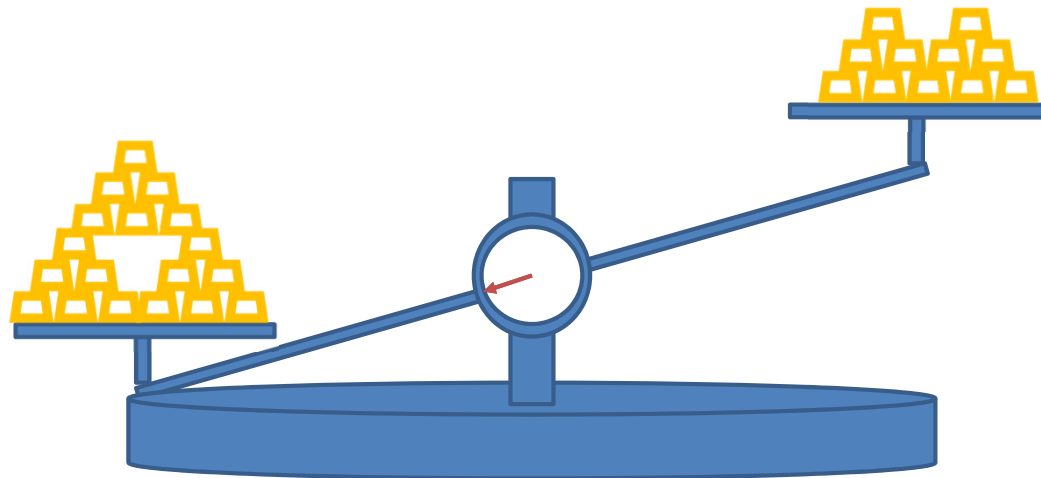
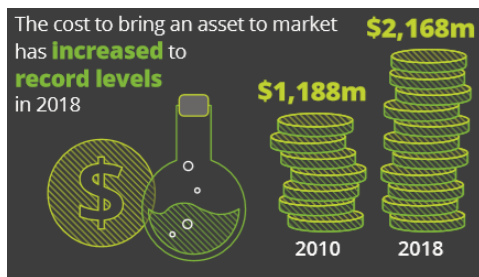
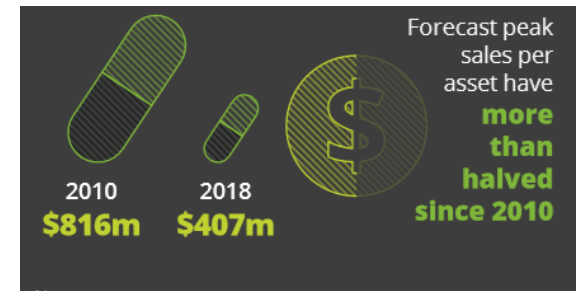
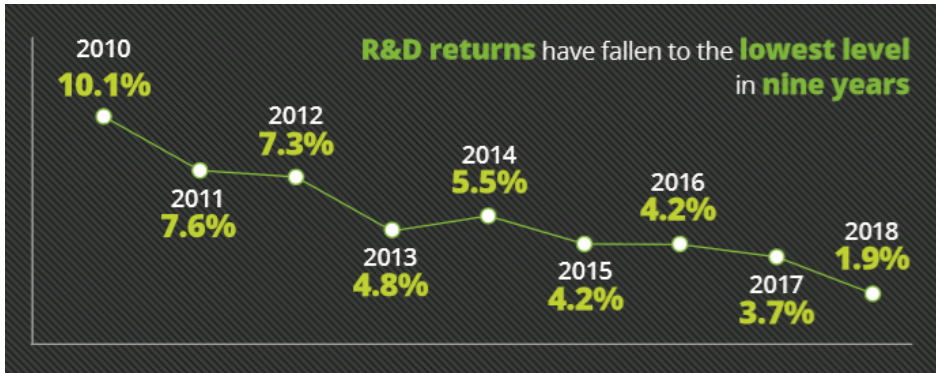


Opportunities and challenges creating novel therapeutics in today's environment

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Chief Business Officer
Recursion

2019 Translational Medicine Symposium
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The Pharmaceutical Industry as we know it has to change:



Yet money continues to flow into newcos as the market thirsts for innovation

- US healthcare venture fundraising reached a record \$9.6B, continuing a four-year upward trend.
- Venture investments increased 50 percent over 2017, setting a record.
- Biopharma dollar volume doubled that of 2017 and was 4x device and Dx/Tools volume in 2018

Series A investments, US and Europe 2016-2018

Series A Deals

US Deals	2016	2017	2018
Number of Investments	124	135	143
Total Series A Funding (\$M)	\$2,612	\$2,665	\$4,166
Corporate Investments (%)	31%	34%	24%
Europe Deals**	2017	2018	
Number of Investments	70	42	
Total Series A Funding (\$M)	\$867	\$658	
Corporate Investments (%)	29%	19%	

Why the continued investment?

- Pharmaceutical companies are faced with pressure to continue organic growth.
- Internal R&D efforts have not yielded enough fuel for the fire.
- Increased reliance on external innovation and earlier partnering
- Venture money (including Pharma Ventures) hopes to capitalize on this thirst by creating new assets.

“ We want First in class assets with an established Mechanism of Action”



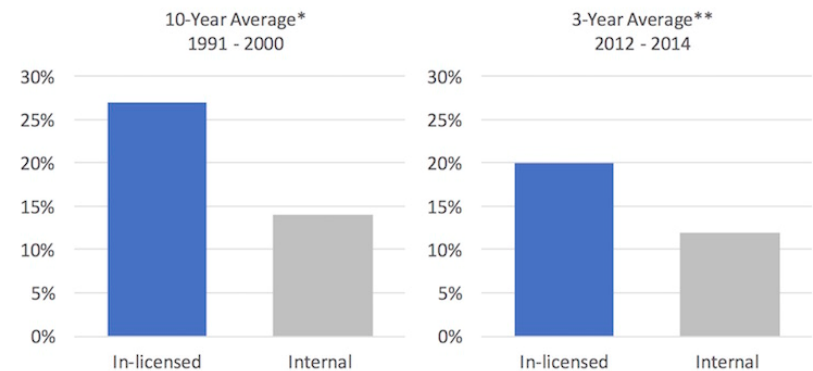
Challenge: New Target does not always translate into clinically (and commercially) differentiated product

One key is determining this as early as possible in the research program.

External R&D: Differential Clinical Success Rates

Internal programs vs externally-sourced (“In-licensed”) programs

Probability of Success from IND to Approval (%)



* Booth & Zemmel, "Prospects for Productivity", *Nature Reviews Drug Discovery* 3, 451-456 (May 2004)
** Smetana, K. et al. "Trends In Clinical Success Rates" *Nature Reviews Drug Discovery*, 15, 379-380 (2016)

What are hot areas trending today?

Oncology, Oncology, Oncology.
(has Immunooncology peaked?)

Neuroscience on a big upswing.

Rare Disease

Antinfectives.

Platforms to “Drug the Undruggable”

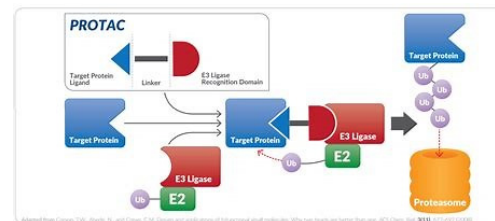
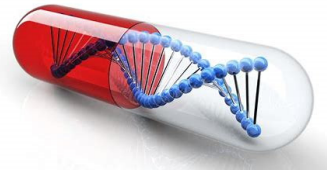
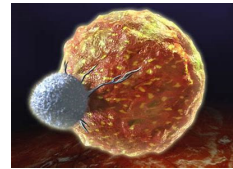
- Gene and Cell Therapy
- Degraders
- synthetic lethality
- protein-protein interactions

Others:

- Fibrotic disease
- Pain

Slowing?

- Microbiome
- Antirheumatics



Series A by Indication – US and Europe Deal Counts (Dollars \$M Invested)

	2016	2017	2018
Oncology	\$1,310 44	\$1,077 56	\$1,296 49
Platform	\$339 18	\$457 26	\$945 27
Neurology	\$368 19	\$278 19	\$612 27
Orphan/Rare Disease	\$276 13	\$618 22	\$640 16
Anti-Infective	\$122 7	\$309 17	\$114 10

New targets and programs are great, but are they really addressing the core issue facing the Industry?

Novel agents are certainly needed, but if the path to market for these programs doesn't change, the current unsustainable model won't change.

Solutions?

Increased focus on translational research plans

Genetically validated targets through national genomic/phenomic consortia

- Amgen acquisition of DeCode Genetics
- Genomics Medicine Ireland
- Genomics England
- Finngen



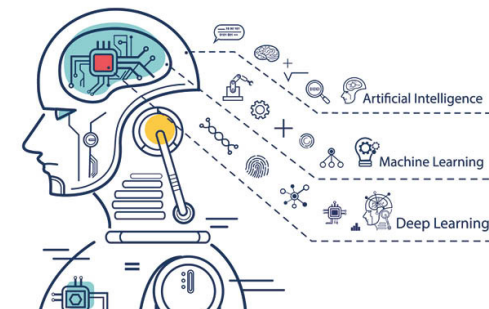
Risk Sharing Partnerships and consortia

- Pfizer/Lilly anti-NGF
- Dementia Discovery Fund
- Accelerating Medicines Partnership



Artificial Intelligence

- Clinical Trial Design
- Accelerating Research



“Necessity is the mother of invention”

-Unknown