



With great graphs comes great power

Baldur Magnusson

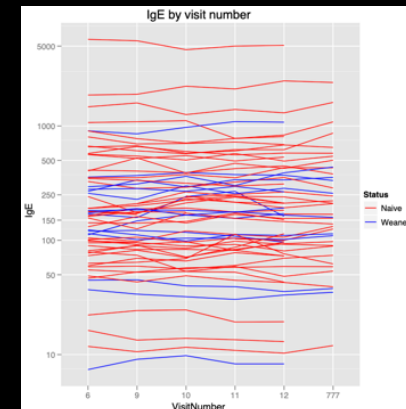
Early Development Biostatistics, Novartis Pharma AG

R/Pharma 2020

My start in data visualization

- From a no-graph, data-free statistics PhD...
- ...into a highly exploratory environment
- Google said: “try ggplot2!”

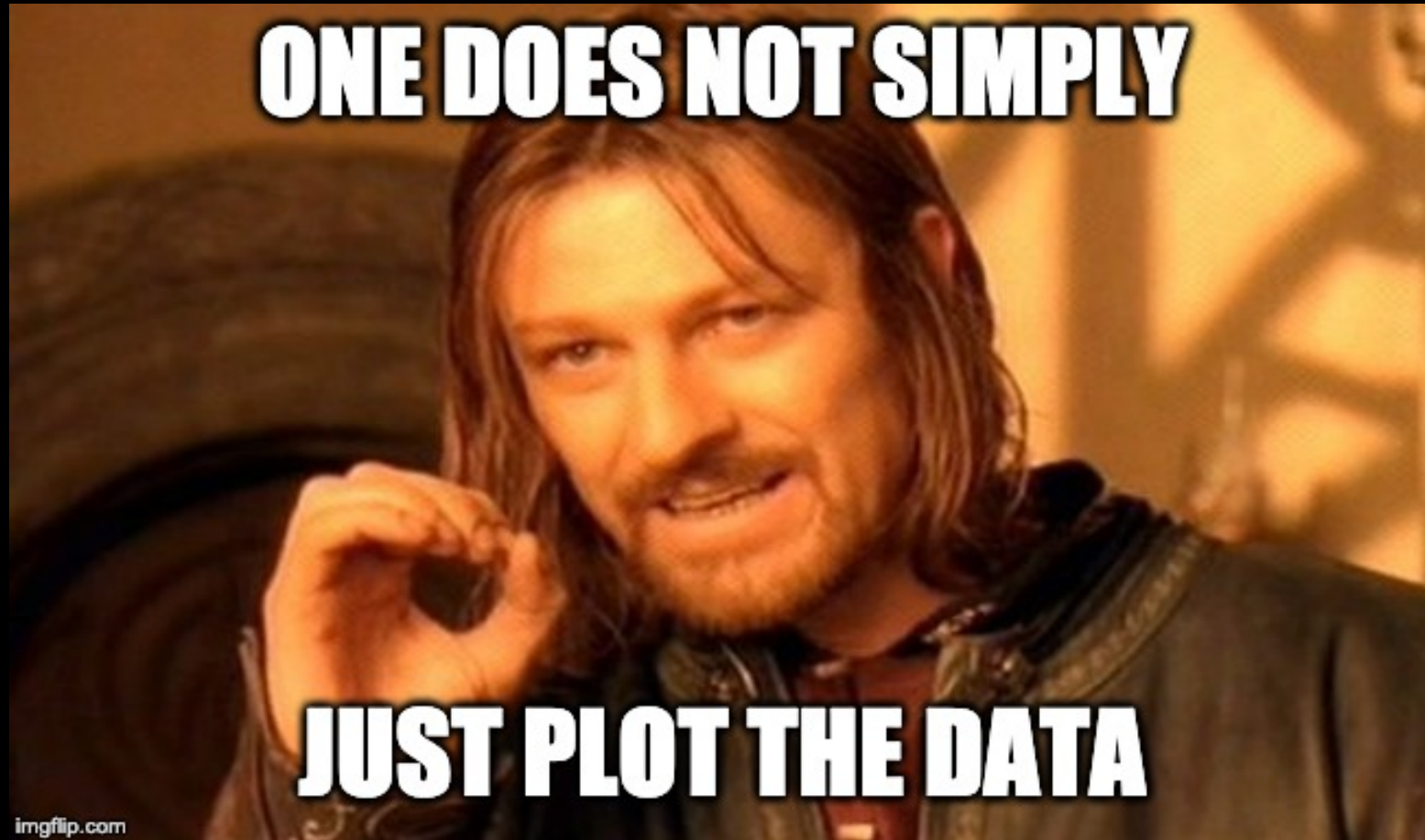
```
ggplot(data6,aes(VisitNumber,IgE,group=sid1a,colour=Status))+geom_line()  
last_plot()+scale_colour_manual(value=c("red","blue"))  
last_plot()+opts(title="IgE by visit number",plot.title=theme_text(size=15,vjust=0))  
last_plot()+scale_y_continuous(trans="log",breaks=ymaj,labels=ymaj)
```



Plotting is fun, but...

- A bad plot can be worse than no plot
- Producing a lot of graphs \neq effective visual communication

Great graphs are not trivial



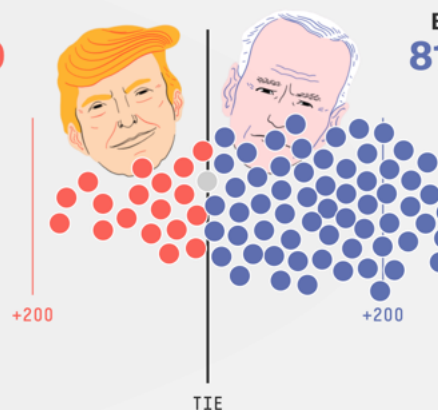
Effective visualizations are all around us

Biden is *favored* to win the election

We simulate the election 40,000 times to see who wins most often. The sample of 100 outcomes below gives you a good idea of the range of scenarios our model thinks is possible.

Trump wins
18 in 100

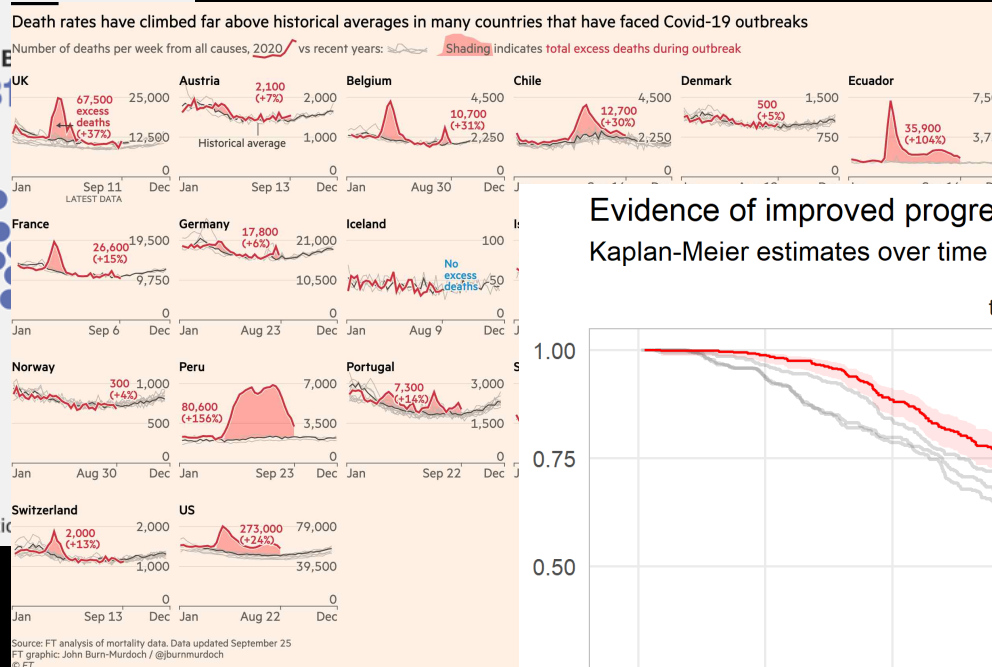
+400
ELECTORAL VOTE
MARGIN



● Trump win ● Biden win

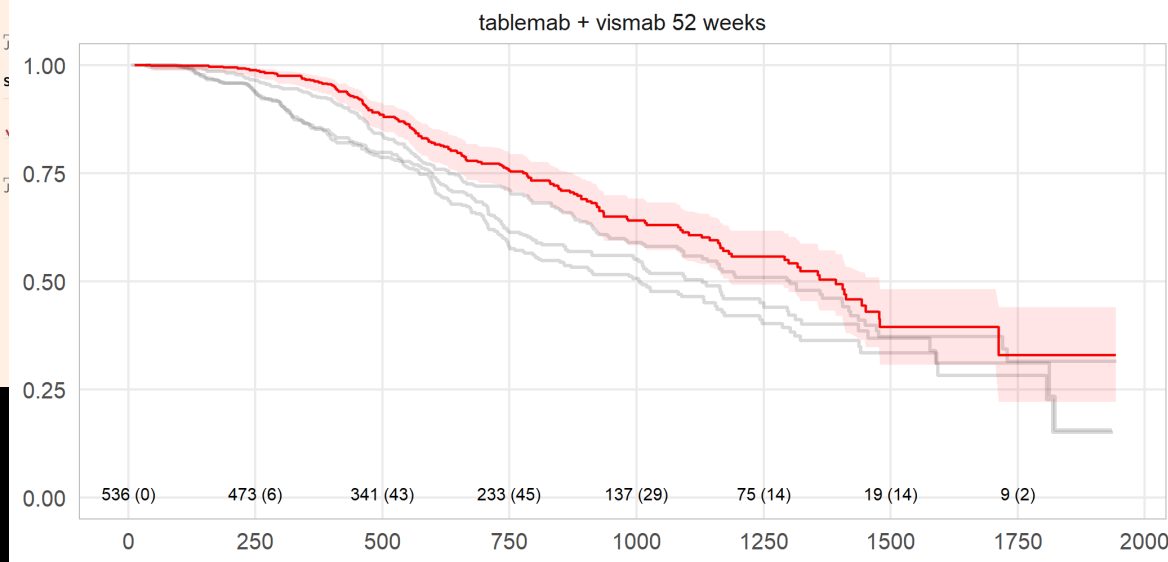
● No Electoral College majority, House decides election

<http://www.fivethirtyeight.com>



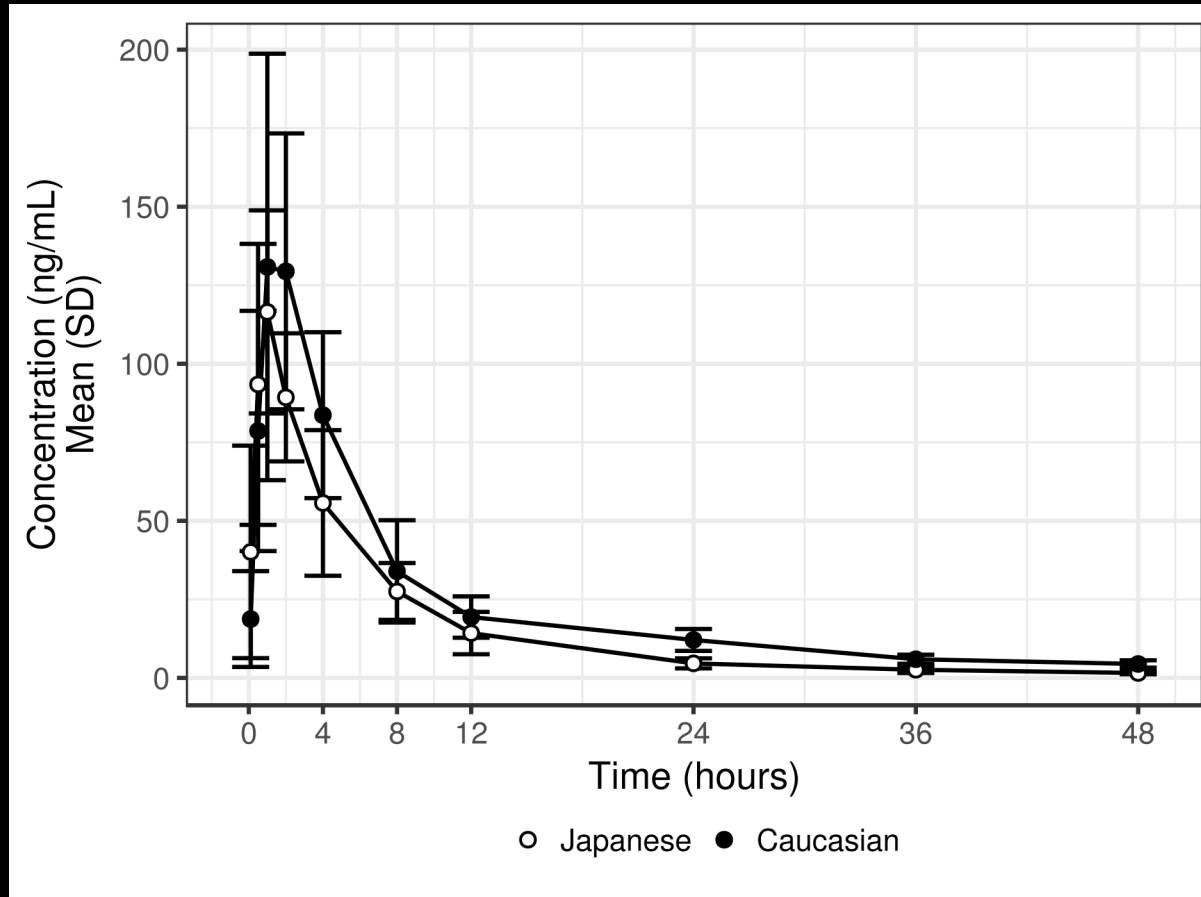
<http://www.ft.com/coronavirusfree>

Evidence of improved progression-free survival for combo over monotherapy
Kaplan-Meier estimates over time including 95% uncertainty interval



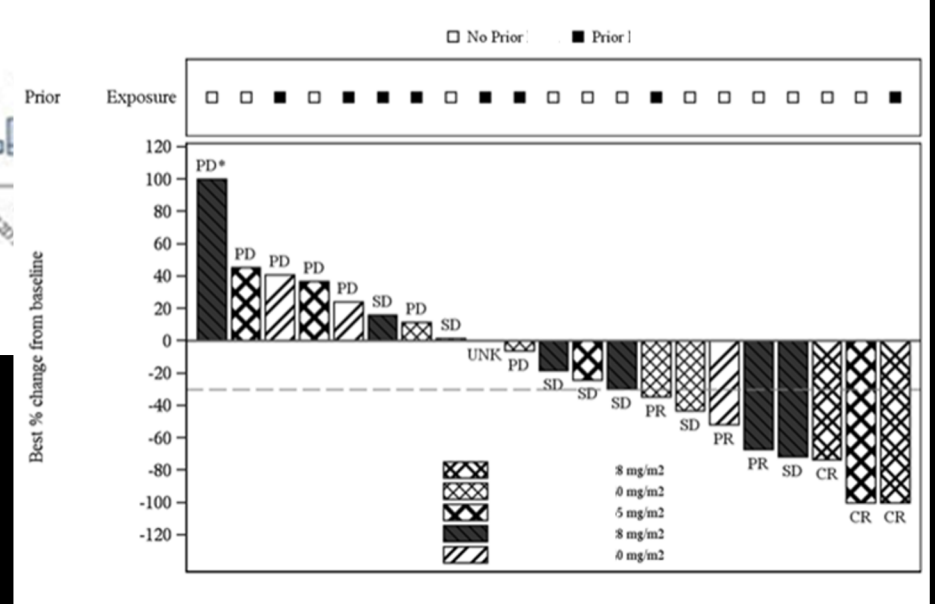
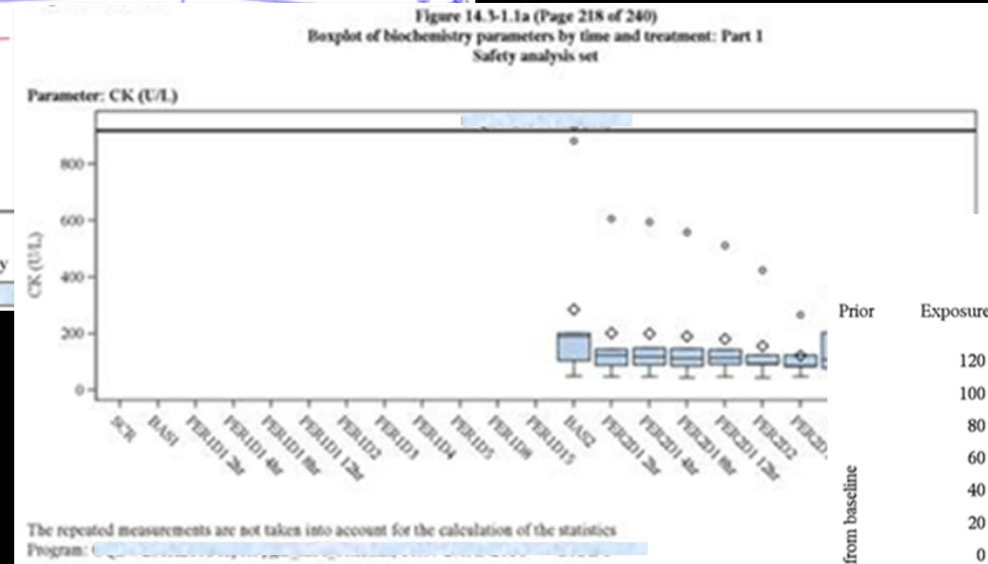
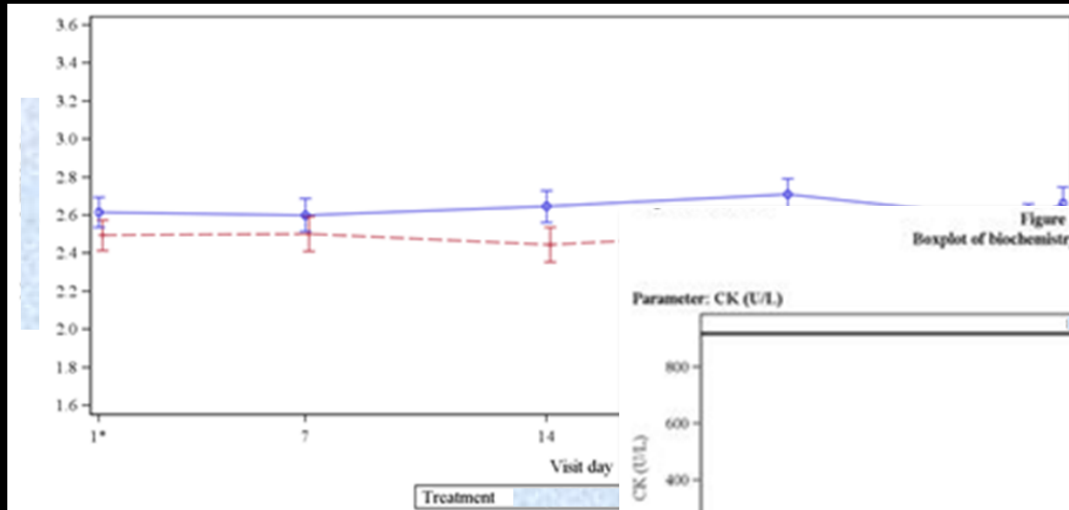
<http://vis-sig.github.io/blog>

Is exposure different? How?



What are we supposed to conclude?

It is not hard to find more examples



What if we could do better?

- We can...
- What if we consistently **did** better?

How do we get there?

- Know your purpose
- Show the data clearly
- Make the message obvious

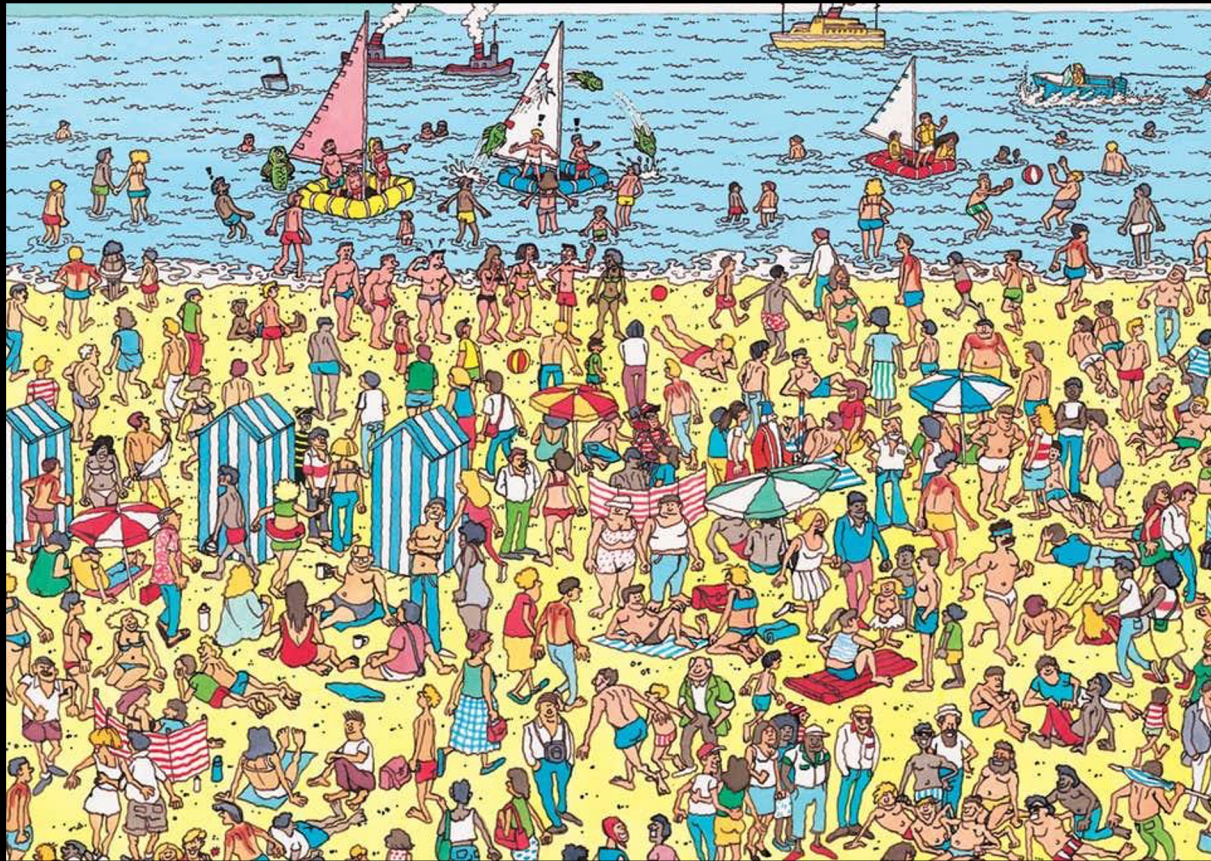
Know your purpose

- What is the question?
- Who wants to know?
- Why do they want to know?

Show the data clearly

- Simplify!
- Maximize the signal over the noise
- Show the relevant data directly

Tying it all together



Do you want your audience to play “Where’s Wally?”

Credit: Andrew Wright

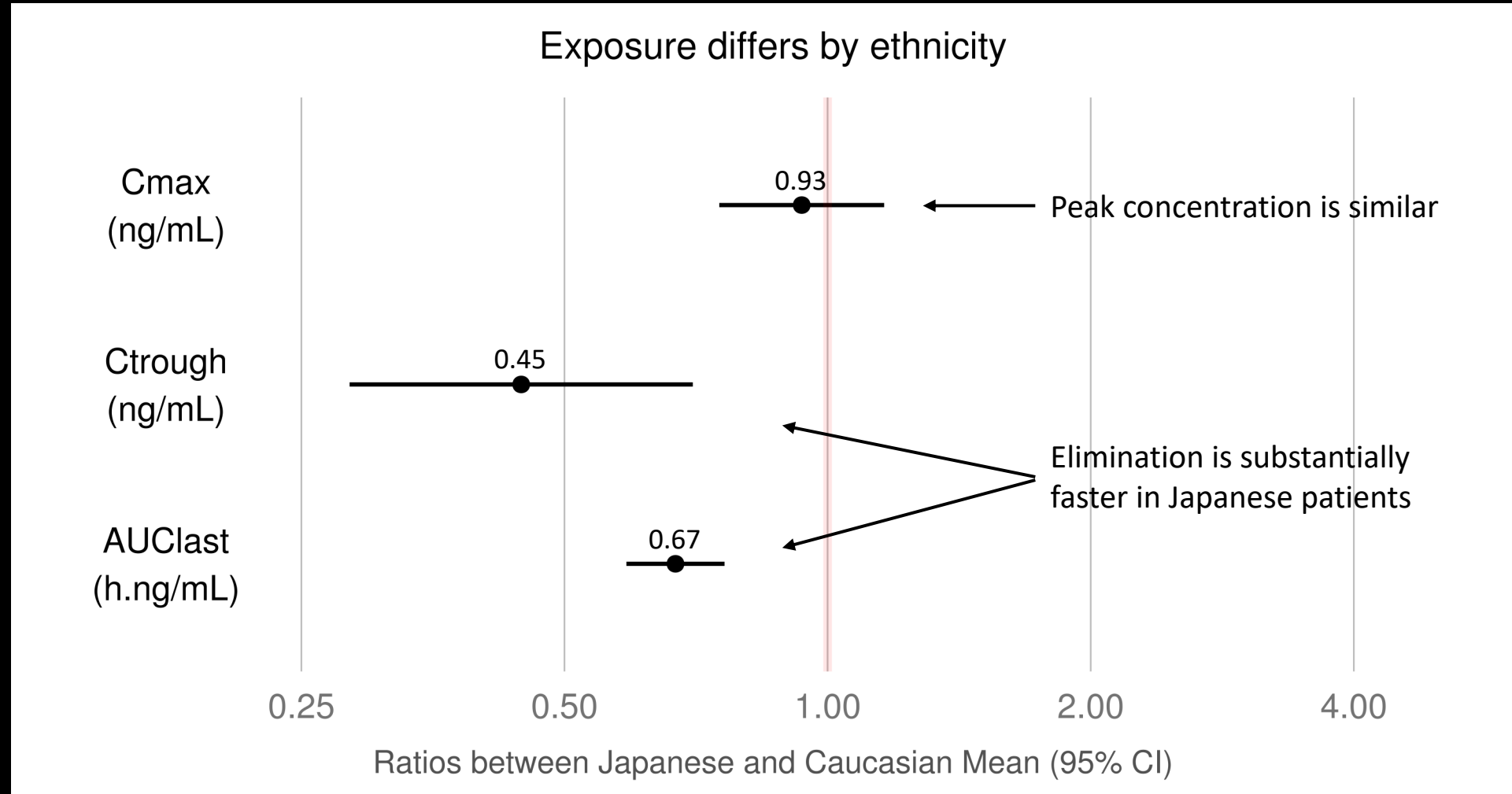
Make the message obvious

- Show the answer
- Draw attention & do repeat yourself
- Always add a title
- Make the message impossible to miss

The elephant in the room...

- No one-size-fits-all
- Choose consciously for your situation
- Make it a habit – test and repeat

Is the exposure different? How?



The goal of the quantitative scientist is to influence through data

- Influence → communication
- Most effective medium: **visual**
- Purpose – Clarity – Message



With great graphs
comes great power!

If you want to be more like Spiderman...

- <https://graphicsprinciples.github.io/>
- EVC [video](#) and [tutorial](#)
- A graphics principles [cheat sheet](#)
- xGx: <https://opensource.nibr.com/xgx/>
- WW: <https://github.com/VIS-SIG/Wonderful-Wednesdays>
- visR: <https://openpharma.github.io/visR/>

Acknowledgments

- Alison Margolskee*
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- Ivo Vranesic
- Doug Robinson
- Allison Florance

And many more...

Thank you