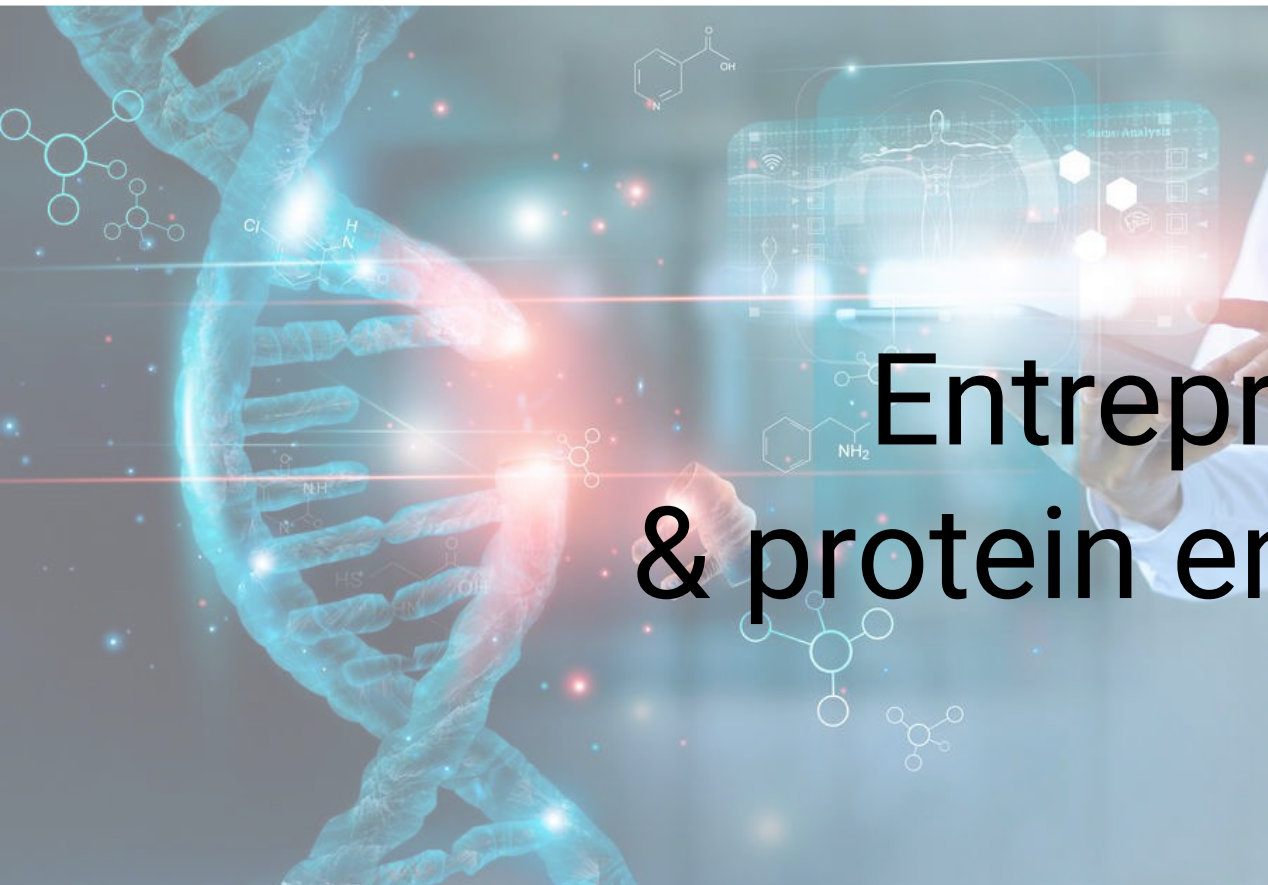


# Class core values

1. Be **respectful** to yourself and others
2. Be **confident** and believe in yourself
3. Always do your **best**
4. Be **cooperative**
5. Be **creative**
6. Have **fun**
7. Be **patient** with yourself while you learn
8. Don't be shy to **ask "stupid" questions**



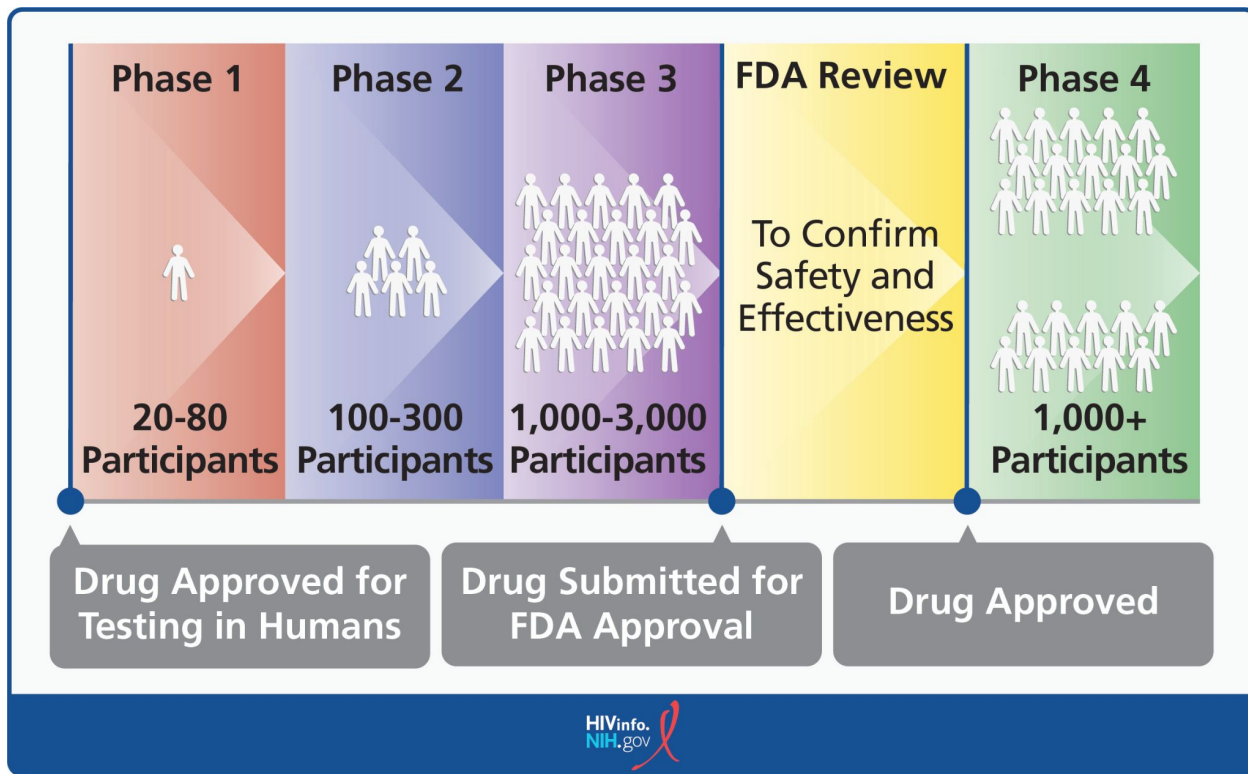
Week 9, Lecture 2

# Entrepreneurship & protein engineering

# Learning Objectives

1. Describe bio-ethical considerations in a start-up
2. Understand challenges of starting a company
3. Identify areas of opportunity in the field
4. Learn about available resources

# The who ...



# Are we transparent?

The Tuskegee trial



# Are we including everyone?

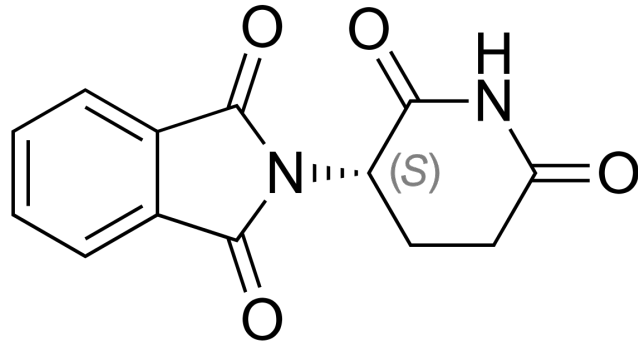
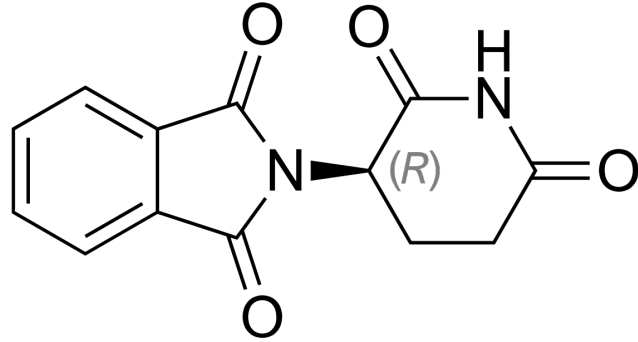
HEALTH NEWS

## FDA Issues 'Black Box' Warning on Sleep Aids Like Ambien: What You Need to Know



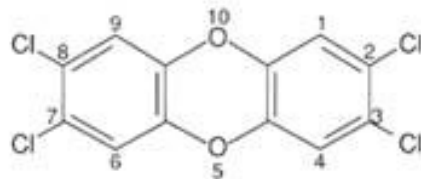
# What will be the side effects?

Thalidomide

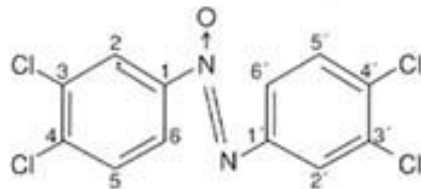


# What will be the side effects?

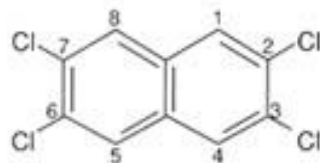
Agent Orange



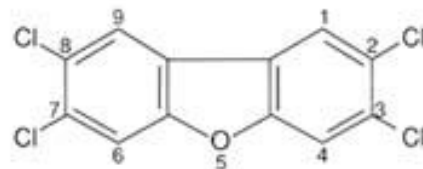
2,3,7,8-Tetrachlorodibenzo-*p*-dioxin



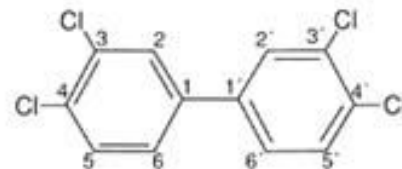
3,3',4,4'-Tetrachloroazoxybenzene



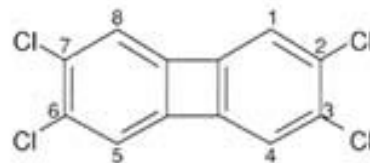
2,3,5,7-Tetrachloronaphthalene



2,3,7,8-Tetrachlorodibenzofuran



3,3',4,4'-Tetrachlorobiphenyl



2,3,5,7-Tetrachlorobiphenylene



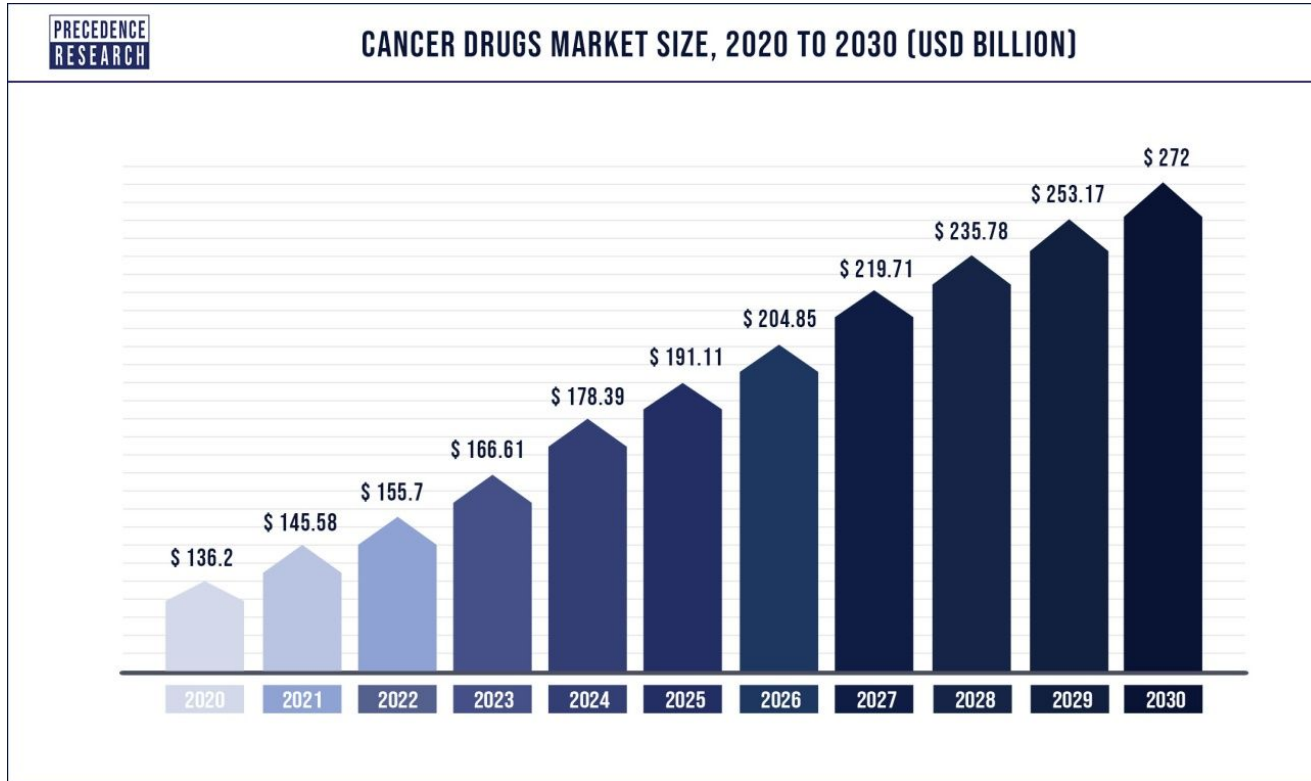
# What will be the side effects?



# Privacy of data

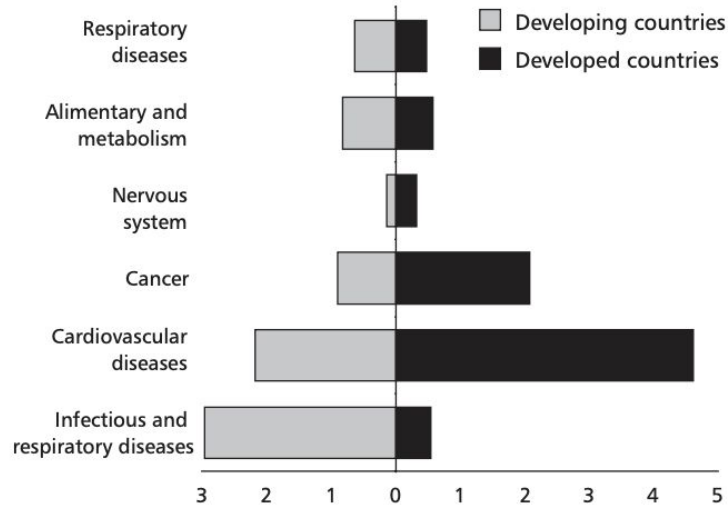


# The market



# The market

Figure 2 **Weighted distribution of deaths caused by major global diseases (deaths per mil of relevant population)<sup>22</sup>**



# The market

Figure 2 **Weighted distribution of deaths caused by major global diseases (deaths per mil of relevant population)<sup>22</sup>**

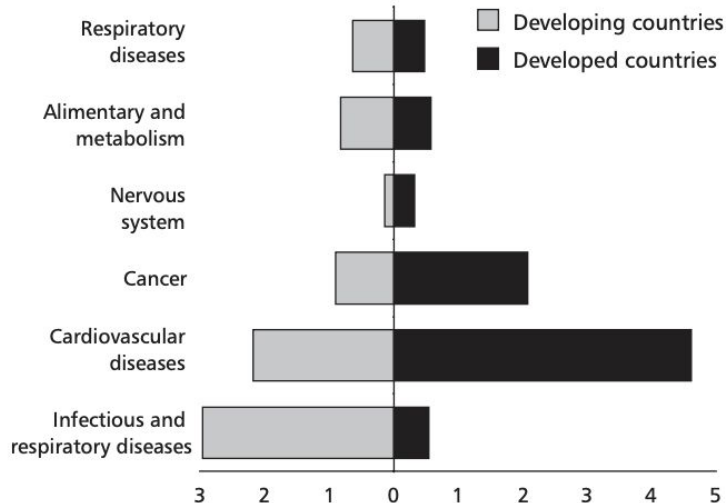
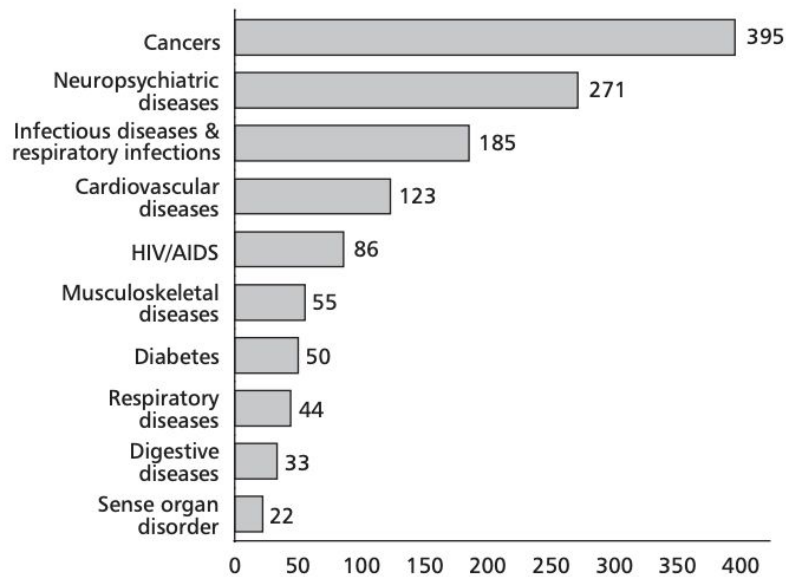
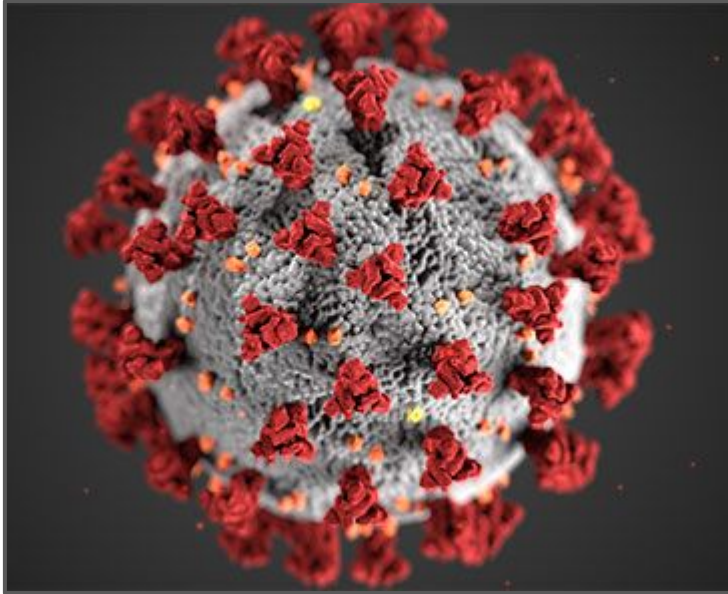


Figure 3 **Number of compounds in development by major disease categories<sup>24</sup>**





# The dilemma of start-up in biotech



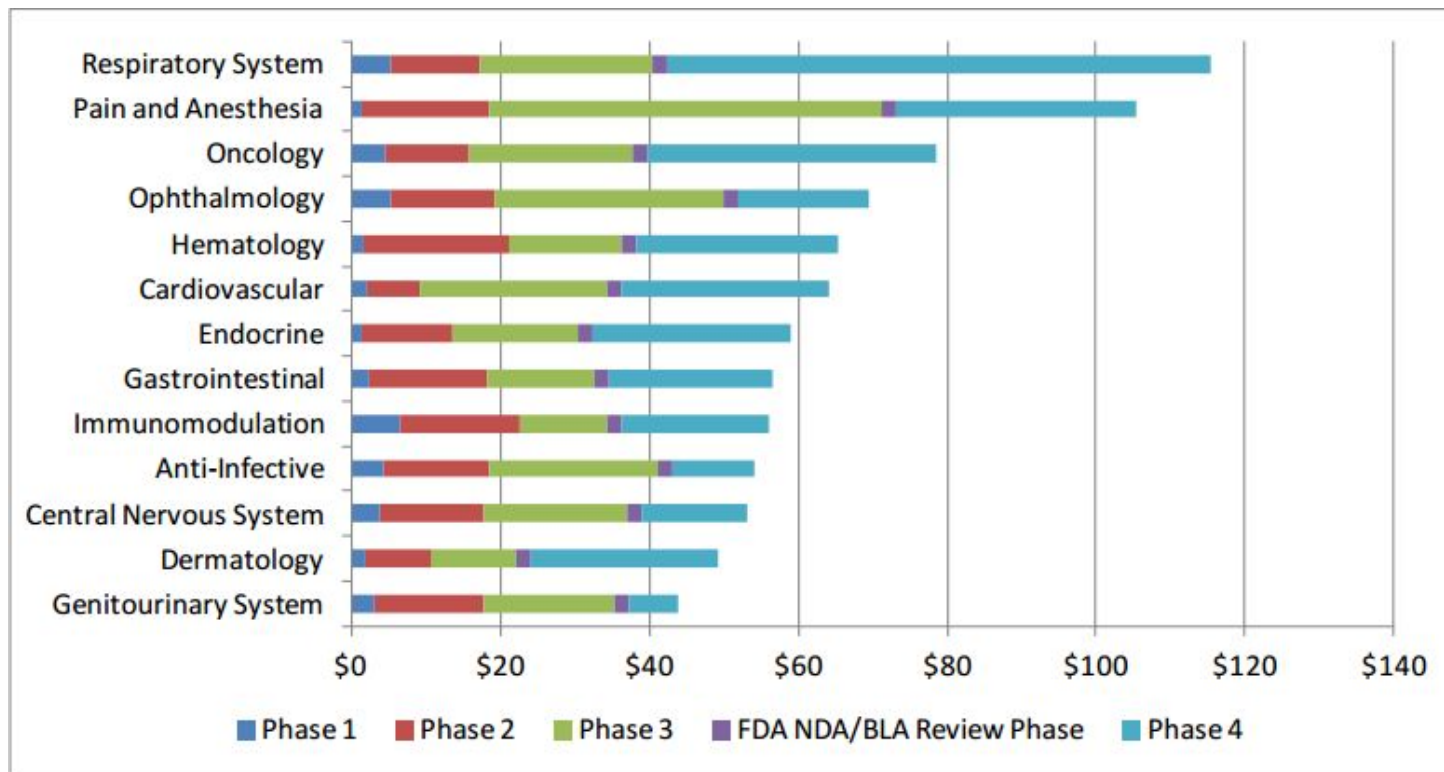
# The dilemma of start-up in biotech

OxyContin and the opioid crisis



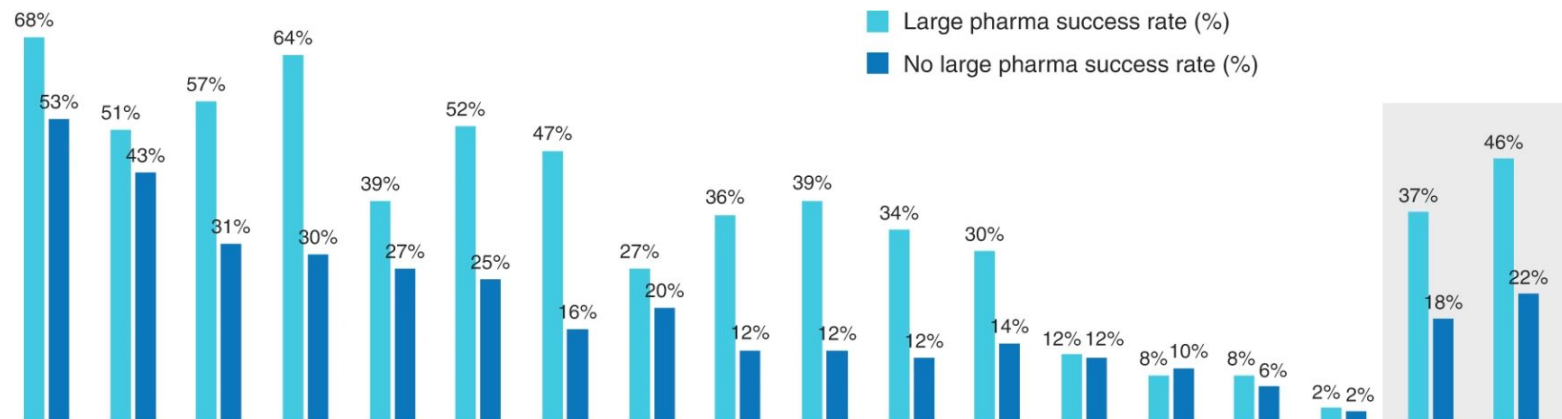
Image from New York Times, [Damage from OxyContin continues to be revealed](#)

# Working under stress



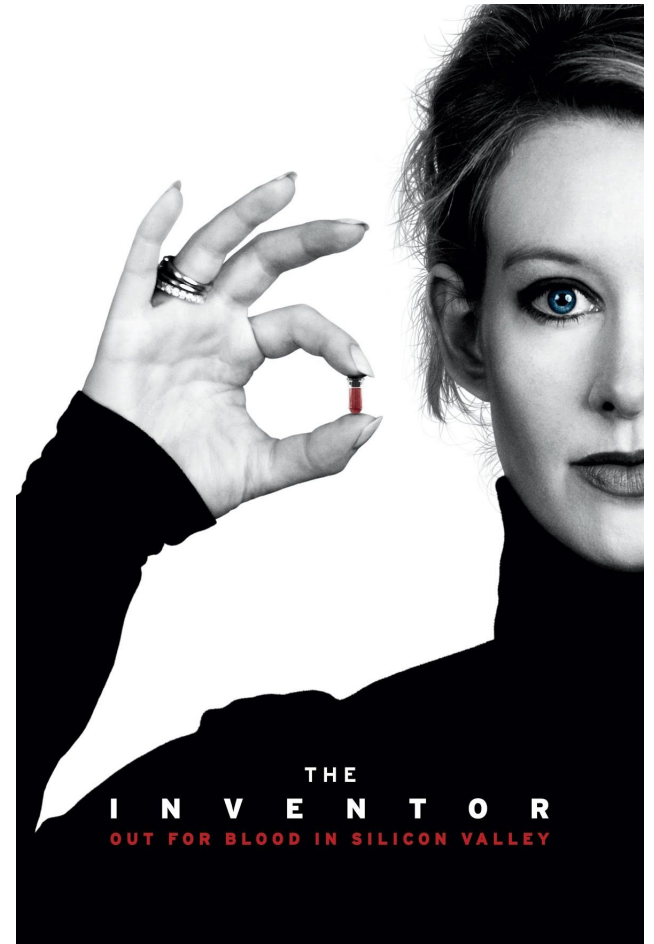


# Working under stress



By year of first venture financing	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total	2004–2015
Large pharma vs. no large pharma investor (significance)	*	NS	***	***	NS	**	***	NS	***	***	***	***	NS	NS	NS	NS	***	***
Large pharma vs. no large pharma investor ( <i>P</i> -value)	0.018	0.330	0.001	$1.5 \times 10^{-4}$	0.108	0.002	$3.3 \times 10^{-6}$	0.385	$8.2 \times 10^{-5}$	$3.3 \times 10^{-5}$	$1.8 \times 10^{-5}$	$8.0 \times 10^{-4}$	0.959	0.792	0.665	0.869	$2.3 \times 10^{-30}$	$3.9 \times 10^{-33}$
Total sample size	431	362	356	370	334	315	463	429	651	612	507	501	511	490	469	540	7,341	5,331

# How things can go wrong



Guest speaker

*Dr. Daniel Adriano Silva*



# For the next lecture:

1. (105) Methods submission
2. You'll be assigned your peer reviews

Next lecture:  
*Wrap up*

