Medical research and innovation: where to look?

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Agenda

- Introduction
- General Analysis
- City Analysis
- Ranking and Conclusion

Key Question: where are the best places for health research and innovation?

- **Where**: can refer to
  - Types of diseases
  - How it’s changed overtime
  - Physical locations

- **Motivating Facts:**
  - The National Institute of Health (NIH) has granted over $90B in the last 4 years
  - Example - Houston: $610M from 1,300 grants in 2016
  - Over 1000 early stage companies have received VC funding since 2000

We started by trying to understand what were the major trends, and then focused on a main leverage point: location (specifically city)

1. General Analysis: **Where can we dive deep? What is important?**
   - What are the trends:
     - Specific diseases
     - Time trends
     - Locations

2. Specific analysis → locations → cities → **what differentiates them?**
   - “Access to talent”
   - “Access to funding”
   - “Access to resources”

3. Ranking

We used **5** main data sources:

1. NIH (the National Institute of Health), 1995,2000,2005,2010, and 2012-2016
   - From 2013 to 2016, the NIH grants > $90B for medical research

2. Thomson One VentureXpert, 2000-2016
   - Venture capital for startups - Medical Devices and Equipment, Healthcare Services, Biotechnology

3. AHR (America's Health Rankings), 2015
   - Cancer/Cardiovascular Death rate, Diabetes/Obesity rate in each state

4. Kaiser Family Foundation, 2016
   - Total Professionally Active Physicians, and Hospitals

5. Top 100 Universities in the U.S., 2016 (US News)

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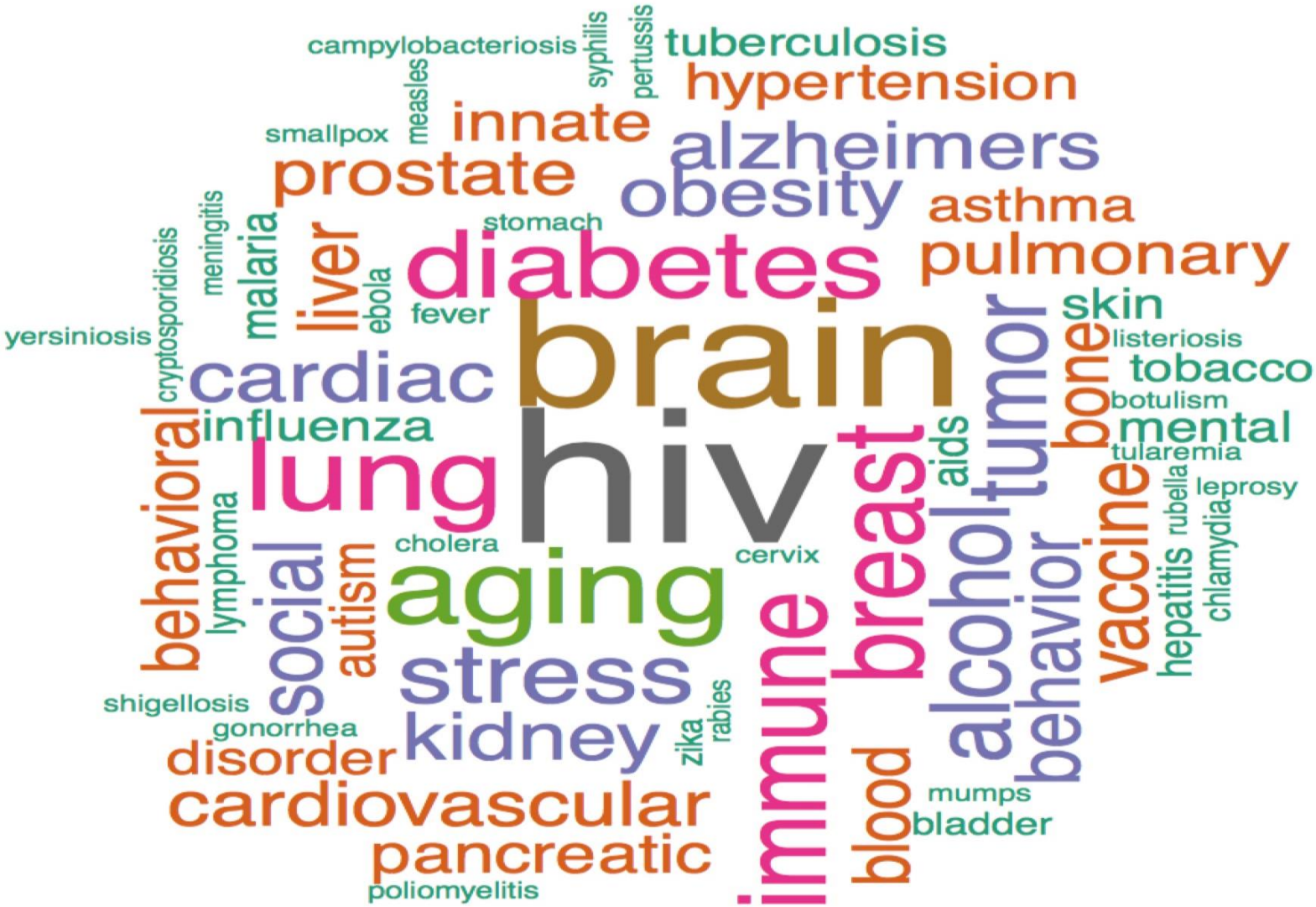
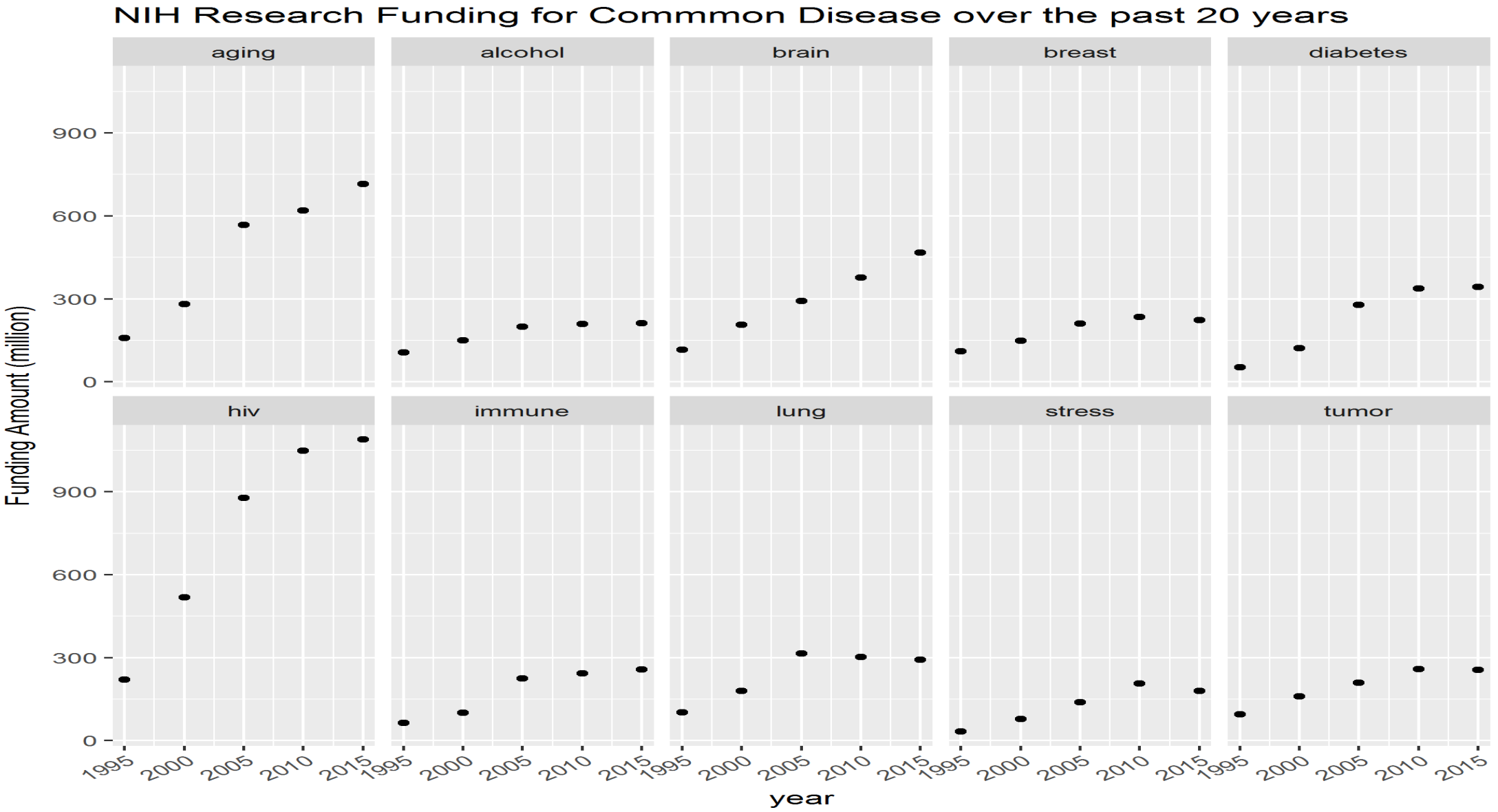
Start with diseases: large amount of NIH funding goes to HIV, brain, aging and diabetes related issues

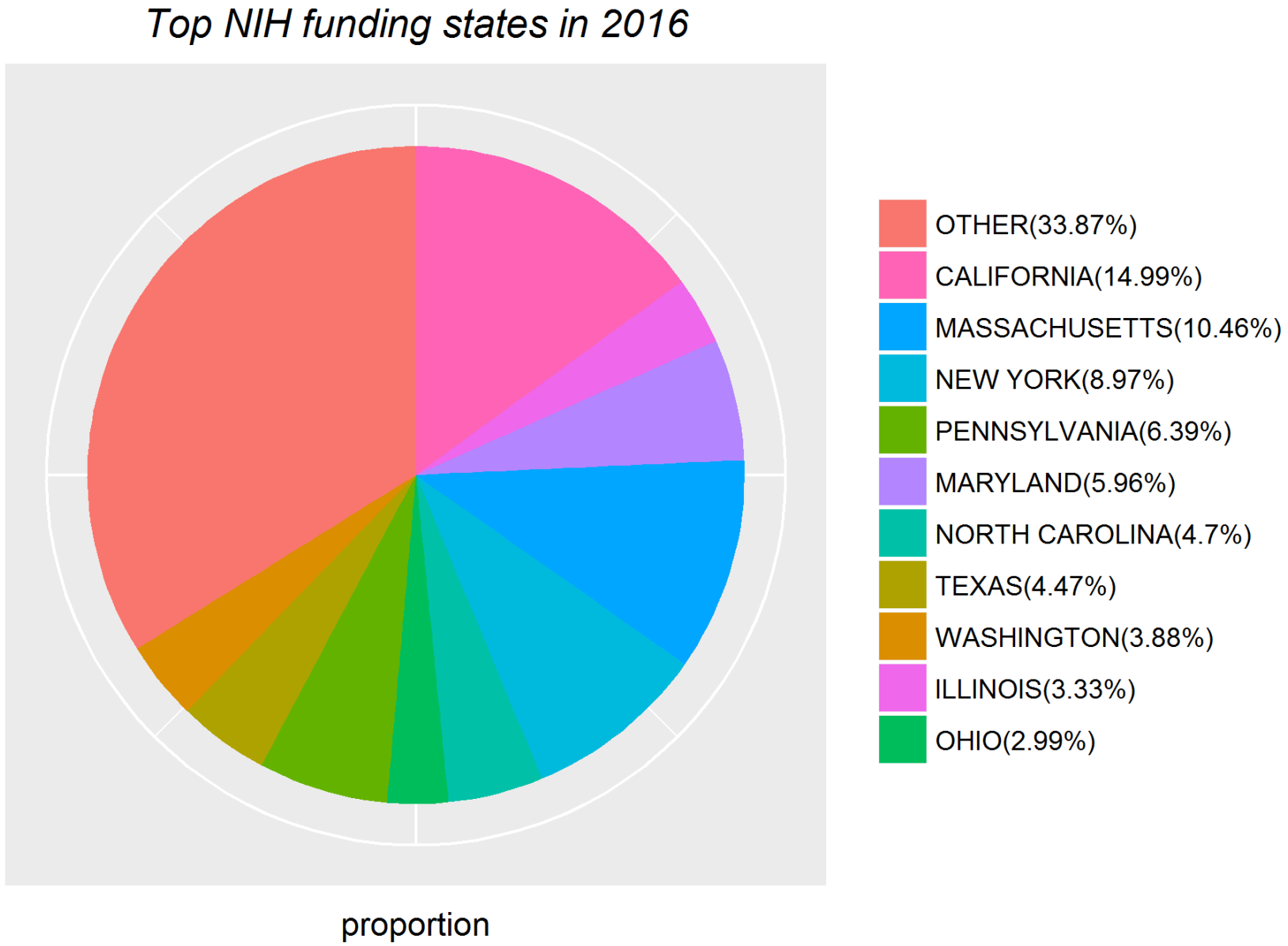


*Excludes cancer

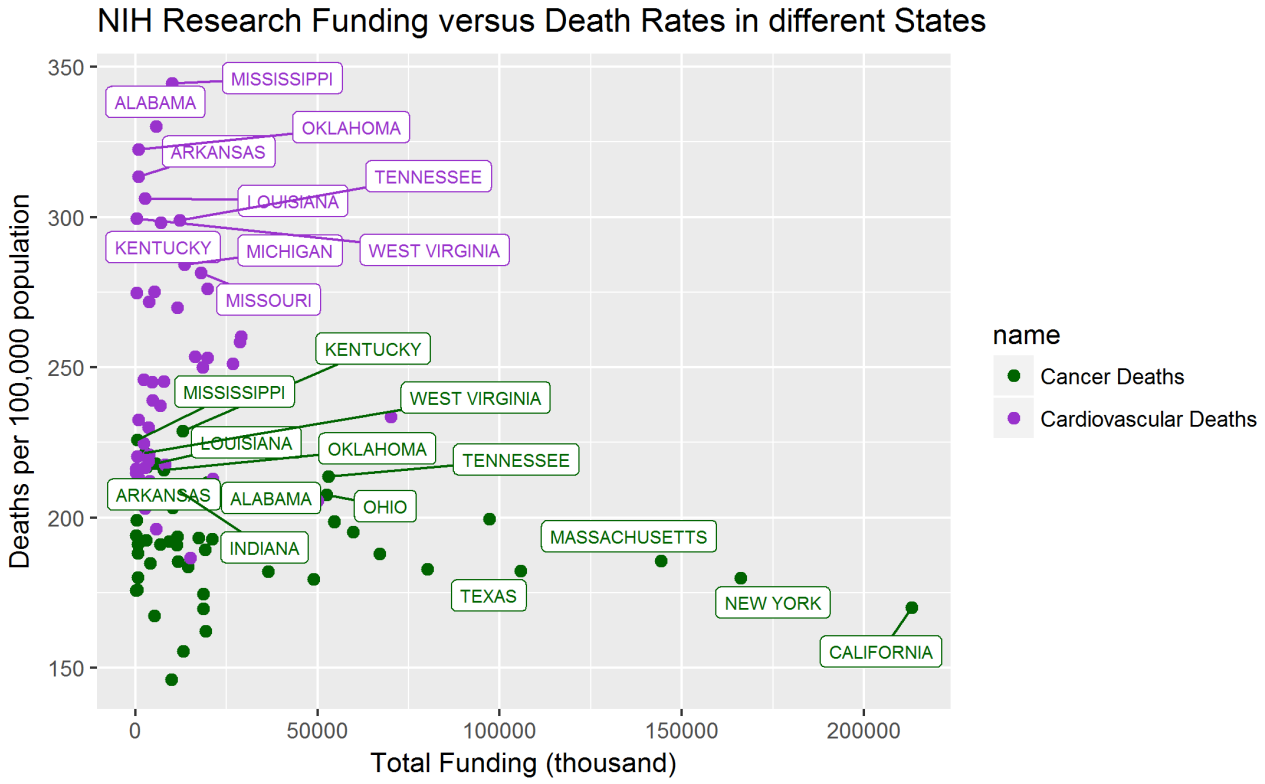
Next, time: funding for diseases generally trends with the total NIH funding, but HIV, aging and brain continue to receive high funding regardless

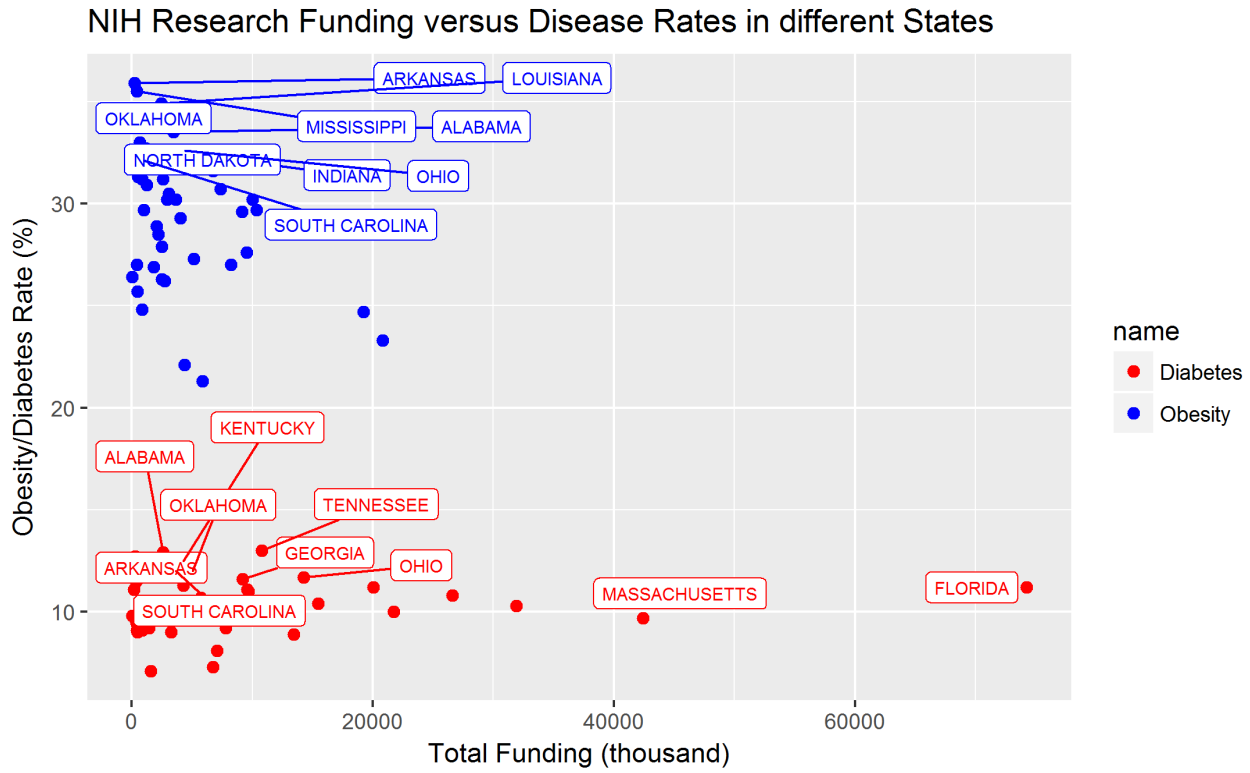


Now location: California, Massachusetts, and New York have the highest amounts of funding, with the top10 account for over 66% of funding.

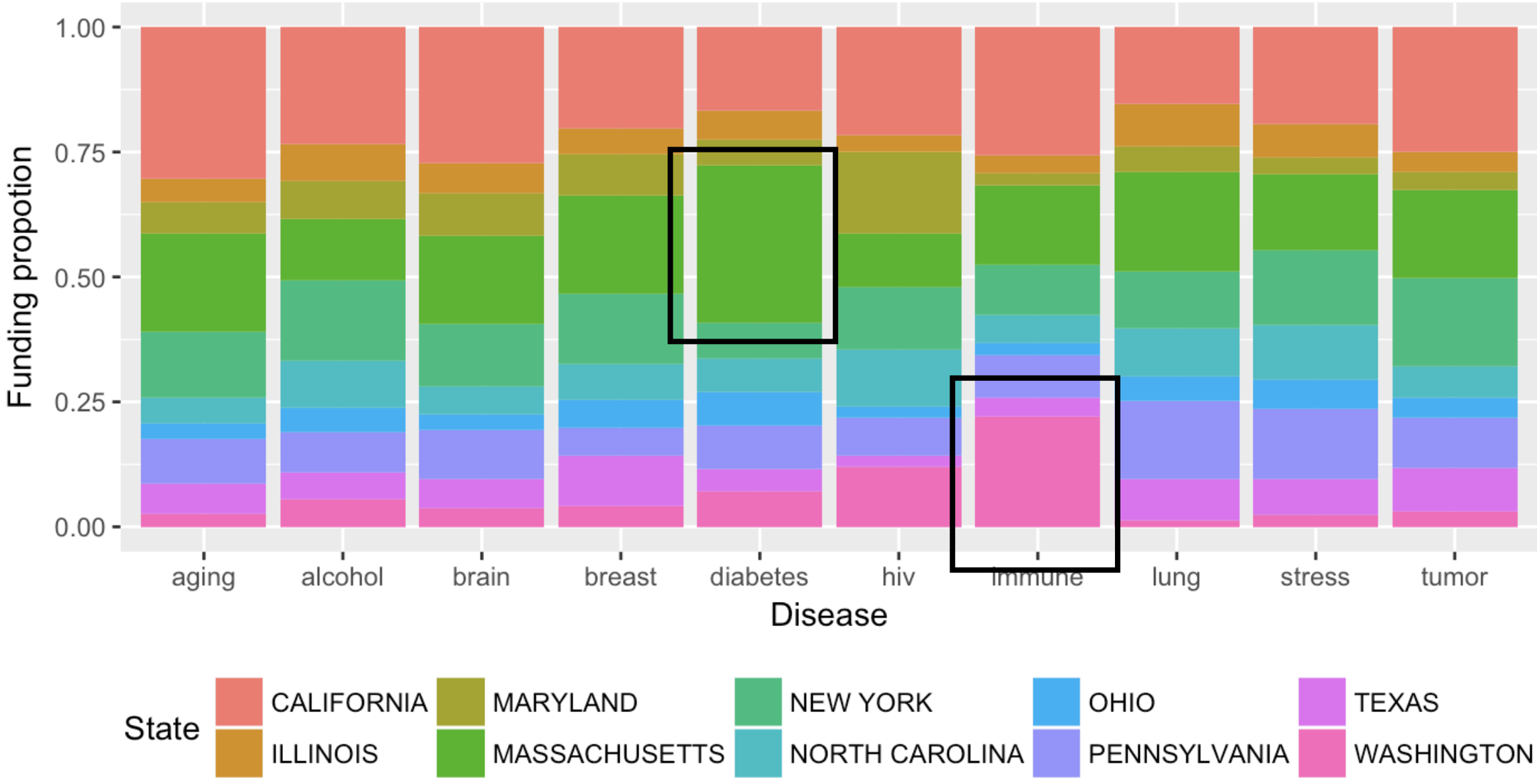


Comparing with incidences of diseases: funding are more likely to go to those states with more research institutes/universities/hospitals;
AND the research focus is not highly consistent with the death/disease rate.





And, states may (not) specialize in specific diseases



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States → Cities: The largest cities by population per state are also the most funded

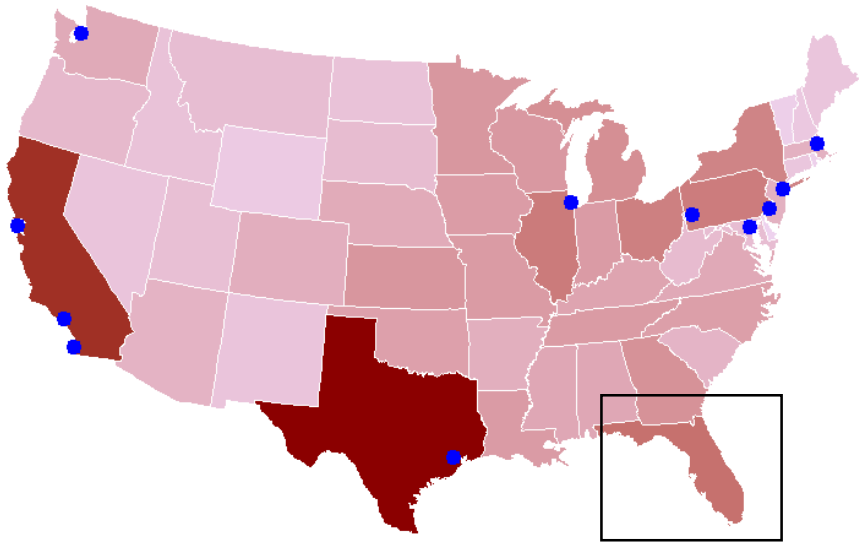
Table 1: A City Ranking Table

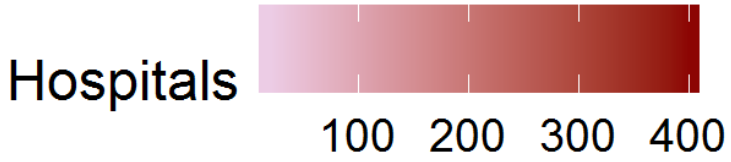
STATE	CITY	Size_State	Funding_State	Pop._US	NIH.Fund_US
Massachusetts	Boston	1	1	24	1
New York	New york	1	1	1	2
Washionton	Seattle	1	1	21	3
Pennsylvania	Philadelphia	1	1	5	4
Maryland	Baltimore	1	1	26	5
California	San Diego	2	1	8	6
California	Los Angeles	1	2	2	7
Illinois	Chicago	1	1	3	8
Pennsylvania	Pittsburgh	2	2	62	9
California	San Francisco	4	3	14	10
Texas	Houston	1	1	4	11

Access to Resources: Cities in the largest states have access to the highest number of physicians and hospitals (TX, NY, CA), but that does not necessarily translate to cities (FL)

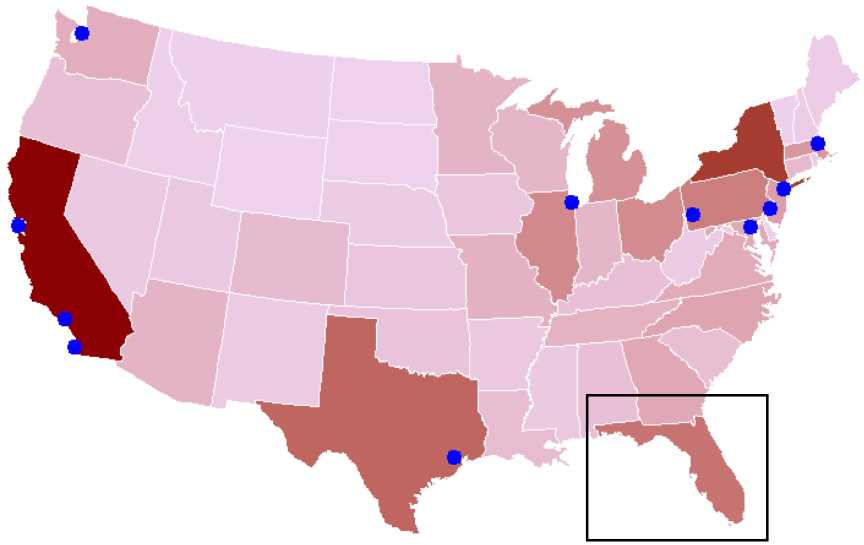
Hospital & Physicians by State (2016)

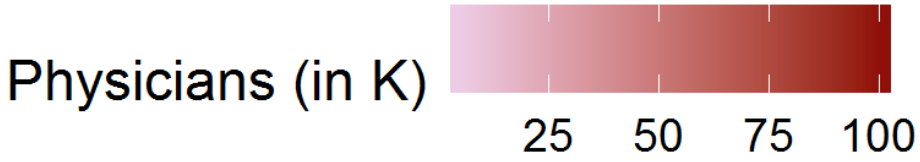
Hospitals





Physicians

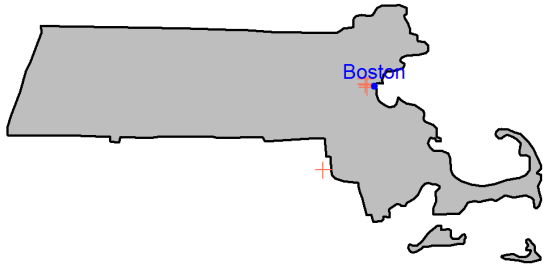




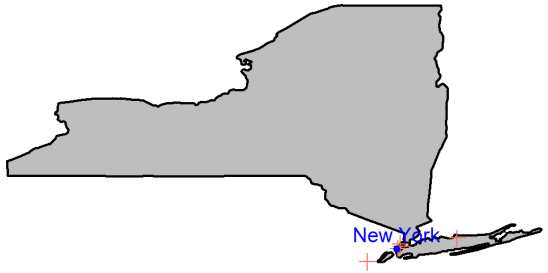
Access to Talent: there is not a significant difference in the number of top 100 schools near the cities - both Boston and New York have 2 of the most schools

Nearby top 100 universities in top cities

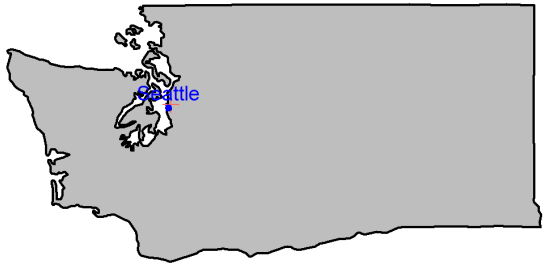
Boston (5)



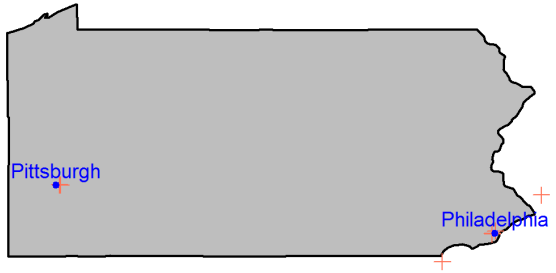
New York (6)



Seattle (1)

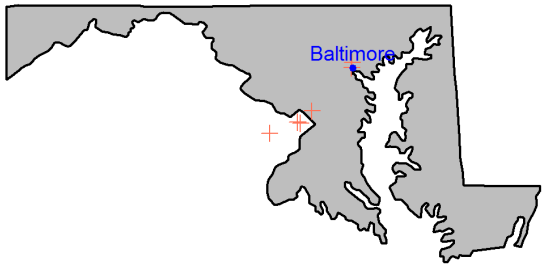


Philly (5), Pitt (2)

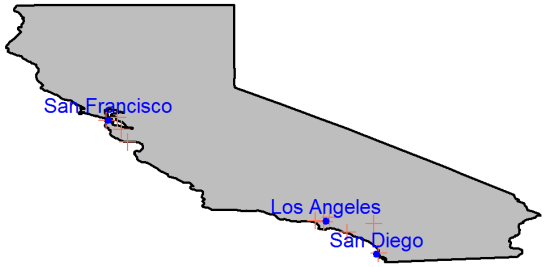


Nearby top 100 universities in top cities

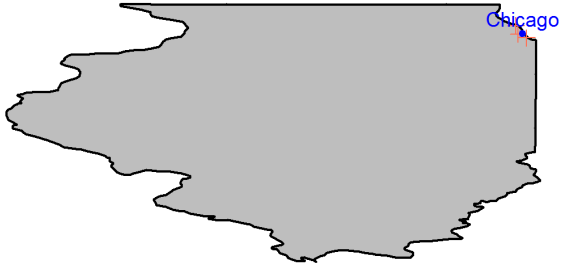
Baltimore (6)



SF (4), SD (1), LA (5)

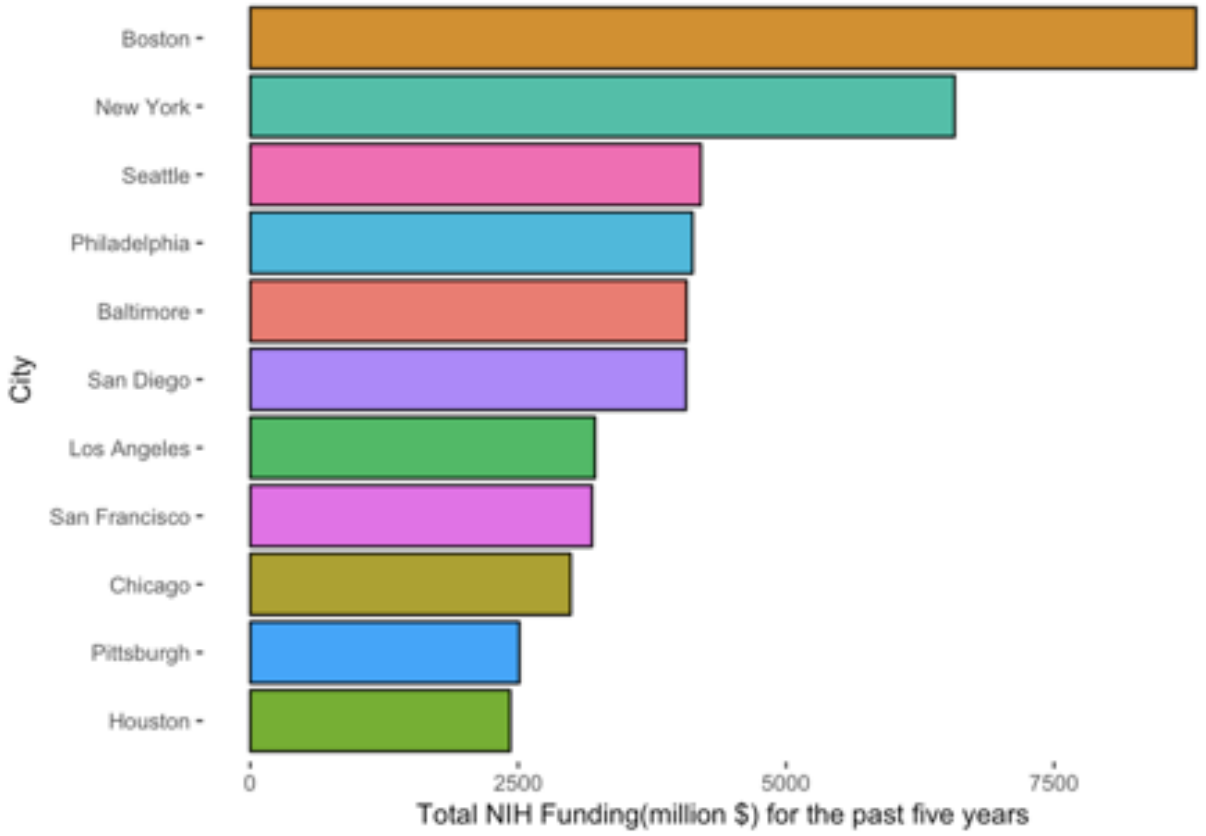


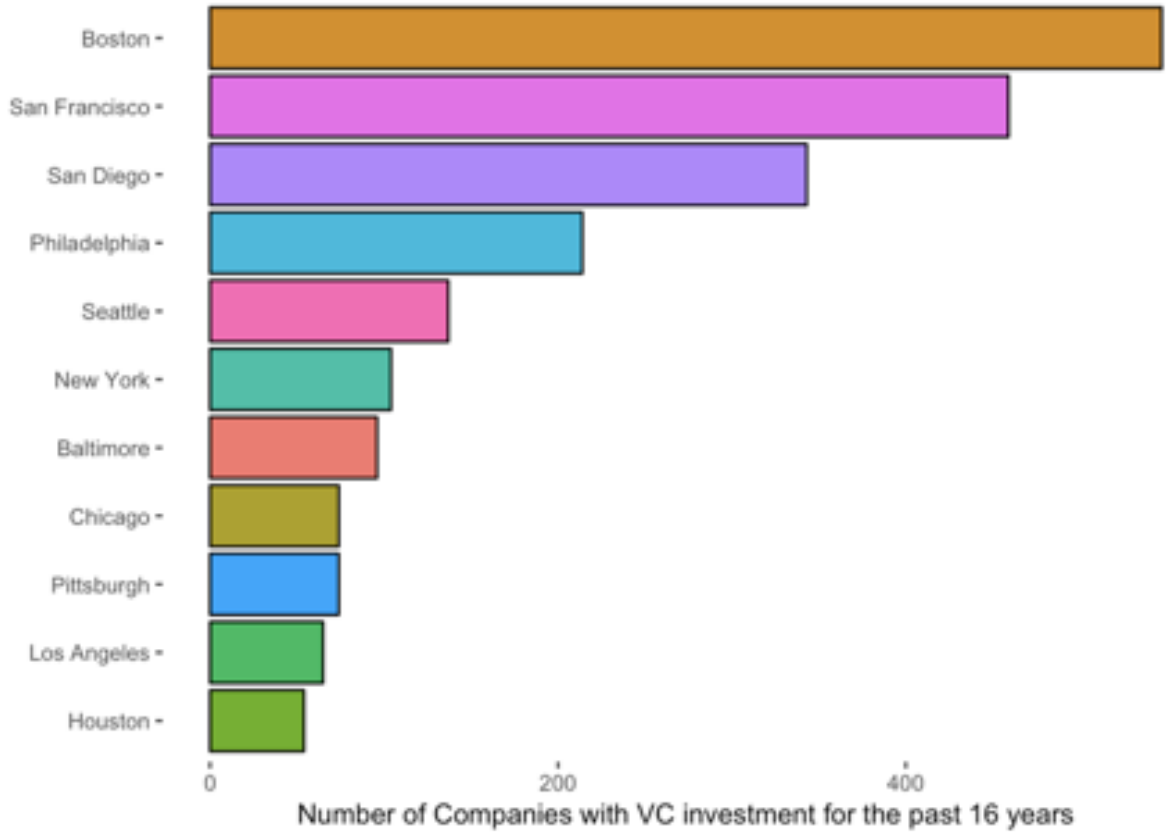
Chicago (3)



Houston (2)

Access to Funding: Boston and New York receive a disproportionately high amount of NIH funding, while Boston, SF, and San Diego have a disproportionately high number of companies that receive VC funding





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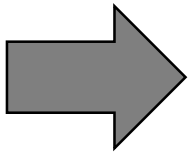
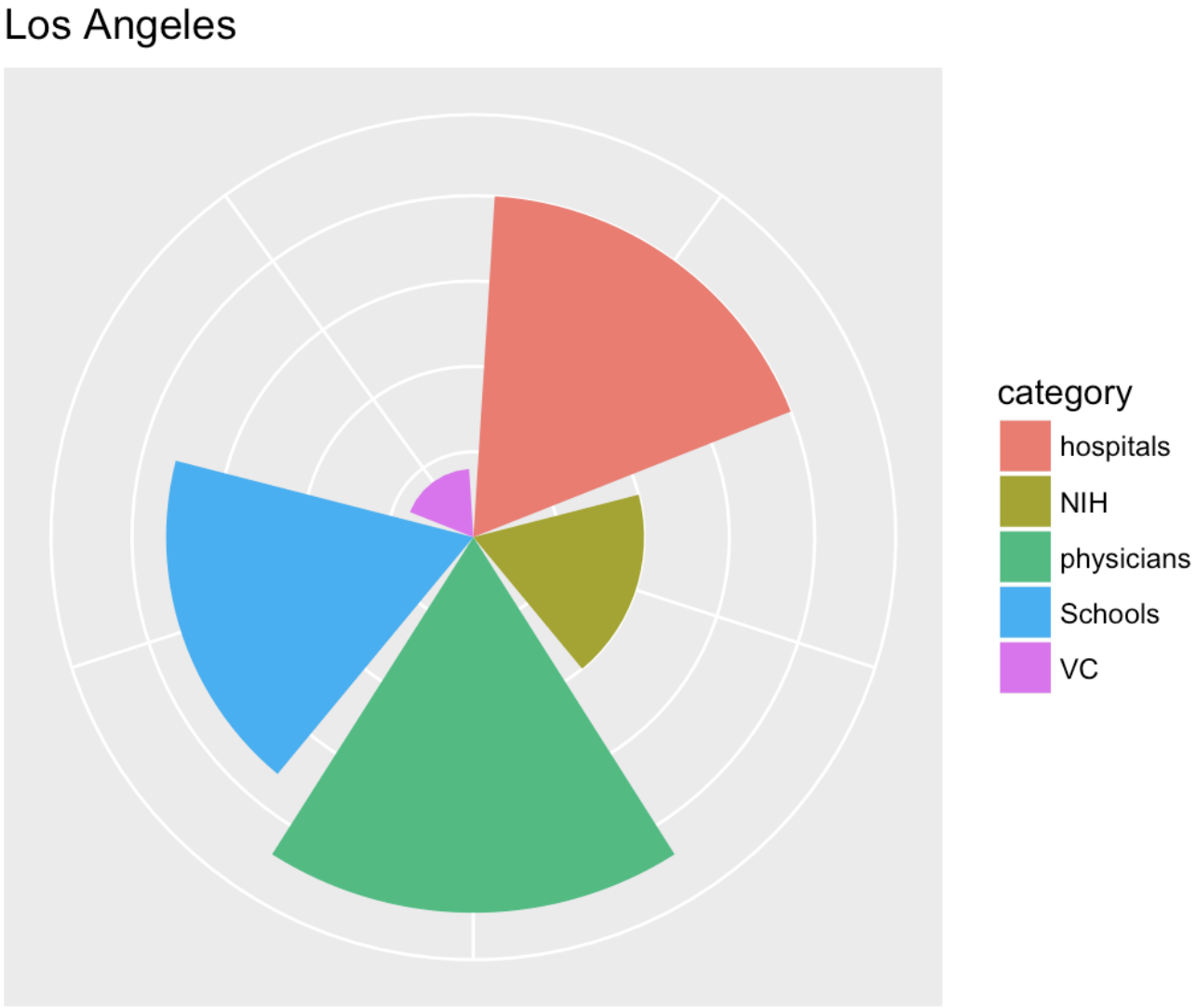
We rank cities based on three criteria: access to talent, funding, and access to resources

Talent	Funding	Resources
Top universities	**NIH**	**State Hospitals**
	Venture Capital	**State Physicians**



Rank per Category → create an aggregated score

Sample ranking per city (here Los Angeles)



Based on our ranking, NY and SF are the best places for medical research, while Seattle ranked lowest for the selected cities

Concluding Remarks

- Based on our results, NY is the best city for medical research, but there are significant opportunities to improve our ranking:
  - Fix number of hospitals/physicians
  - Focus on cities for specific diseases
  - Etc.

- There are also really interesting trends in medical research beyond city-level
  - Focus on Cancer, HIV, Brain, and Aging
  - Funding not necessarily going to the highest instances of a disease