

Perspectives on BioPharma Innovation

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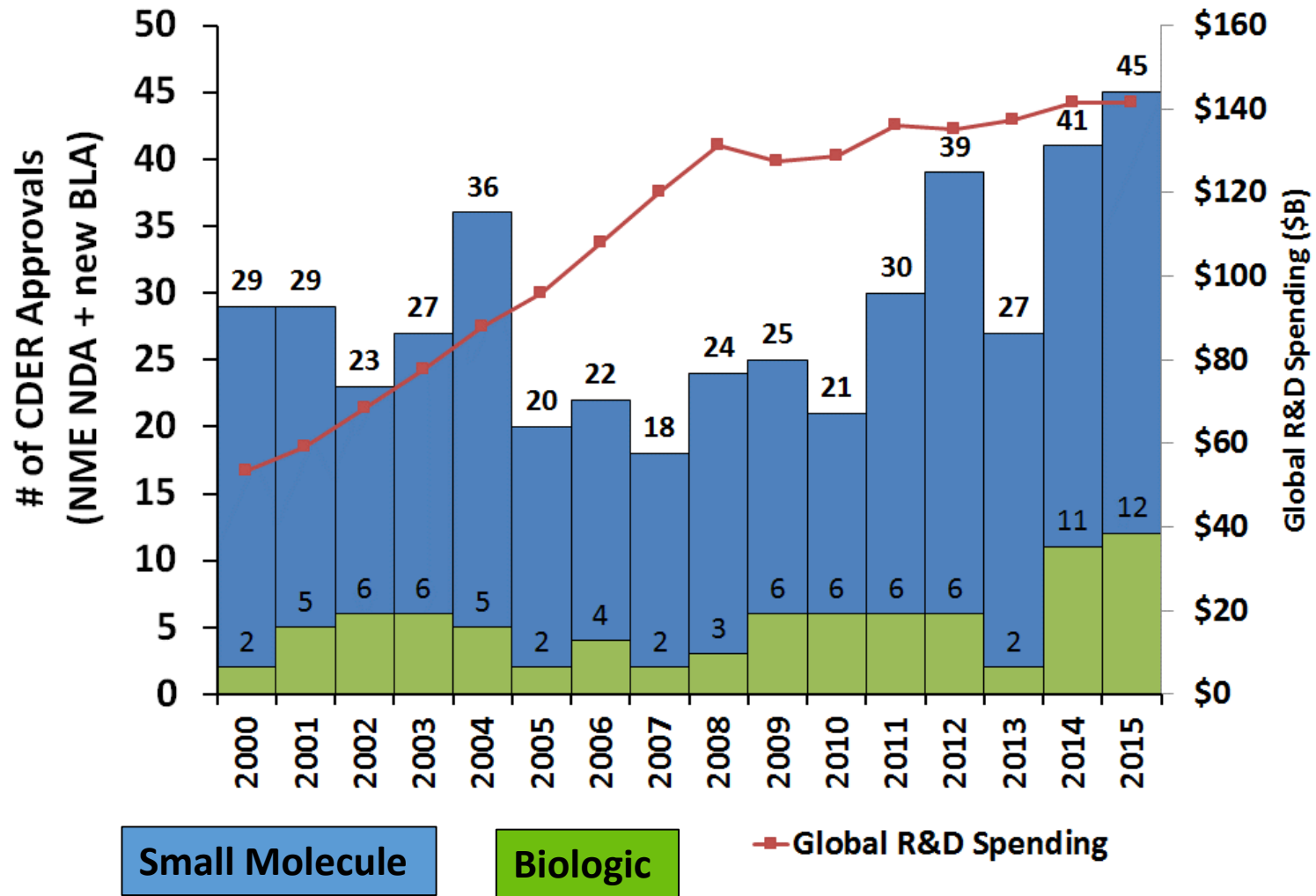
Senior Director, Industry Research & Policy Analysis

BIO

**Presented to members of the National
Conference of State Legislatures
June 2016**

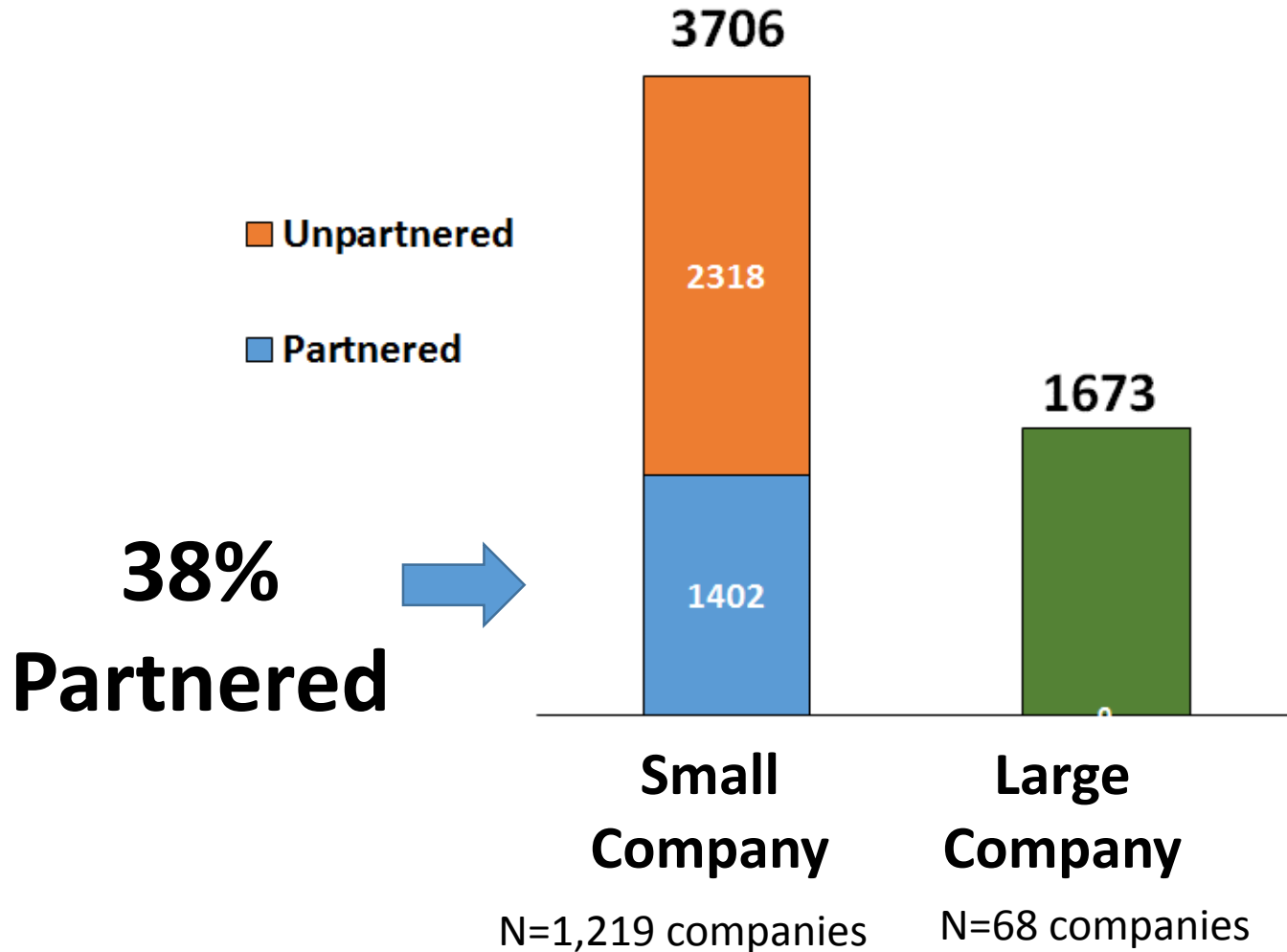


New FDA Drug Approvals



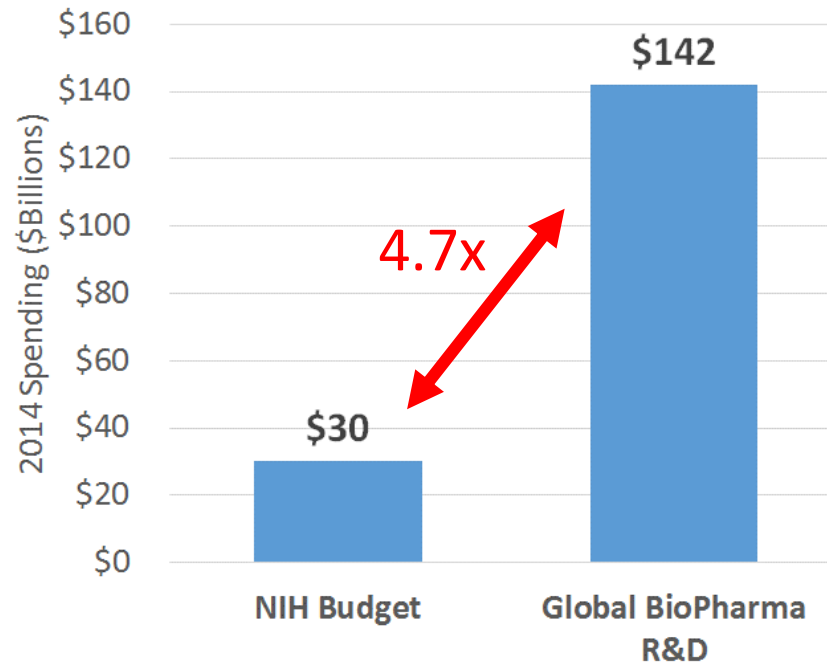
Global BioPharma Pipeline

- **5,393 clinical programs**
- **70% from small companies**

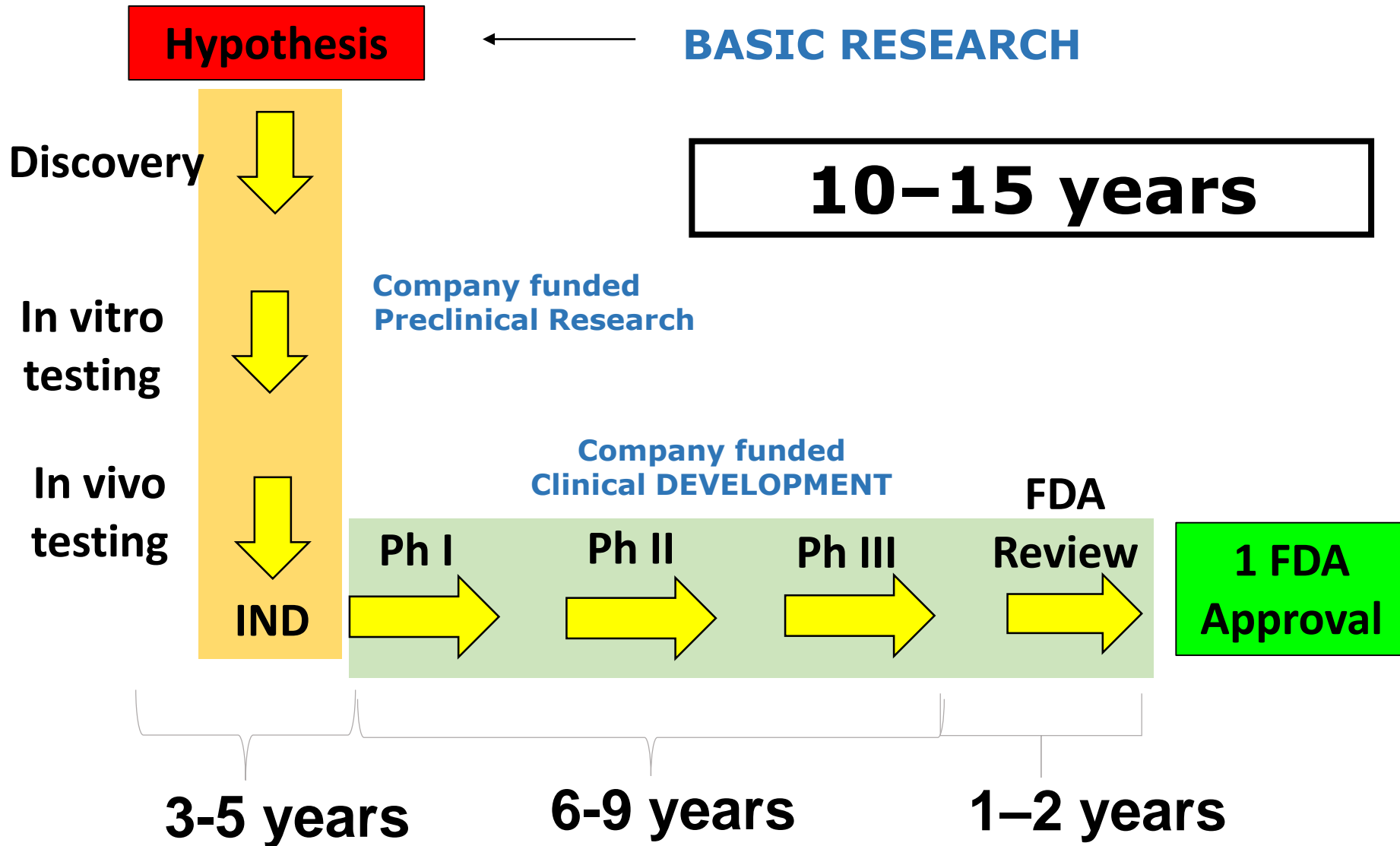


Perspective on R&D Spending

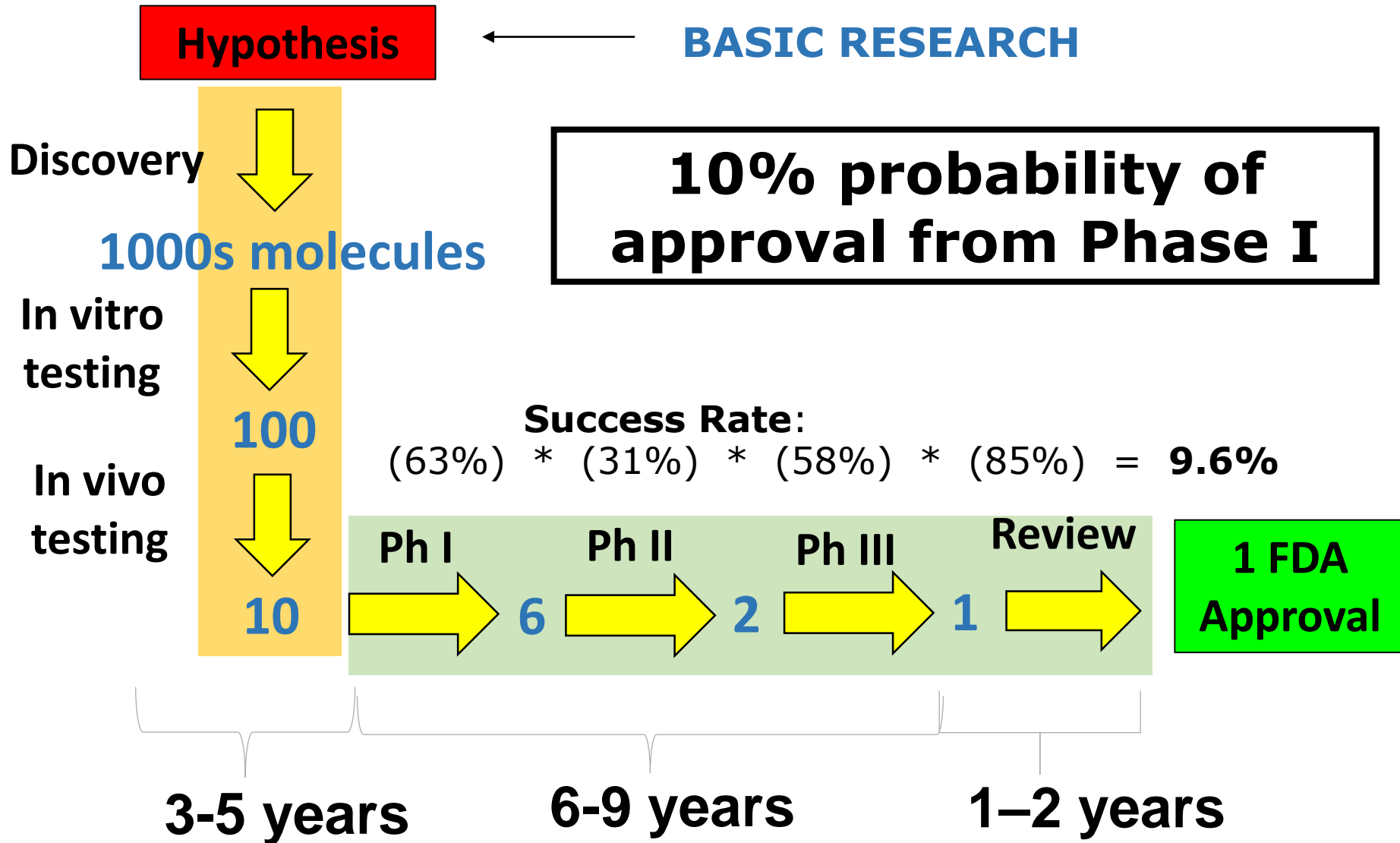
2014 Spending



Drug Development Timeline



Drug Development Timeline

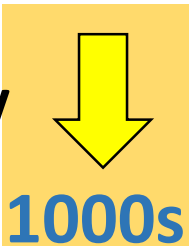


Drug Development Timeline

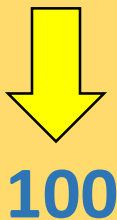
Hypothesis

BASIC RESEARCH

Discovery



In vitro testing

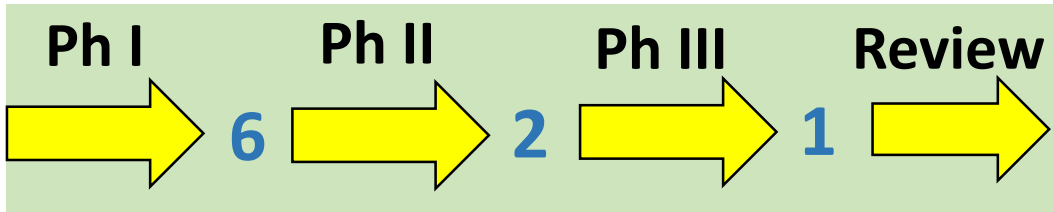


In vivo testing



Direct Cost: ~\$1-2 B
Capitalized Cost: \$2.6 B*

Cost Post-Approval: \$0.5B
for Phase IV & monitoring



3-5 years

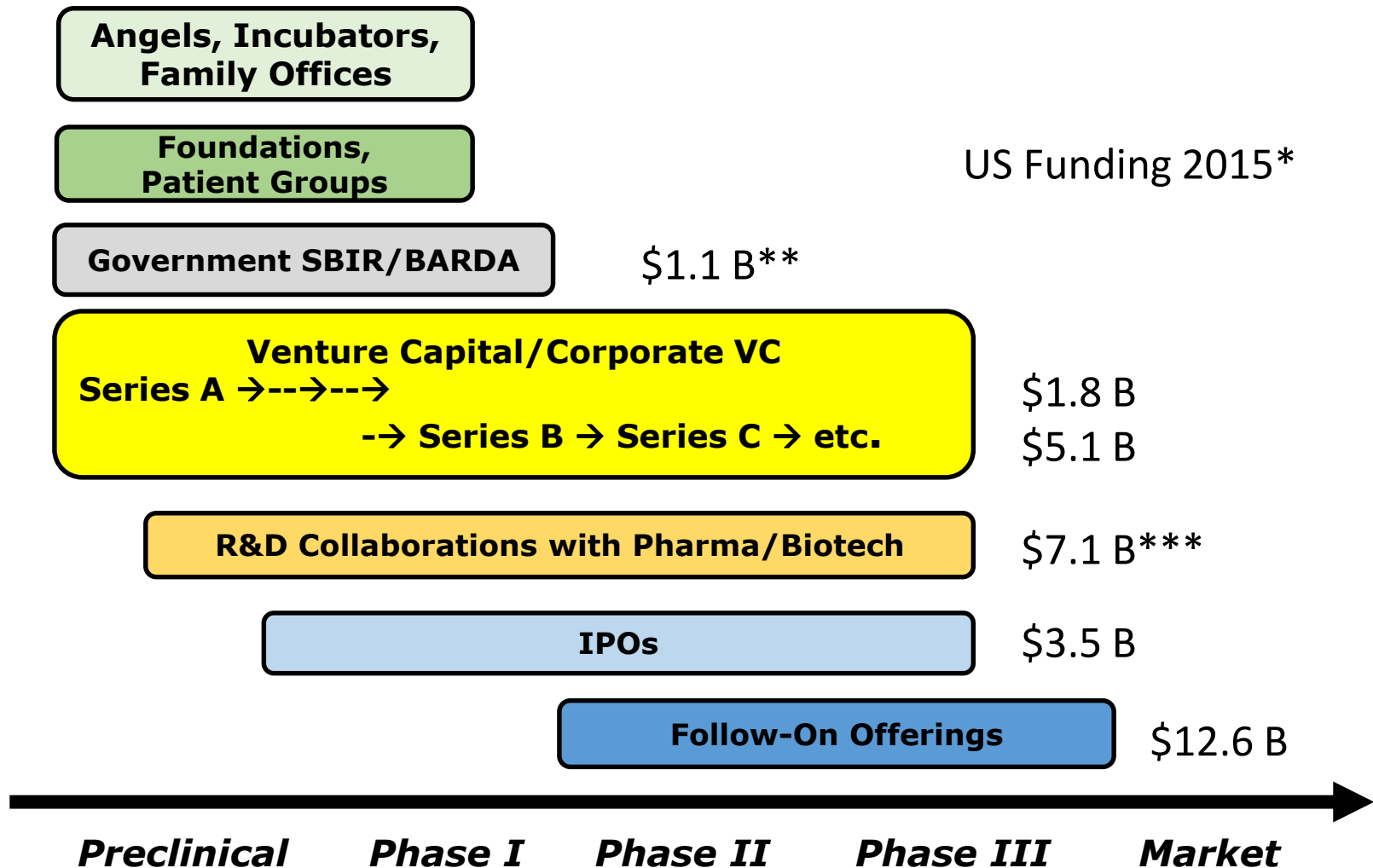
6-9 years

1-2 years

*Tufts, Journal of Health Economics, 2016
BIO Industry Analysis, January 2016



Biotech R&D Funding Sources



* US Emerging Therapeutic Companies only

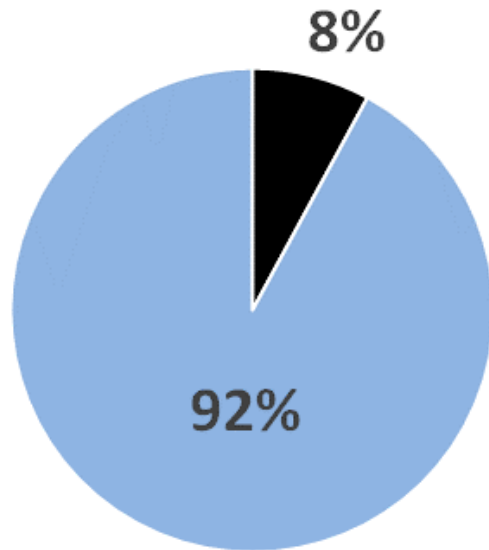
**2014: SBIR = \$677M, BARDA = \$415M

***Upfront Licensing Fees



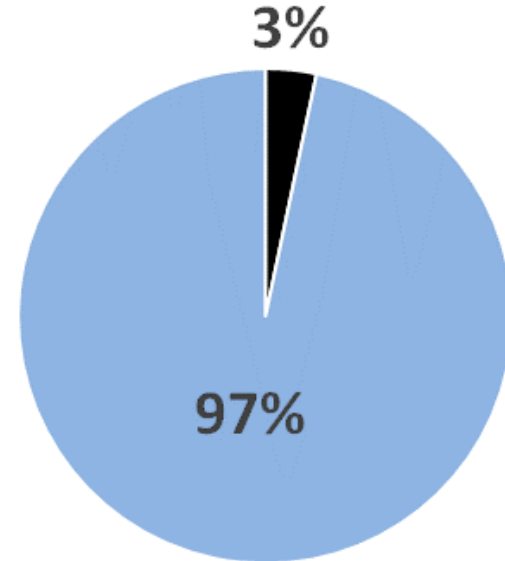
How Many Profitable Drug Companies in the US ?

Publically traded
therapeutic biotechs
N = 367



- Pos Net Income (from drug sales)
- Negative Net Income

Privately held
therapeutic biotechs
N = 1,080



- Market-Stage
- R&D-Stage (No product)

How Profitable are Drug Companies? (Sorted by Top 10 US Companies, ROE)

ROE = “Return on Equity”

Top 10 BioPharma rank #23

Industry	N	ROE
Financial Publishing/Services	10	44.8%
Information Technology Services	10	44.2%
Other Transportation	4	33.2%
Restaurants	10	32.9%
Automotive Aftermarket	10	32.9%
Home Improvement Chains	3	31.3%
Finance/Rental/Leasing	10	30.0%
Apparel/Footwear Retail	10	29.5%
Telecommunications Equipment	10	29.2%
Beverages: Non-Alcoholic	10	29.1%
Aerospace & Defense	10	27.5%
Airlines	10	25.3%
Air Freight/Couriers	10	24.6%
Chemicals: Agricultural	10	23.0%
Other Metals/Minerals	10	22.6%
Office Equipment/Supplies	9	22.3%
Trucks/Construction/Farm Machinery	10	22.3%
Household/Personal Care	10	22.0%
Packaged Software	10	21.0%
Food Retail	10	20.9%
Specialty Stores	10	20.8%
Chemicals: Major Diversified	8	20.8%
Top 10 Biopharma	10	20.5%

How Profitable are Drug Companies? (looking at the entire industry)

ROE = “Return on Equity”
BioPharma ranks #42

Industry	ROE
1 Financial Publishing/Services	44.8%
2 Other Transportation	33.2%
3 Automotive Aftermarket	32.9%
4 Home Improvement Chains	31.3%
5 Restaurants	31.2%
2 Beverages: Non-Alcoholic	29.1%
3 Telecommunications Equipment	28.8%
4 Information Technology Services	27.8%
5 Apparel/Footwear Retail	27.0%
6 Finance/Rental/Leasing	26.5%
7 Airlines	25.3%
8 Air Freight/Couriers	24.6%
9 Aerospace & Defense	24.4%
10 Chemicals: Agricultural	23.0%
11 Other Metals/Minerals	22.6%
12 Office Equipment/Supplies	22.3%
13 Household/Personal Care	21.9%
14 Trucks/Construction/Farm Machine	21.7%
15 Food Retail	20.9%
16 Packaged Software	20.8%
17 Chemicals: Major Diversified	20.8%
18 Beverages: Alcoholic	20.5%
19 Specialty Stores	20.1%
20 Cable/Satellite TV	19.7%
21 Containers/Packaging	19.5%

Industry	ROE
22 Media Conglomerates	19.4%
23 Railroads	19.4%
24 Other Consumer Specialties	18.8%
25 Insurance Brokers/Services	18.4%
26 Computer Processing Hardware	18.1%
27 Data Processing Services	18.0%
28 Discount Stores	17.8%
29 Semiconductors	17.2%
30 Apparel/Footwear	17.1%
31 Auto Parts: OEM	17.0%
32 Miscellaneous Manufacturing	16.5%
33 Building Products	16.3%
34 Industrial Specialties	16.3%
35 Industrial Machinery	16.1%
36 Major Telecommunications	16.1%
37 Medical Distributors	15.9%
38 Integrated Oil	15.6%
39 Oil Refining/Marketing	15.6%
40 Electrical Products	15.3%
41 Home Furnishings	15.3%
42 BioPharma Industry	15.1%

Highest Rate of R&D Reinvestment of any Industry

353 US Public BioPharma Companies
Rank #1 of 126 industries

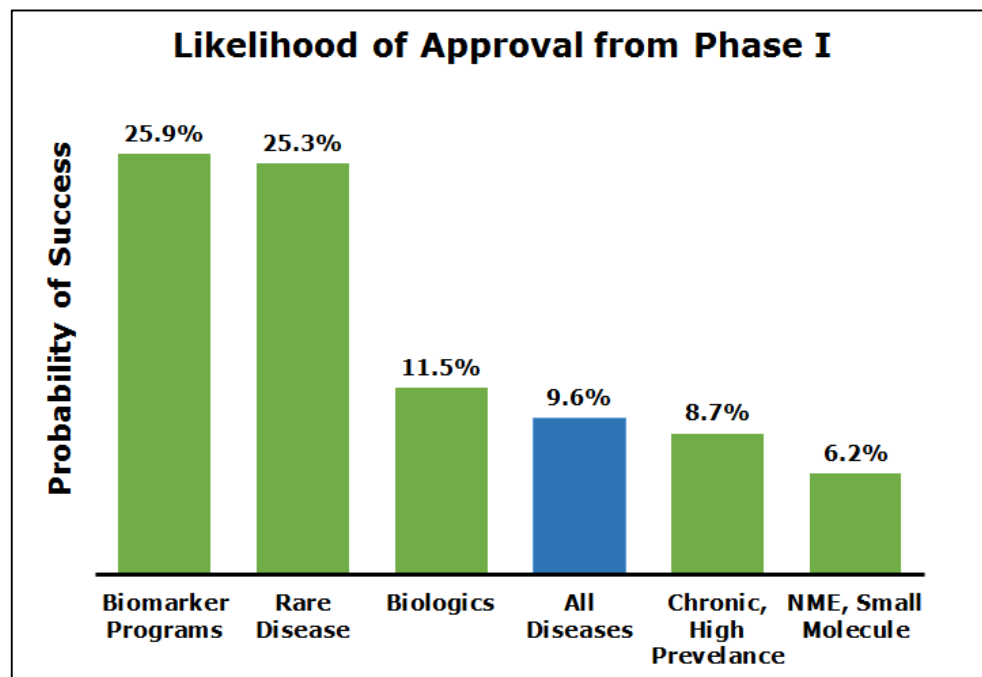
	Industry	% R&D of Sales
1	BioPharma Industry	19.4%
2	Semiconductors	18.0%
3	Electronic Production Equipment	17.8%
4	Internet Software/Services	15.5%
5	Computer Communications	14.3%
6	Packaged Software	14.0%
7	Computer Peripherals	11.3%
8	Internet Retail	9.1%
9	Electronic Equipment/Instruments	9.1%
10	Medical Specialties	7.0%
11	Recreational Products	6.6%
12	Telecommunications Equipment	6.0%
13	Information Technology Services	5.1%
14	Chemicals: Agricultural	5.1%
15	Motor Vehicles	4.8%
16	Electronic Components	4.2%
17	Textiles	3.9%
18	Electronics/Appliances	3.8%
19	Other Consumer Services	3.7%
20	Chemicals: Major Diversified	3.4%

On the Cusp of the Next Generation of Medical Breakthroughs

Immuno-oncology
Rare Disease

Gene Therapy & Cell Therapy
Next Generation Biologics

Precision Medicine



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