

The background features abstract, overlapping geometric shapes in various shades of blue, ranging from light sky blue to deep navy blue. The shapes are primarily triangles and polygons, creating a dynamic, modern aesthetic. The text is centered on a white background that is partially framed by these blue shapes.

Trends in BioTech overview and environment for US-Japan transactions

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Akiko Futamura, Ph.D.

President & CEO, InfiniteBio

outline

Introduction to Trends in BioTech

- ▶ Investment trends
- ▶ Political/regulatory aspect
- ▶ Technology breakthrough

Difference between Japan and US and environment for US-Japan transactions

Trends in biotech investment

Investment key words/ buzz words and examples

- ▶ Immunotherapy (Juno therapeutics IPO was the largest IPO raising \$265M in Dec. 2015)
- ▶ Genome editing (Caribou Biosciences raised \$30 M in series B, May 2016)
- ▶ Personalized medicine (Foundation Medicine, Roche's \$1B investment in 2015)
- ▶ Alzheimer's disease (Denali Therapeutics raised \$217 M, May 2015)
- ▶ Microbiome (EpiBiome supported by Illumina Accelerator)
- ▶ Rare disease (Spark Therapeutics raised \$161M in IPO, Jan 2015)

Innovations supported by mega pharmaceuticals

- ▶ JLABS, J&J Innovation group by Johnson & Johnson

IPO trends

2013 50 IPOs

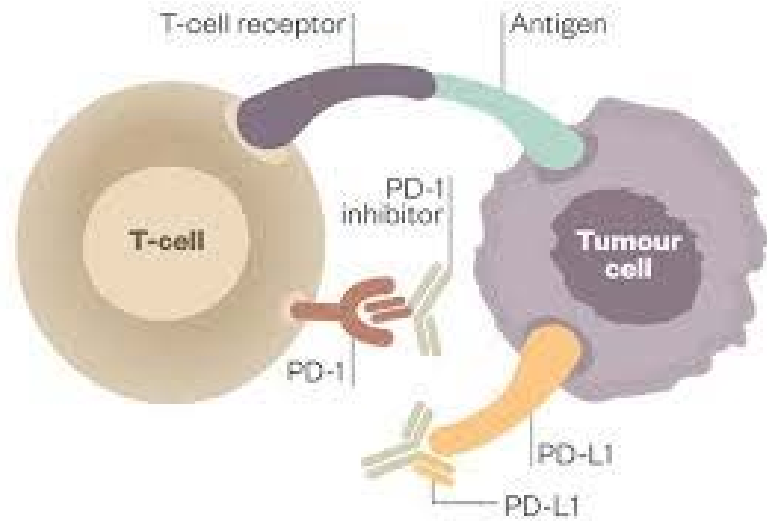
2014 81 IPOs

- ▶ Ultragenyx Pharmaceutical (rare disease) \$122M
- ▶ Avalanche Biotechnologies (gene therapy) \$102M
- ▶ Kite Pharma (immuno therapy) \$128M
- ▶ Juno Therapeutics (immune therapy) \$265M

2015 41 IPOs

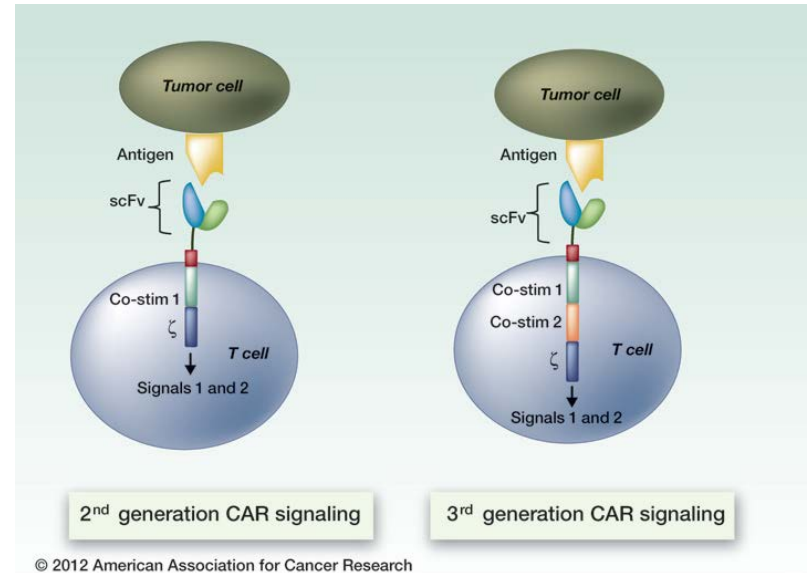
- ▶ Spark Therapeutics (gene therapy) \$161M
- ▶ Aduro Biotech (immune therapy) \$119M

Immuno oncology



Key players

- Ono Pharmaceuticals
- BMS
- Merck
- Roche....

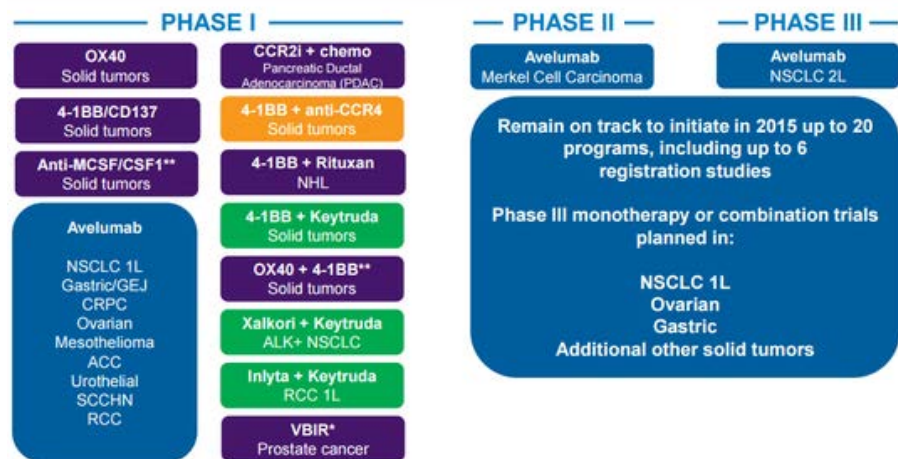


Car-T related companies

- Juno Therapeutics
- Kite Pharma
- Bluebird Bio

Immuno oncology is driving competition, collaborations and M&A

Pfizer's Immuno-Oncology Pipeline



* Study start expected in 2015
 ** Study start expected in 2016

■ NMEs & Novel combinations
 ■ Avelumab studies co-development with Merck KGaA, Darmstadt, Germany

■ Merck & Co collaboration
 ■ Mogamulizumab combination with Kyowa Hakko Kirin



Notable partnerships:

- Kite Pharma-Amgen, Genentech, Bluebird Bio
- Juno Therapeutics-Celgene
- Bluebird bio - Celgene
- AstraZeneca- Eli Lilly

Political/ regulatory aspect of biotech

Precision medicine/ personalized medicine

- ▶ Obama's initiative provided \$125M funding to obtain data, create the database and modernize regulation



FDA

- ▶ Breakthrough Therapy Designation and other fast track approval process have been implemented
- ▶ Growing emphasis on personalized medicine and biomarker

Drug pricing pressure from presidential candidates

I am with
Hillary and
Bernie on drug
pricing



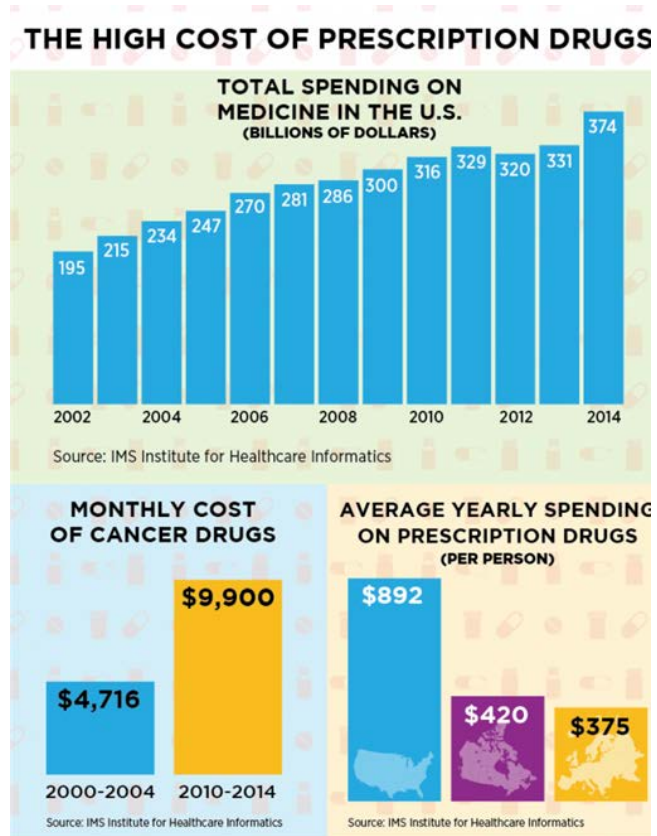
Government
should
negotiate the
drug pricing



American tax
payers should
not have to
pay the
highest drug
price



Cost effectiveness of drugs debate



How to evaluate “cost effectiveness” of drugs?

- ▶ Gilead’s Harvoni
\$115,000 per patient with drug
- ▶ Without Harvoni, there is the cost for increased fibrosis, liver failure, and transplantation (and of course hospitalization)
- ▶ Harvoni will “cure” the disease
- ▶ How about cancer drugs?

Technology breakthrough

Advancement of Genome-related technologies

Genome editing : CRISPR/Cas and other variants

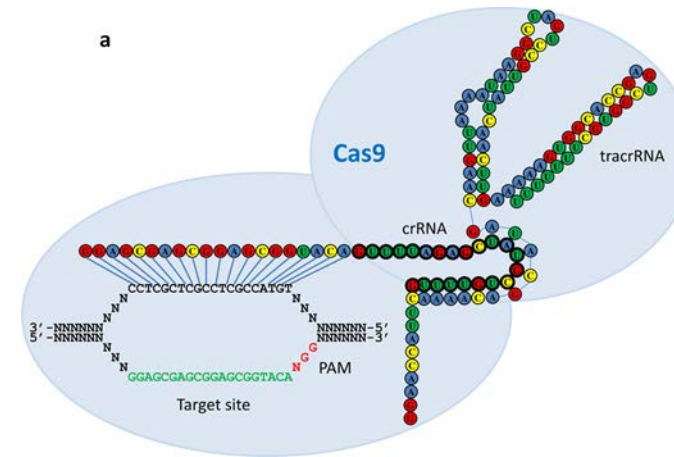
▶ Useful as research tool and as therapeutics

Cost of sequencing: NGS and beyond

Other technologies

Single cell analysis

Machine learning, big data ...



US Japan deal-making environment

- ▶ Market size
- ▶ Immunotherapy M&A
- ▶ Emphasis on innovation by large companies
- ▶ Regenerative Medicine leadership in Japan

Astellas— acquisition of Ocata therapeutics

Fujifilm - acquisition of Cellular Dynamics

