Tests

Matrikelnummer:

Password:

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[register](#)

basis of pharmacology eLearning

flash development » eLearning

[\[main\]](#) [\[requirements\]](#)

## 1. Aminoglycoside Antibiotics

### [1.1 Plasma Konzentration](#)

### 1.2 Konzentration im Steady-State

### [1.3 Pharmakokinetische Parameter](#)

### [1.4 Dosierungsschema](#)

## 2. Digoxin (zur Behandlung angeborener Herzfehler, CHF)

### 2.1 Digoxin loading dose (intravenous)

### [2.2 Digoxin loading dose \(oral\)](#)

### [2.3 Daily maintenance dose](#)

### [2.4 Digoxin Spiegel](#)

### [2.5 Aterielle Fibrillation](#)

[<< main](#)

P.M. is a **40**-year-old, **80** kg woman with a serum creatinine of **0.5** mg/dl. A gentamicin dose of **120** mg was infused over **30** minutes.

Calculate the plasma concentration **5.5** hour after the infusion was started (i.e. **5** h after the infusion was completed).

Submit

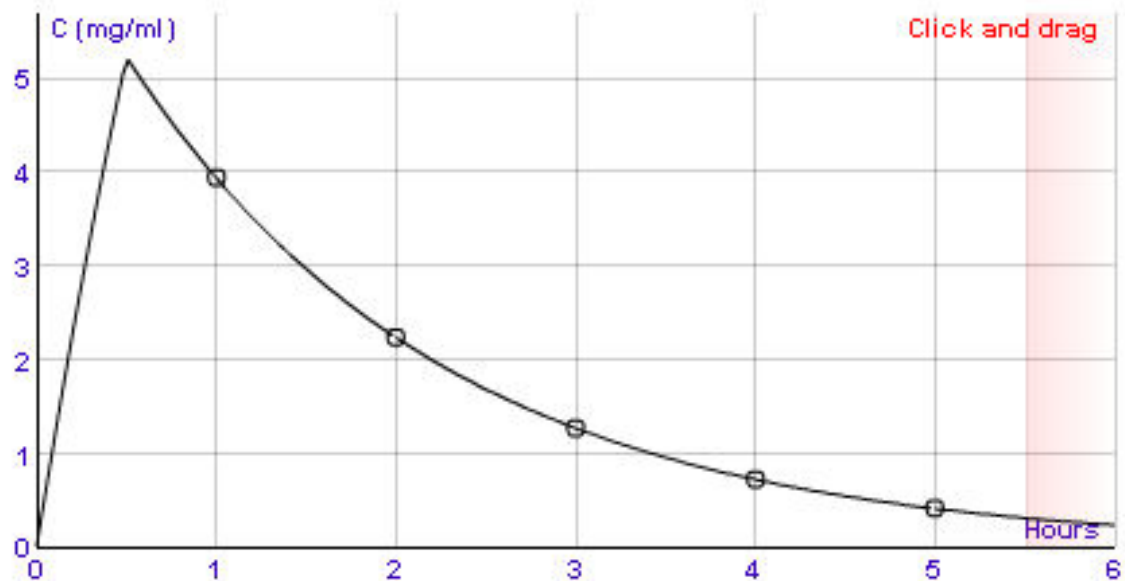
[show help >>](#)

[show statistic >>](#)

[hide help <<](#)



time: 5.5 h



$$Cl_0 = (140 - \text{Age}) * \text{Weight} * 0.85 / (72 * Cr_{ss})$$

$$k = Cl_0 / (0.25 * \text{Weight})$$

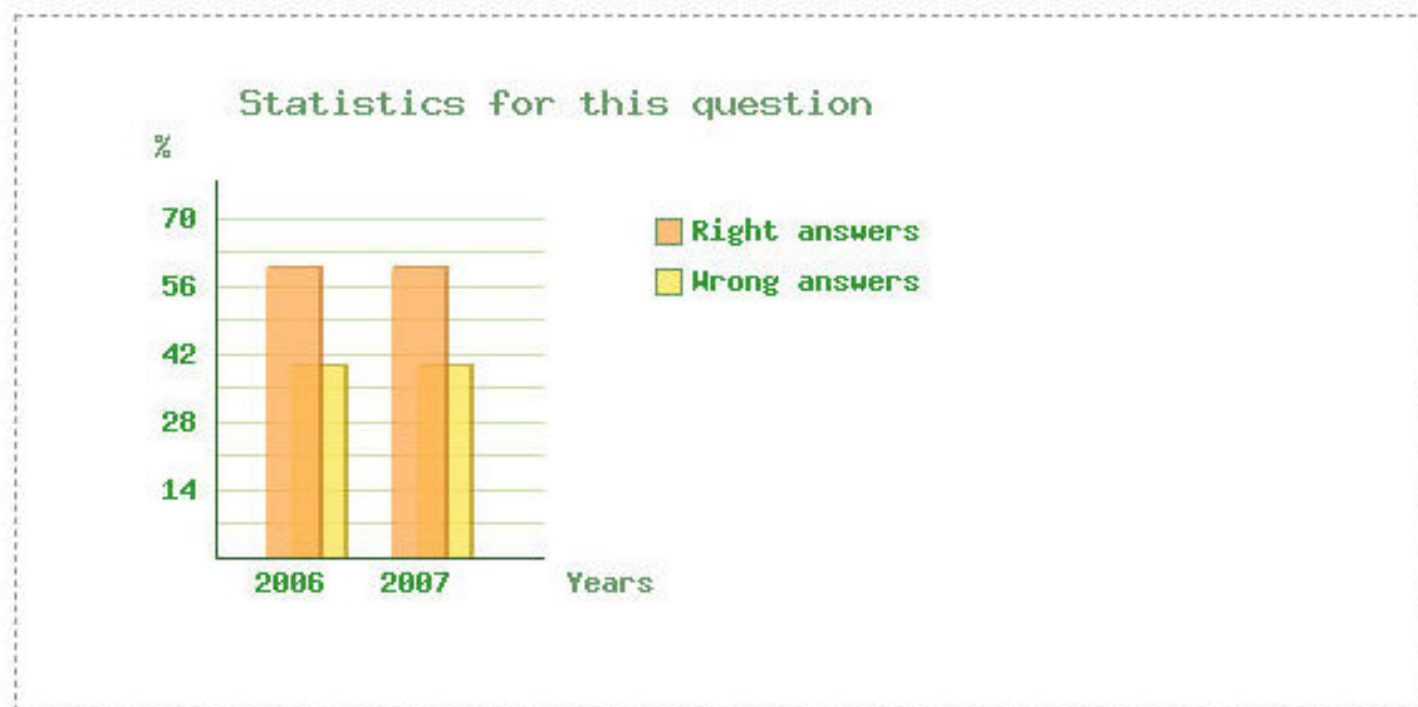
$$C(t_{inf}) = C_{ss} * (1 - \exp(-k * t_{inf}))$$

$$C_{ss} = F / Cl = D / (t_{inf} * Cl)$$

$$C(T) = C(t_{inf}) * \exp(-k * (T - t_{inf}))$$

[show statistic >>](#)

[hide statistic <<](#)



[<< main](#)

In this section you can compose your own test (to work offline) or take an exam (online). To do it - select the tasks you want to include in test/exam and press the button "Combine the test" or "Combine the exam" (at the bottom of this page).

1. Aminoglycoside antibiotics
  - 1.1 Plasma concentration
  - 1.2 Concentration at steady-state
  - 1.3 Pharmacokinetic parameters
  - 1.4 Dosing regime
  
2. Digoxin (to treat Congestive Heart Failure, CHF)
  - 2.1 Digoxin loading dose (intravenous)
  - 2.2 Digoxin loading dose (oral)
  - 2.3 Daily maintenance dose



Matrikelnummer:

Name:

- 1.1** P.M. is a **30-year-old, 50 kg woman** with a serum creatinine of **0.5 mg/dl**. A gentamicin dose of **160 mg** was infused over **90 minutes**. Calculate the plasma concentration **2.5** hour after the infusion was started (i.e. **1 h** after the infusion was completed).

answer:  (mg/l)

- 1.2** P.M. is a **60-year-old, 70-kg woman** with a serum creatinine of **0.4 mg/dl**. She was given **140 mg** of Gentamicin over **20 minutes** every **10 hours**. Predict her maximal and minimal concentrations at steady-state level.

answer:  min (mg/l)

answer:  max (mg/l)