GENERAL COMMENTS FOR IMPROVING YOUR REPORT; WE EXPECT YOU TO USE THESE GUIDELINES

Prepared by Dr. Alexander Warning, 2016
Updated by Mayuri Ukidwe, Spring 2018

GENERAL COMMENTS

All equations should be numbered.

All figures need a numbered caption below and all tables need a numbered caption above.

Do not just write an equation. It needs words/sentences before/after it, that describe how it is relevant and explaining any notation.

For your mesh section, show “enough angles” of the mesh and in the section make sure to eventually include the convergence plot with mesh statistics.

Do not just write “normal” or “coarse” mesh. It is meaningless unless you write the configurations.

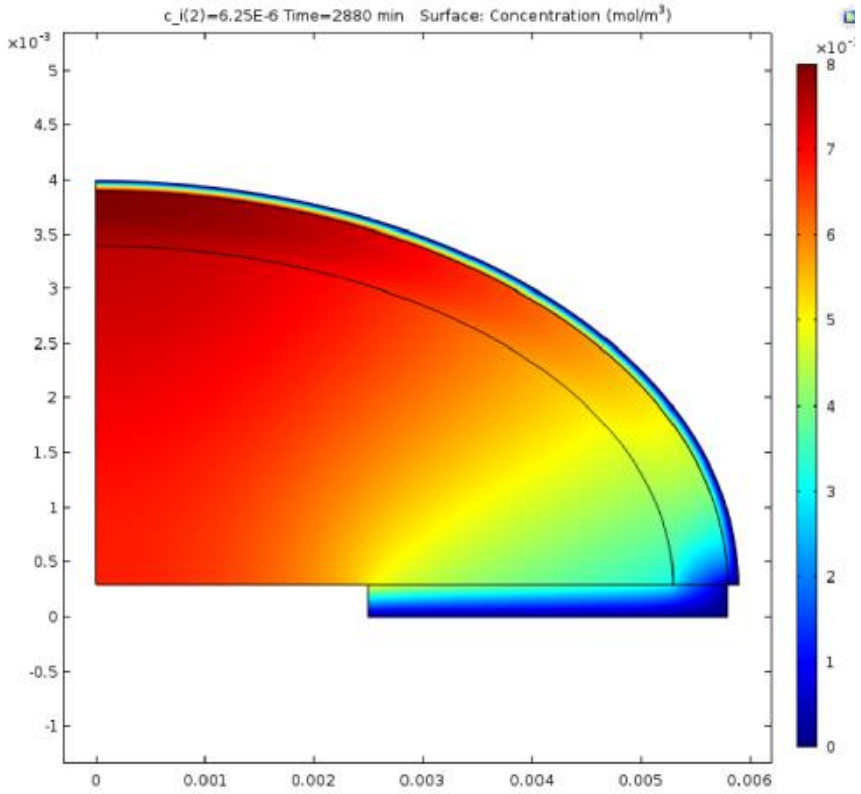
Crop out white space between figure and legend.

Make sure text is readable.

It’s ok to use annotations to explain figures.

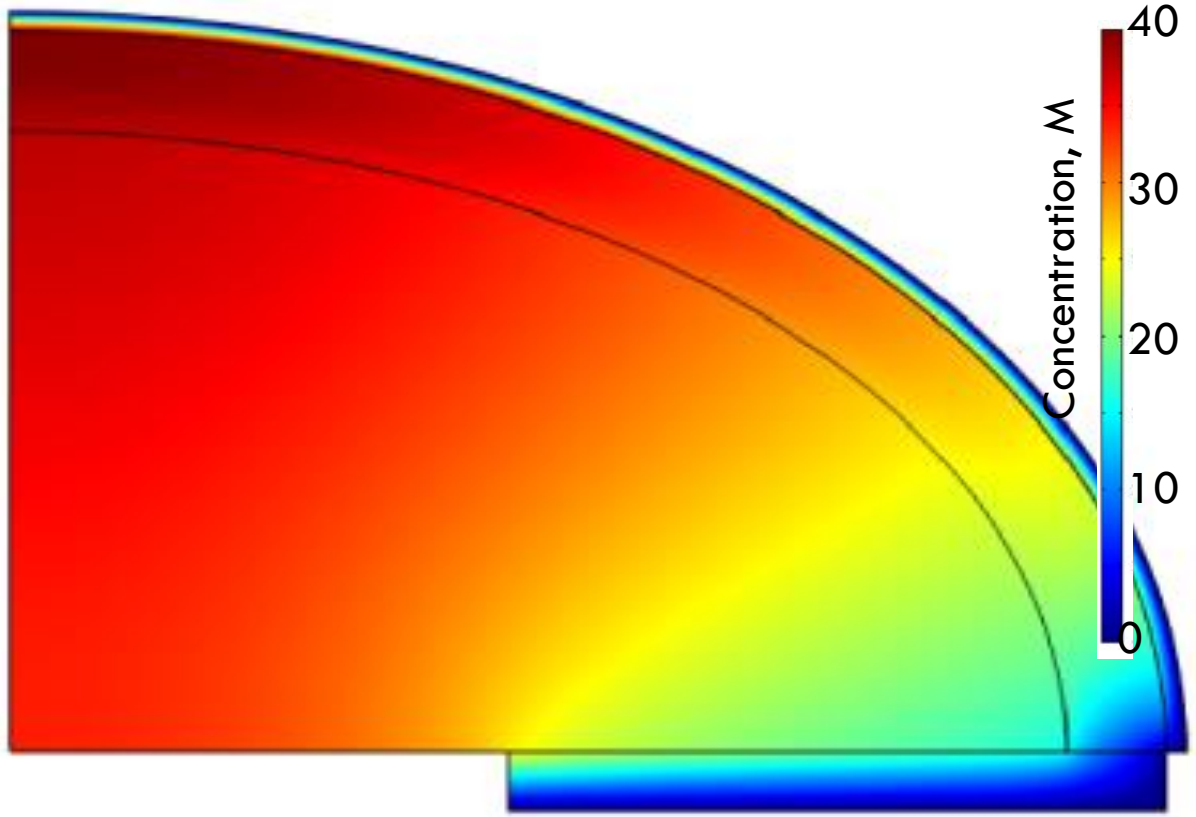
FIGURES

Unacceptable



Acceptable

No white space or extra axis. The legend is the same size as the plot and the font is readable and bigger. Additionally, the variable plotted is on the graph



FIGURES

Unacceptable

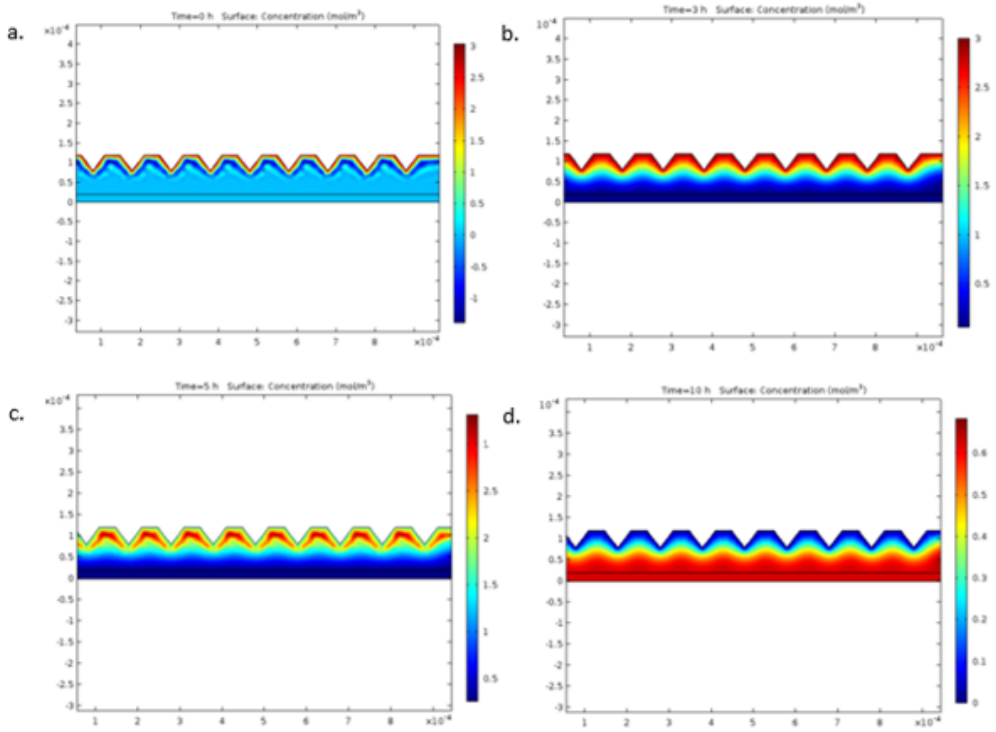


Figure 5a-d. Surface plot of insulin. Plots a to d show surface plots of the model at times t = 0, 3, 5, and 10 hours respectively. Take notice that the color scale for each subplot is different.

Acceptable

Notice how the time is on the plot, there is 1 fixed legend, and the reader knows what the color represents since the variable is on the legend

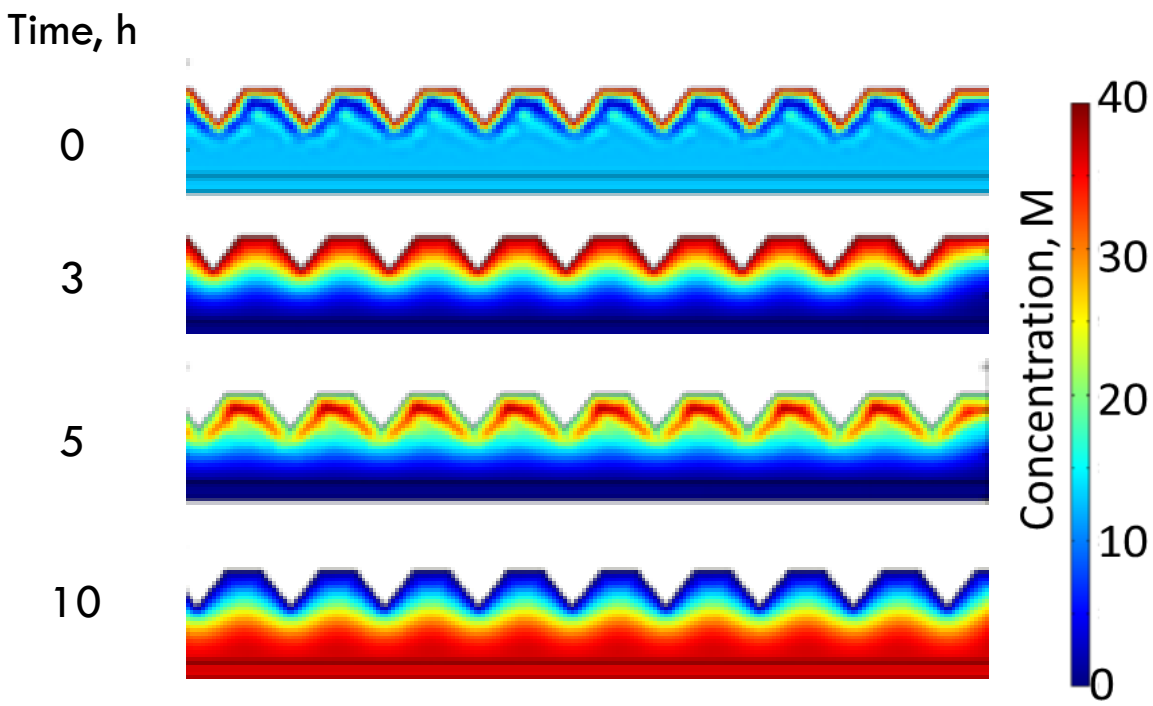
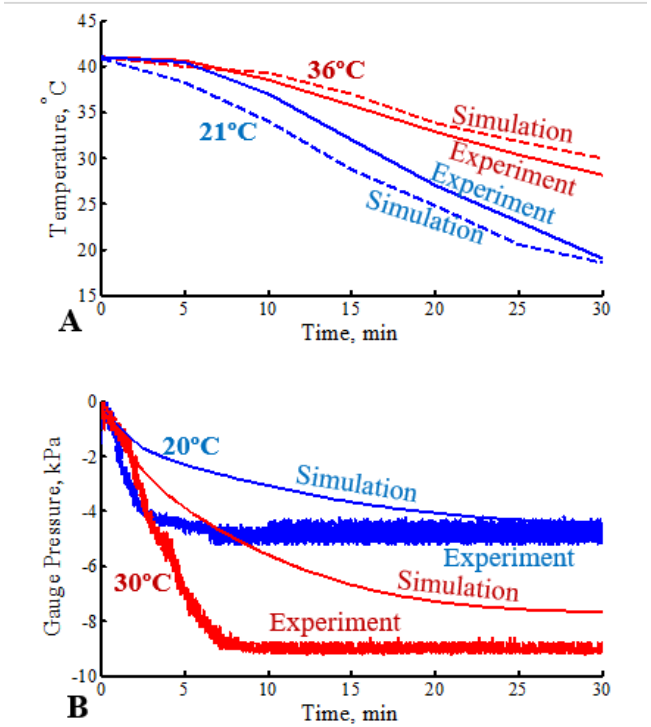


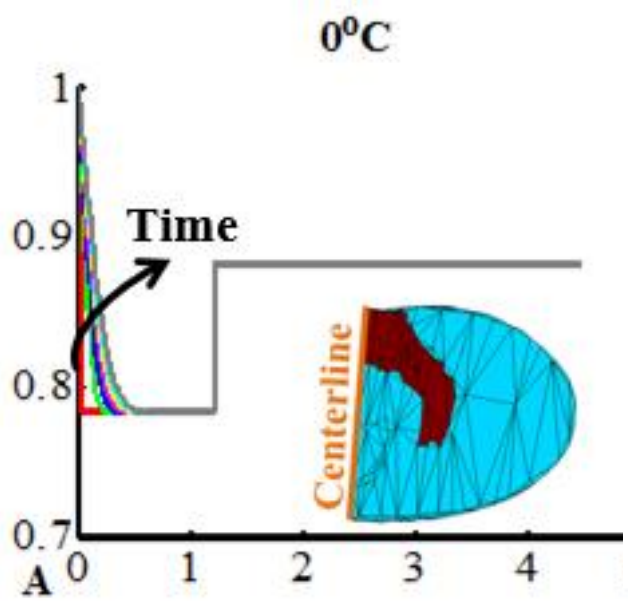
Figure 5: Surface plot of insulin concentration at various times.

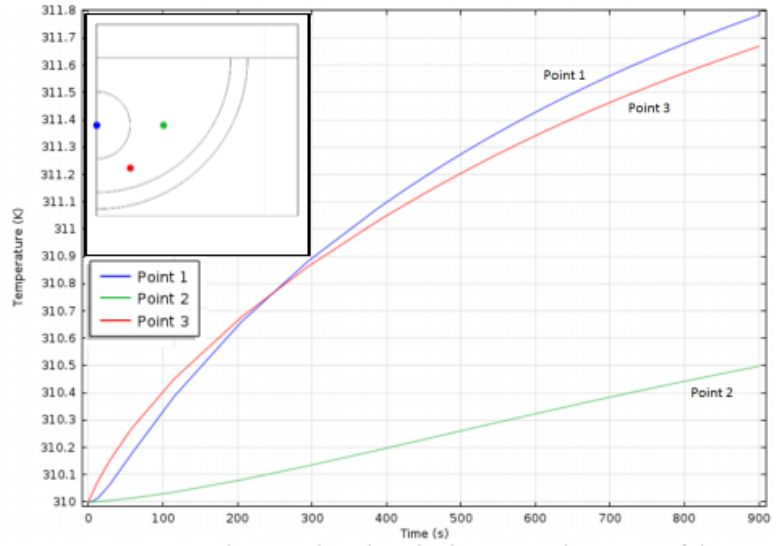
FIGURES

Put legend on graph, use colors and various line markers/styles.



Put arrows showing time progression between lines. Show inset plots of where/what you are plotting. You can "Plot" the cut point/lines and there is an option to plot them. Insert these inset plots.





GENERAL INSTRUCTIONS

Unacceptable	Acceptable
hm or h_m	h_m
10^-2, e-2, and E-2	10^{-2}
10 degC	10 °C
r=10mm	r = 10 mm (Space between number and unit)
Switching between lowercase and uppercase	Use consistent notation
Do not use * for multiplication	Use · or nothing for multiplication
Do not use Microsoft's default font	The font for captions and the text should match
Units in "*italics*" (*Pa* is wrong)	Units in "text" (Pa is correct)
.63	0.63

GENERAL INSTRUCTIONS

Pick one notation kg/m^3 or $kg\ m^{-3}$

Table captions go above, figure captions go below

No figure titles

Make **vectors bold** or put an arrow above, while scalar fields can be *italic text* as normal

GIVE THE GOVERNING EQUATIONS, BOUNDARY CONDITIONS, AND INITIAL CONDITIONS THEIR OWN SECTIONS IN SOME WAY:

6) Model implementation
- 6.1) Governing equations
- 6.2) Boundary and initial conditions

OR

6) Governing equations

7) Boundary and initial conditions

DO NOT USE "TEXT" WRITING

Unacceptable

- The laser intensity I [W/m^2] from an isotropic laser source is proportional to the laser power and attenuation coefficient, where P_{laser}[W] = laser power.
  - The "=" sign and "#" sign is essentially scientific slang not meant for writing.

Acceptable

- The laser intensity, *I*, from an isotropic source is proportional to the power and attenuation coefficient, where P_{laser} is equal to the laser power.
  - The units for variables can go in the input table.

FONT SIZE IN FIGURE SHOULD BE NEARLY SAME SIZE AS FONT IN TEXT, I.E. READABLE

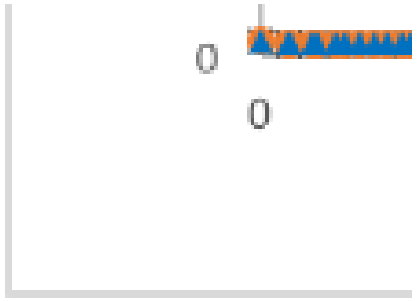


Figure 6 *A mesh convergence per*
at time t=2 h.

The graph shows the concentrat
line connecting the points r=2.5

USE CONSISTENT NOTATION FOR SUBPLOTS. DO NOT SWITCH BETWEEN LOWERCASE AND UPPERCASE.

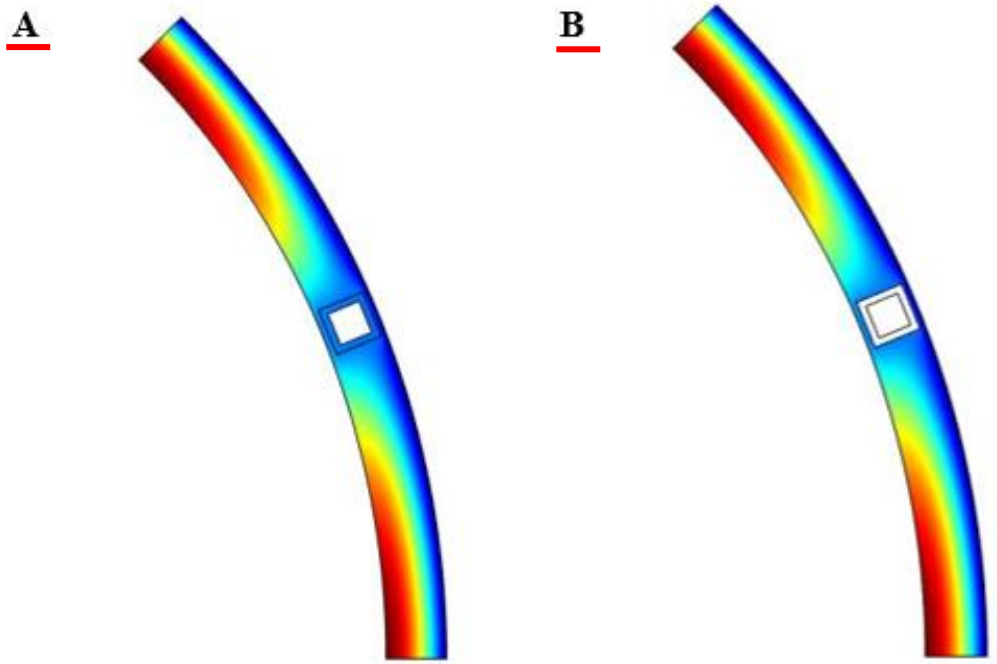


Figure 4a, 4b: Concentration Plot of free Sirolimus (4a) and bound Sirolimus (4b) within the stent after 10 days. At 10 days, the interior of the stent still contains free sirolimus, and as the drug diffuses through the arterial wall, the concentration of free drug closely mimics the concentration of bound drug within the concentration plot.

IMPROVING YOUR MESH CONVERGENCE PLOT

Remove title.

Units of labels should not have ^.

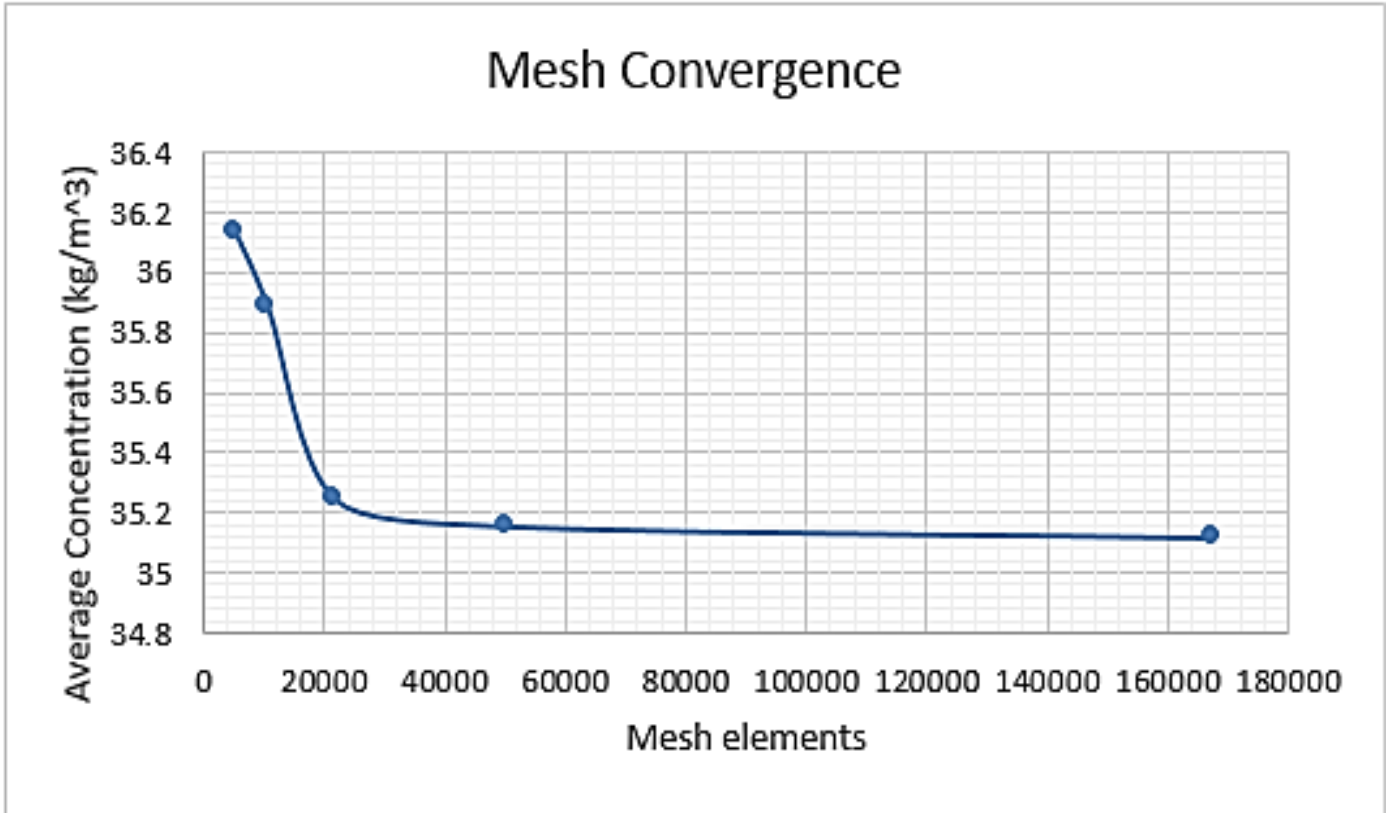
Make sure the x-y labels use appropriate significant figures.

Make the x-axis log likely.

Average concentration of what?

Mesh elements → Total number of tetrahedral mesh elements

Do not use # sign to mean number!



WHEN TALKING ABOUT EQUATIONS, STATE THE EQUATION NUMBER. AND DEFINE THE TERMS.

Bad:

- Since our model is a 2D axisymmetric drug diffusion process, the following governing equation will be used.

Better:

- Timolol, c, is transported in the eye via diffusion and convection (Equation 1):

$$D_{AB}(\nabla^2 c) = \frac{\partial c}{\partial t} + \nabla(uc) \qquad (1)$$

where D_{AB} Timolol diffusivity and u is the velocity due to natural convection.

Notice how all the variables are explained without using I/we/our etc. and, the equation number is referenced.

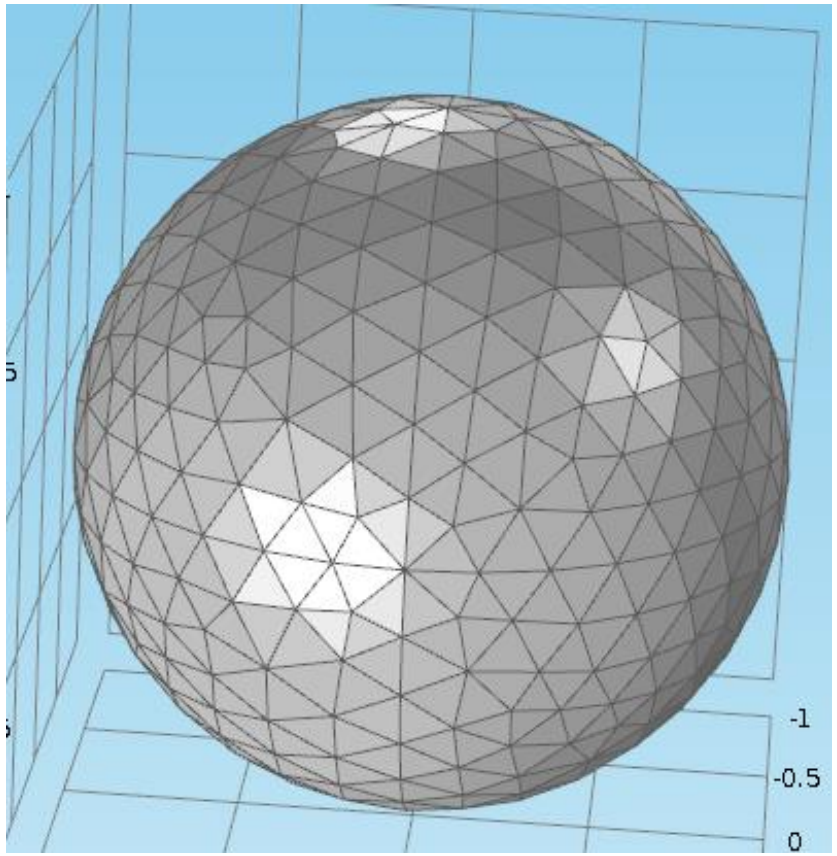
PUT ALL YOUR INPUT PARAMETERS IN A TABLE SIMILAR TO SHOWN HERE.

Table 5: Input Parameters

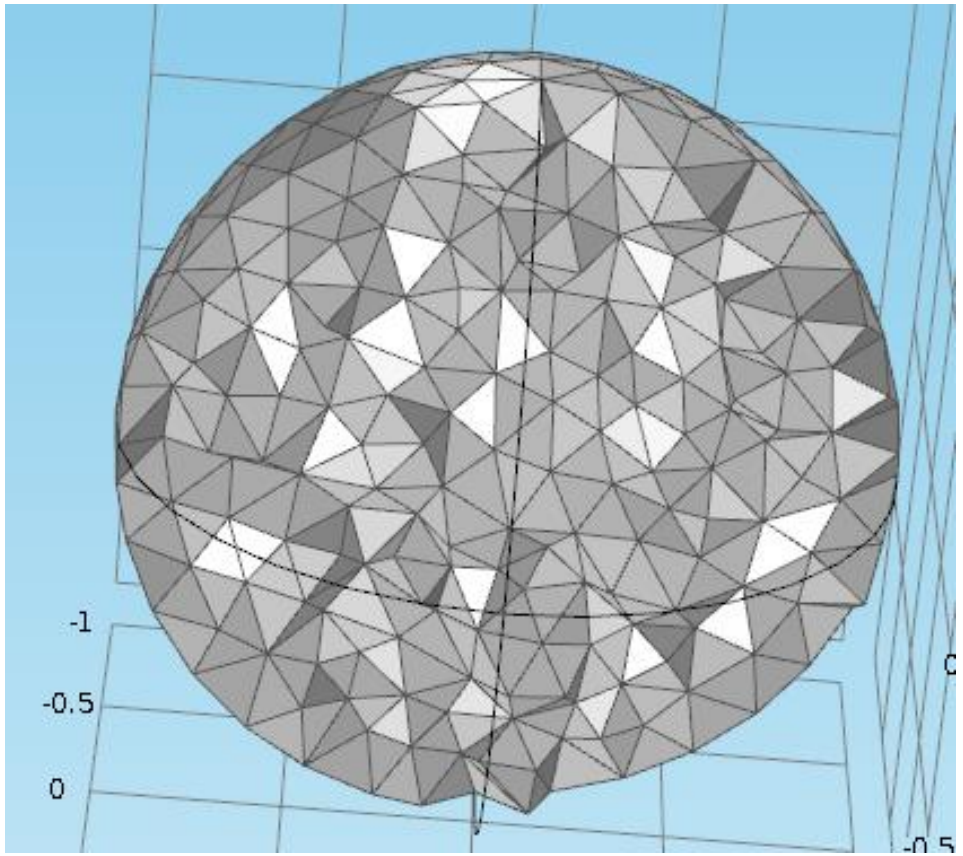
Parameter	Symbol	Value	Units	Source
Fluid properties				
Density	ρ_f	995.7	kg m^{-3}	
Dynamic viscosity	μ_f	0.798 $\times 10^{-3}$	Pa s	
Ionic strength	I_s	85.47	mol m^{-3}	(Ge et al., 2015)
Water dielectric constant	ε_r	78.61		(Ge et al., 2015)
Cell properties				
Density	ρ_p	1100	kg m^{-3}	(Baldwin et al., 1995)
Volume	V_p	2.094 $\times 10^{-18}$	m^3	Calculated
Surface area	S_p	9.42 $\times 10^{-12}$	m^2	Calculated
Radius	r_p	0.5 $\times 10^{-6}$	m	(Zaritsky and Woldringh, 1978)
Equivalent radius	r_{eq}	0.794 $\times 10^{-6}$	m	Calculated
Length	L_p	3 $\times 10^{-6}$	m	(Zaritsky and Woldringh, 1978)
Aspect ratio	β	3	$m^1 m^{-1}$	Calculated
Spherocity	Φ_p	0.841	$m^2 m^{-2}$	Calculated
Bead spring constant	k_b	3.2 $\times 10^{-4}$	N m^{-1}	(Kim and Klapperich, 2010)
Radius of bead	r_b	0.5 $\times 10^{-6}$	m	Assumed
Diffusivity	D_p	3.620 $\times 10^{-13}$	m^2 s^{-1}	Calculated
Energy barrier				
Debye length	κ	0.9524 $\times 10^{-9}$	m^{-1}	Calculated
Cell zeta potential	ζ_p	-0.0365	V	(Truesdail et al., 1998)

SHOWING MESH IN 3D EXAMPLE

What's on the inside?



Show the inside of the mesh



FOR DEADLINE 6

All sections must be written up, **conclusions, sensitivity, validation, etc.**

Even if the results are not done, write them up as if they are.

Please remove all comments and review comments.

Every variable must be described and a parameter value must be listed in your table.

Every table and figure needs a caption.

Mesh convergence must be done (if not, ask TA for help).

Make figures a reasonable size and limit blank space

Do not use "words" (e.g. "laser flux") in equations. Insert a variable for it.

- This is an example of what not to do: $Q_{laser} = laser\ flux \cdot \mu \cdot \exp\left(\frac{-x}{\delta}\right)$
- Do something like this: $Q_{laser} = F_0 \cdot \mu \cdot \exp\left(\frac{-x}{\delta}\right)$

Make sure EVERY variable has a value.

FOR DEADLINE 6

Make sure EVERY table and figure is referenced somewhere

- This means, in the text, you must somewhere talk about Table 1 or Figure 1, etc.

When listing a variable in the text, it MUST be in *italics*.

Captions need to be in black, only "**Figure ##**" should be in bold.

In general, use a line width of 2 or 3 for figures.

Text in figures should be the same size as that in the writing.

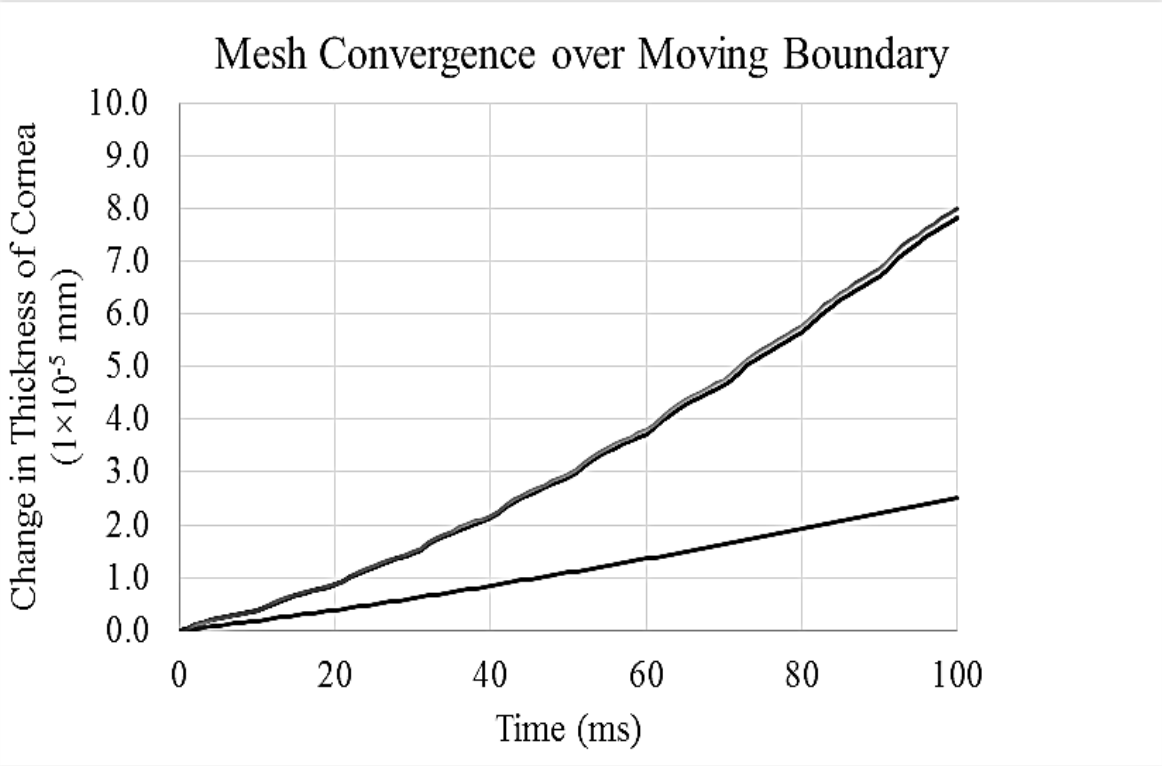
If you have Navier stokes for fluid flow in your model, do not forget continuity.

Legend should be in figure and not on side.

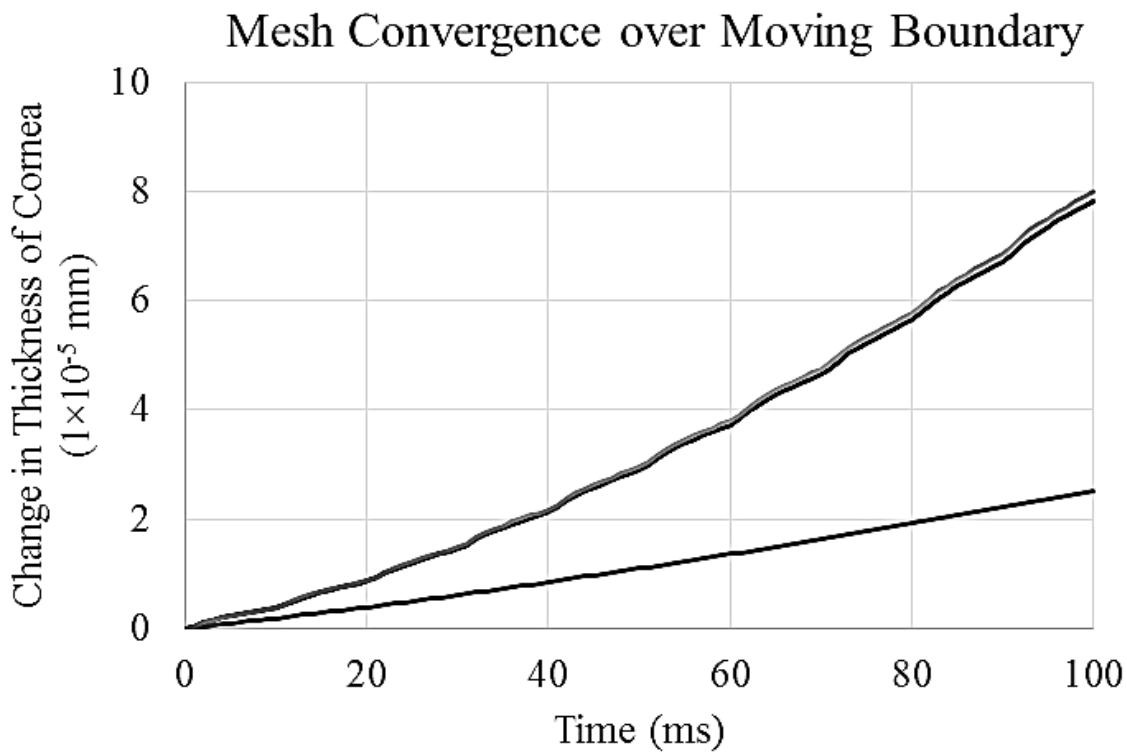
Use inset figures for cut points and cut lines.

CROP USELESS BOUNDARIES; REMOVE IRRELEVANT SIG FIGS; DON'T USE "TOO MANY" LABELS

Unacceptable

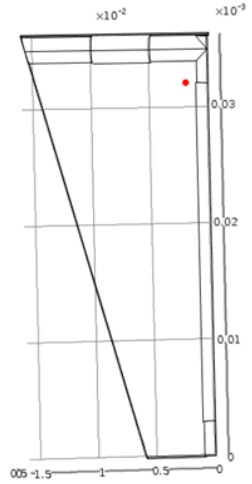


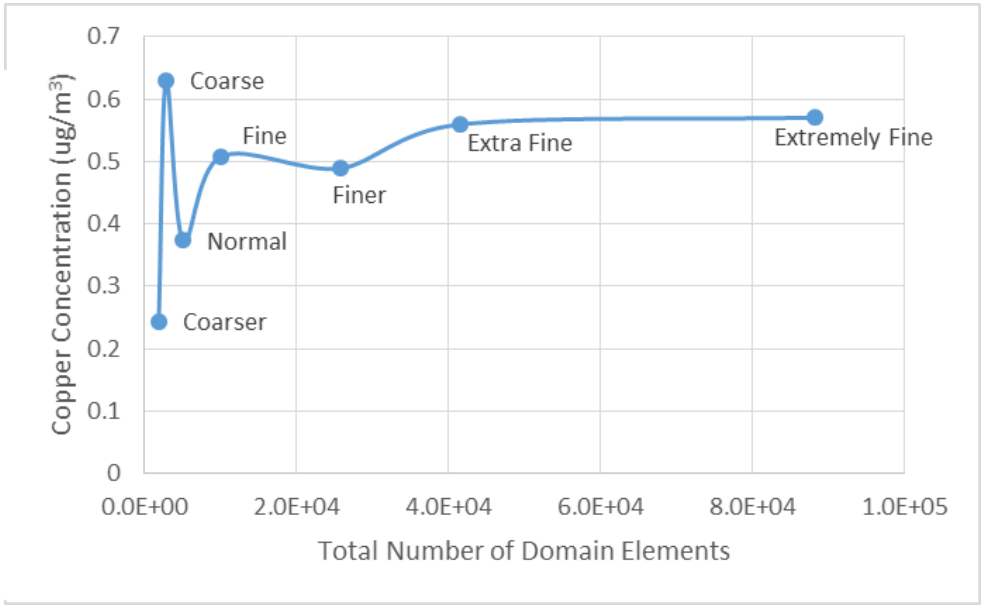
Acceptable



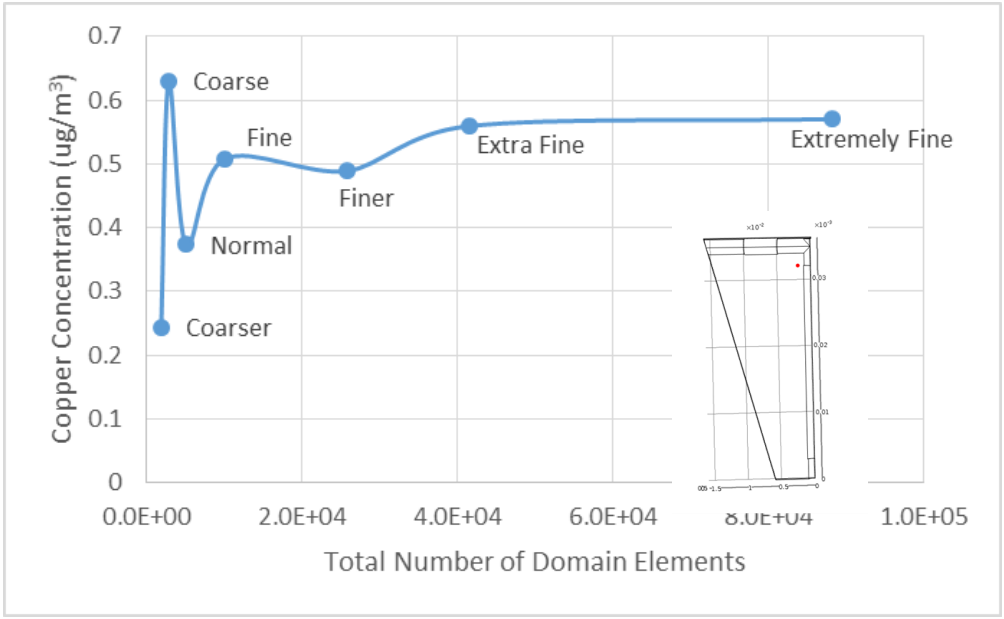
DO NOT LIST POINT/LINE COORDINATES, SHOW AN INSET PLOT OF THE POINT/LINE

Unacceptable





Acceptable

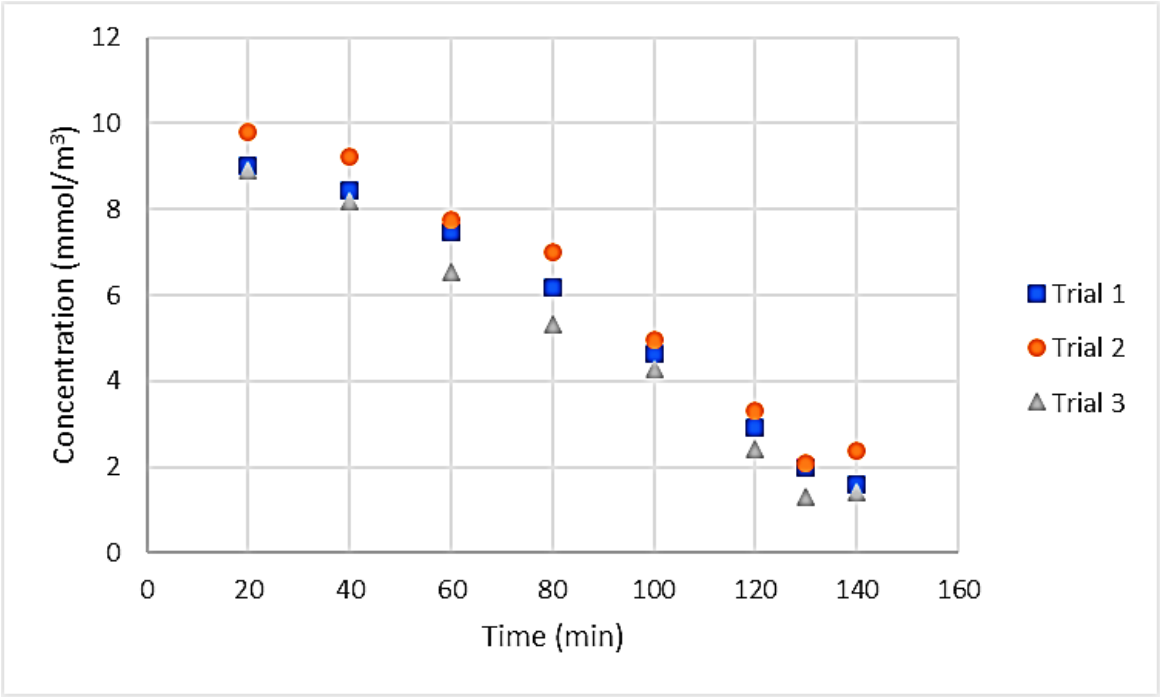


Do not do this:

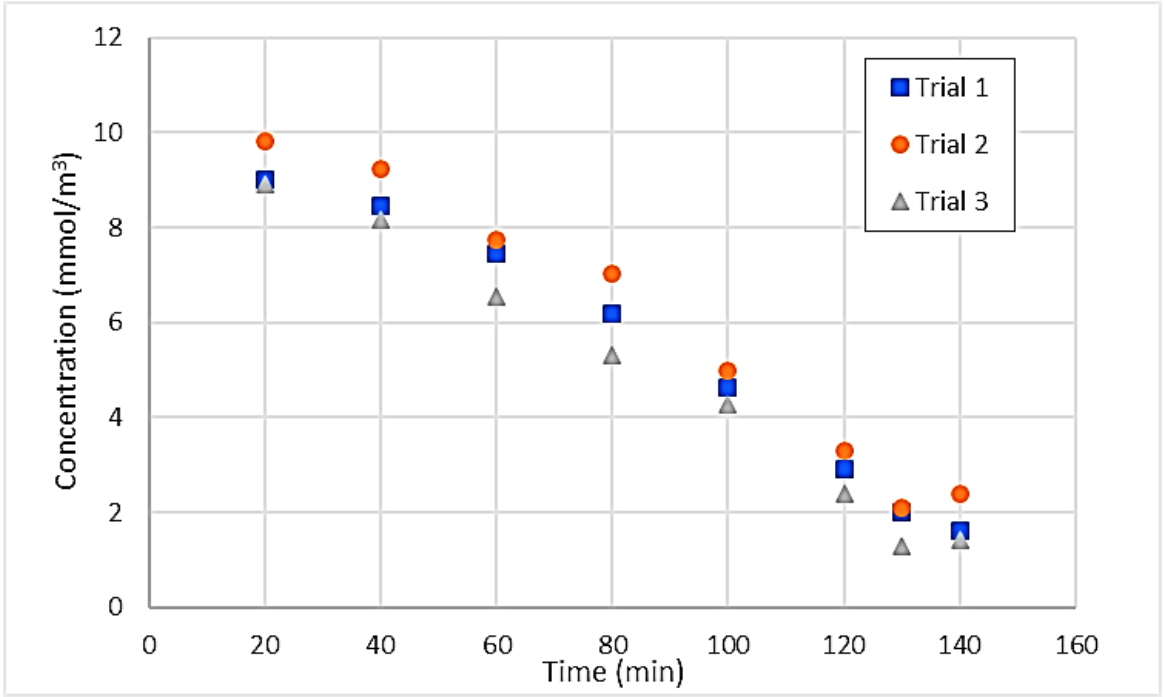
The optimal mesh setting was determined by plotting the copper concentration of the cut point (0.0005, 0.002, 0.032) after……..

IF YOU MUST USE LEGEND, PLACE ON FIGURE AND NOT ON SIDE

Unacceptable

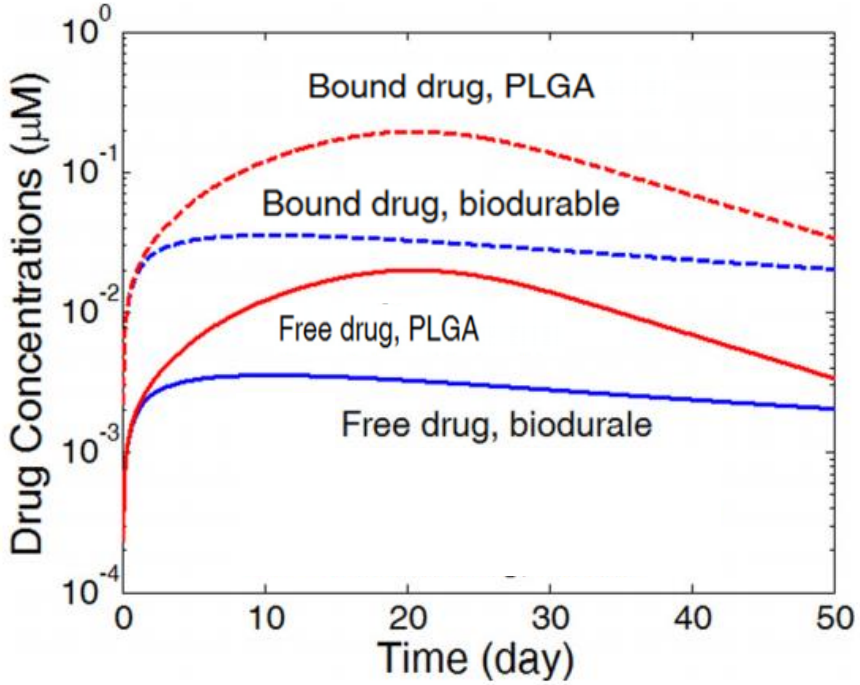


Acceptable

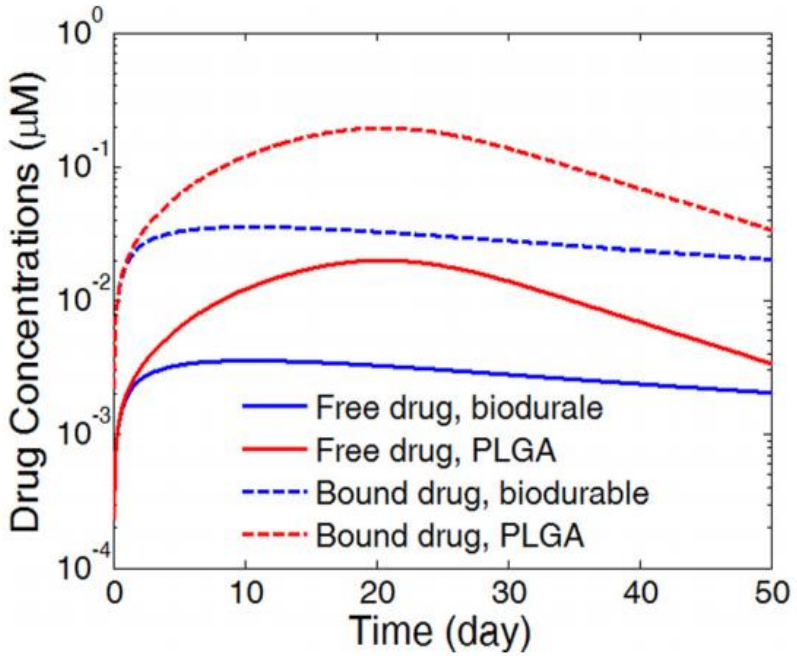


WHEN POSSIBLE, PLACE THE LABELS ON THE CURVES IDEALLY, ALSO COLOR COAT LABELS WITH THE LINE COLORS

Good



Better



NUMERICAL IMPLEMENTATION SECTION

2.7. Numerical implementation

The equations are solved using a commercial finite element package, COMSOL Multiphysics version 4.3b (COMSOL Multiphysics Burlington, MA). Four modules in this software were used: *Transport of Diluted Species*, *Transport of Concentrated Species*, *Heat Transfer in Fluids*, and *Darcys Law*. *Transport of Diluted Species* solved for pore water saturation (Eq. 1) and bacteria concentration (Eq. 20). *Transport of Concentrated Species* solved for mass fraction of water vapor (Eq. 7). *Heat Transfer in Fluids* solved for energy (Eq. 10). *Darcys Law* solved for pressure (Eq. 15). A backward time difference discretization with an initial time step of 1 ns and maximum time step of 0.25 seconds was used thereafter. The relative and absolute tolerance values were 0.001. A mesh of 198960 tetrahedral elements was used for the 3D model for which the maximum element size was set to 500 μm in the core region and at the placenta and pericarp interface. The maximum element size in the pericarp was set to 0.003 m while the locule was set to the default coarser mesh with a maximum element size of 0.0091 m. A fully coupled, MUltifrontalMassively Parallel sparse direct Solver (MUMPS) was used with an automatic non-linear solver. Computational run times varied based on the temperature differential and ranged from several hours to several days with 32 GB of RAM on a 2.0 GHz dual core Intel^{R} Xeon CPU E5-2620 processor.