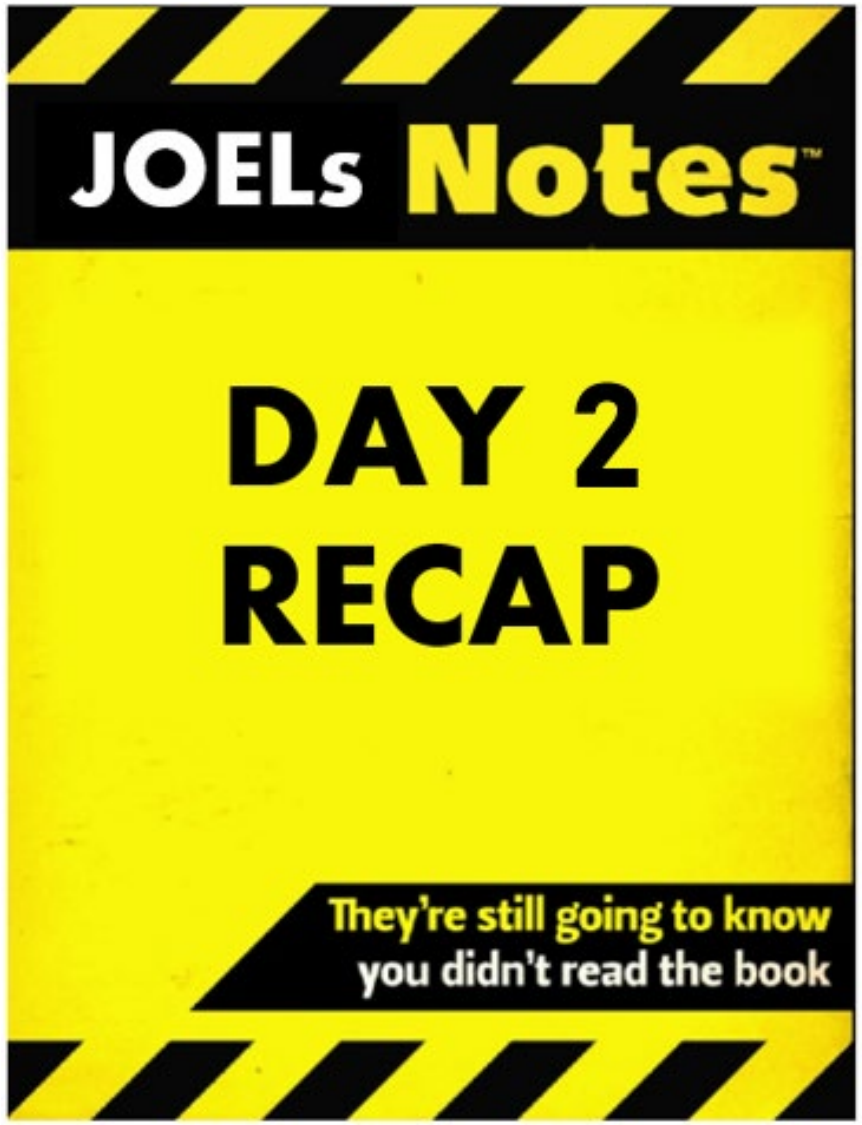
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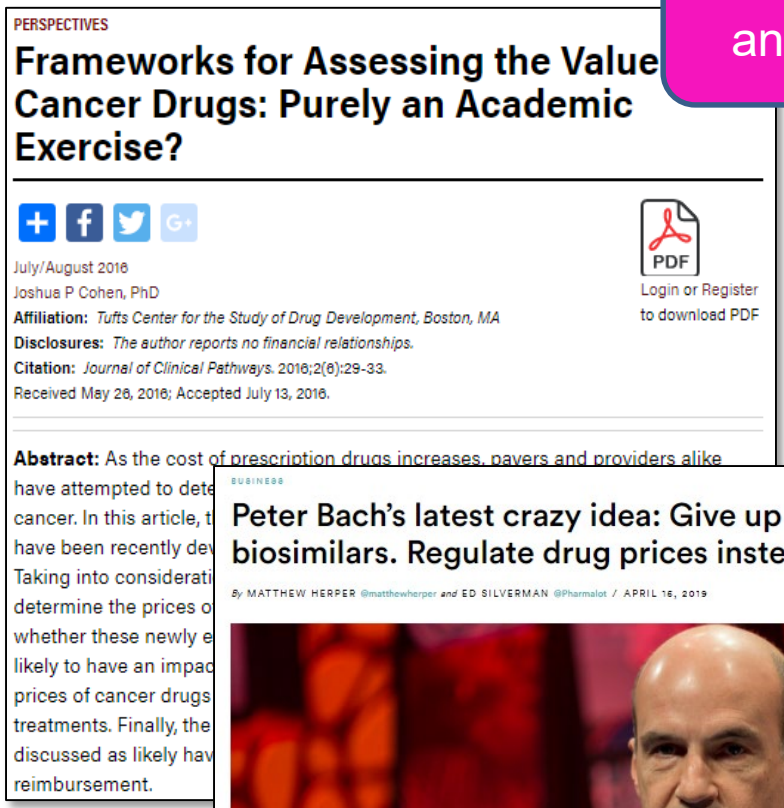
DAY 2
RECAP
They're still going to know
you didn't read the book

Panel #5: Payer/Access Panel

Ed Saltzman (moderator), Peter Bach, Roger Longman, Burt Zweigenhaft

- Special conditions required for a market to be competitive (e.g. lack of barriers to entry, perfect substitutes, etc.) rarely exist in cancer. Therefore, there's a significant divergence between drug price and clinical value.
    - Since market forces do not effectively regulate prices as they do in other consumer industries, value-based frameworks and post-exclusivity price regulations are needed to close the gap between price and value.
- A lively debate ensued discussing the effectiveness of value-based contracts, such as outcomes-based contracts, to regulate prices.
    - Often outcomes-based contracts negotiate net discounts that are not sizeable relative to the uncertainty in performance, lower approval bars, etc. It could be more effective to reduce post-exclusivity drug prices to that of its' marginal cost-of-production via policy regulation.
- However, value-based contracts (VBC) are moving towards shifting risk onto manufacturers, rather than patients (e.g. Lentiglobin VBC - 20% upfront payment, 80% payment if treatment reduces # of transfusions) in an attempt to associate value with performance.
- In order to address accessibility to drugs, which is different from coverage, cost pressures must be understood from the patient perspective. Companies should understand the total cost of care delivery (supportive case, infusions, etc.) and plan for patient support services to increase access.

Ed or analyst/AC



PERSPECTIVES

Frameworks for Assessing the Value of Cancer Drugs: Purely an Academic Exercise?

July/August 2016
Joshua P Cohen, PhD
Affiliation: *Tufts Center for the Study of Drug Development, Boston, MA*
Disclosures: *The author reports no financial relationships.*
Citation: *Journal of Clinical Pathways.* 2016;2(6):29-33.
Received May 26, 2016; Accepted July 13, 2016.

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Abstract: As the cost of prescription drugs increases, payers and providers alike have attempted to dete
cancer. In this article, t
have been recently dev
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likely to have an impac
prices of cancer drugs
treatments. Finally, the
discussed as likely hav
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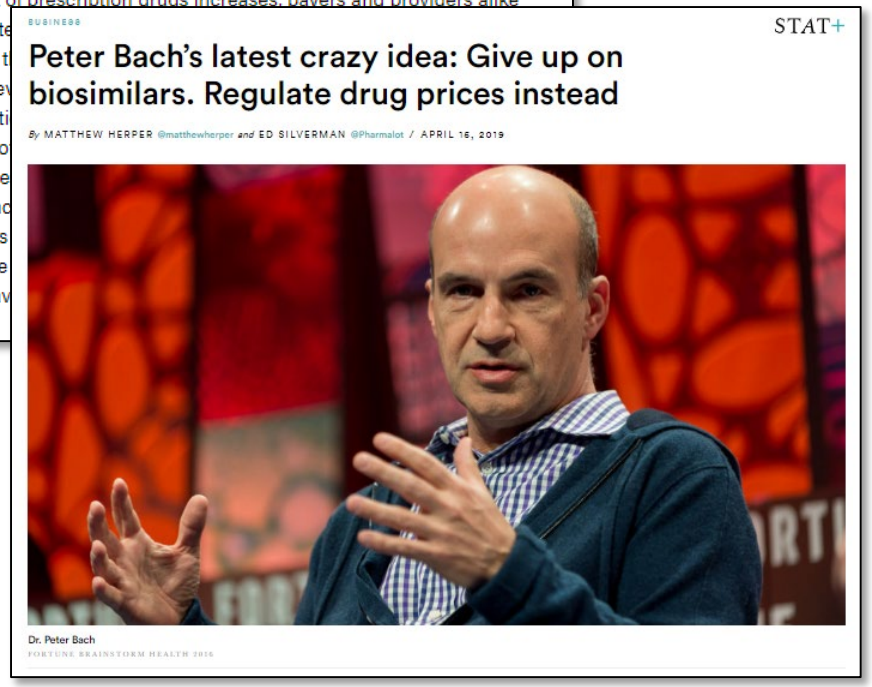


BUSINESS

STAT+

Peter Bach's latest crazy idea: Give up on biosimilars. Regulate drug prices instead

By MATTHEW HERPER @matthewherper and ED SILVERMAN @Pharmalot / APRIL 16, 2019

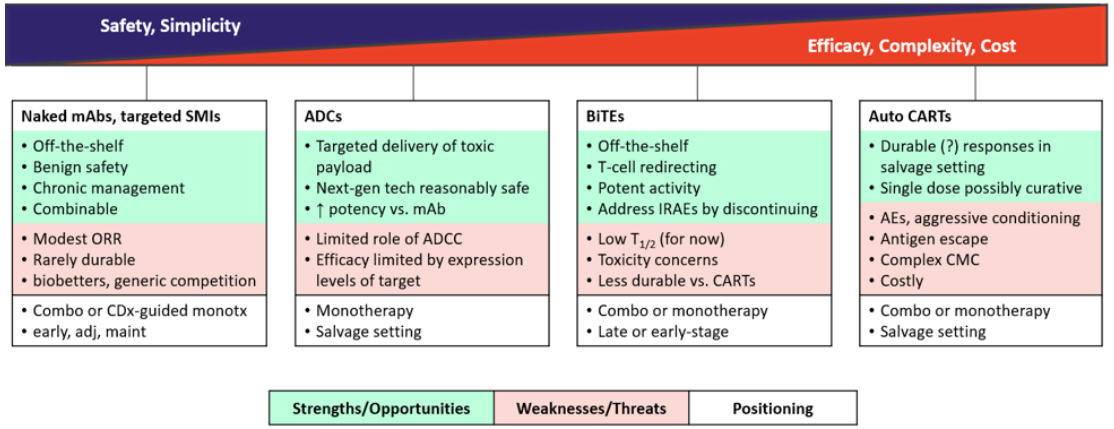
Dr. Peter Bach
FORTUNE BRAINSTORM HEALTH 2016

Panel #6: IO Session II: IO Targets and Platforms - Target Versus Modality - What Are the Keys to the Kingdom?

Joel S. Sandler (moderator), Frank Borriello, Louis Matis, Eric Poma, Dan Shoemaker

- The diversity of modalities (cell-based, biologics) has dramatically increased in the past few decades, with emergence of technologies along a risk-benefit spectrum.
- Target selection must be considered within the context of modality properties to achieve optimal alignment (e.g. anti-CD19 and -BCMA CARTs vs. anti-CD20 mAbs).
- Lead programs comprised of novel modalities should be de-risked with incorporation of validated targets.
- Panelists agreed that initial positioning must be focused on addressing white space, though next-wave modalities could ultimately supplant the entrenched SoC.
- TAA-based targeting or effector-cell redirecting regarded as an effective means to de-risk and facilitate biomarker-guided patient selection, though at the possible expense of antigen escape and associated resistance over time.

Modalities Positioned Along a Spectrum of Risk and Benefit



Finding the Optimal Target-Modality Pairing

- E.g. α-CD20 mAbs vs. α-CD19 CARTs in NHL
- Key considerations include:
  - Expression pattern (on- vs. off-tumor targeting)
  - Target biology (immunogenicity, oncogenicity)
  - Turnover rate and mechanism
  - Presence, types of proximal effector cells (warm vs. cold tumors)
  - IP, CMC, and other logistical considerations

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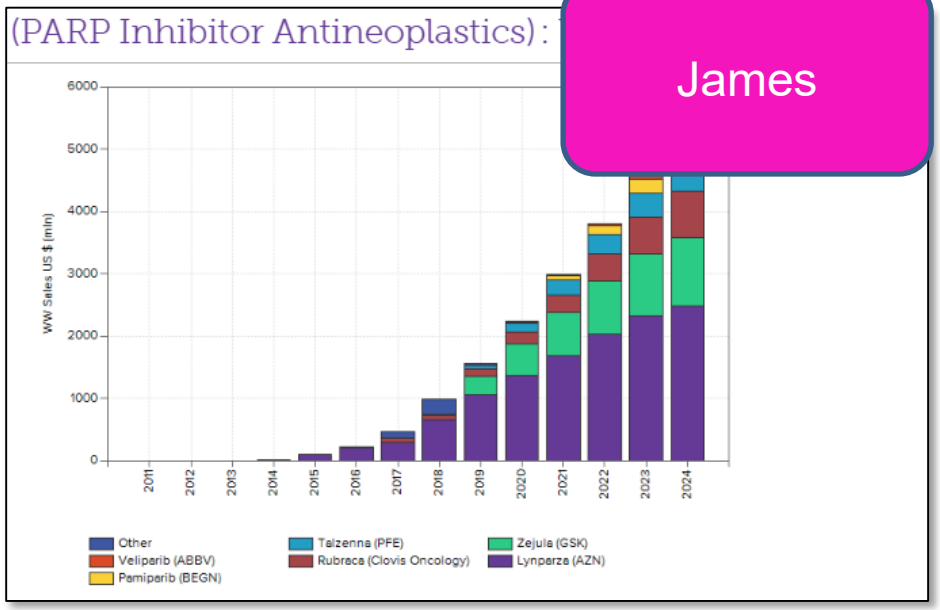
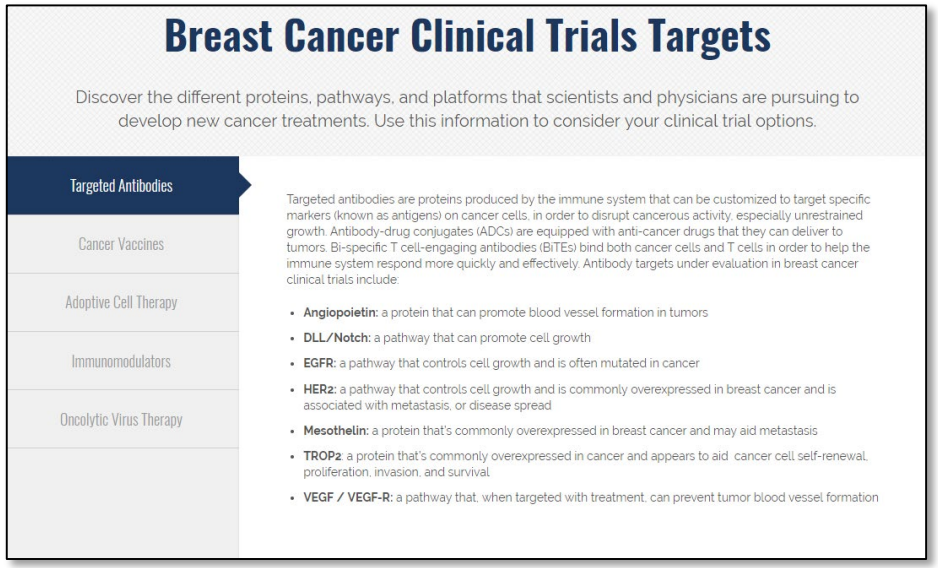
Panel #7: Gynecological & Breast Cancers, Much Progress, Much to Do: How Novel Therapies from PARPs to Immunotherapies Are Transforming Care

James T. Lee (moderator), Brian Leyland Jones, Martin Lehr, Patrick Mahaffy, Dmitriy Zamarin

- In light of the approvals of PARP inhibitors and immunotherapies, there is still a significant unmet need in gynecological and breast cancers.
- Largest hurdle that is yet to overcome is finding a way to treat those that do not respond to the current therapeutics, which is still a large percentage of TNBC and HR+BC refractory to CDK4/6 inhibitors.
- Significant issues exist in identifying novel targets that will work in ovarian cancer, driven by the unique nature of the disease where driver mutations are less frequent and even when new targets are identified, it is difficult to validate in vivo.
- The future may be identifying the optimal combination partners with both PARP inhibitors and immunotherapy, but could end up being a very empirical exercise vs a more thoughtful one.

James





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Panel #8: Biotech Deal-Making in the Face of IO Frenzy or Fatigue: Same Old or Different New?

Jeffrey M. Bockman (moderator), Jean Chang , Jane Dancer, Kapil Dhingra, Helen Tayton-Martin, Jill O'Donnell-Tormey

- Over the past 4 years Immuno-Oncology (IO) deal-making has been at the forefront of Oncology partnerships, with most of the top 10 deals in cancer by upfronts being for IO licensing or M&A
- Despite the pace and size of deals slowing in light of high-profile stumbles (e.g. IDO inhibitors), there is a continued hunger for IO assets, novel MOAs and modalities; so, the question must be raised as to how deal-making is changing, or needs to change in the future.
- Biotechs face a challenge in weighing the investment in a deal versus further validating their programs to inflect value.
- Discussion of more innovative deals being done biotech-to-biotech rather than biotech-pharma ensued; not a new BD mantra but, perhaps newer to IO.
- Questions remain on how to control the proliferation of thinly differentiated CPI's and 'me-too' programs, while simultaneously maintaining competition to drive down cost.
- How do we make sure that great programs are not lost that may be transformative or only simply alternatives that can be important for giving patients more options?

Jeff

2015: IO Started to Dominate Top

Top 10 Deals by Upfront Value ($M): 2015

Rank	Company	Deal Partner/ Product Source	Product	Phase			
1	Celgene	Juno Therapeutics	JCAR017	Phase 1/2			
2	Sanofi	Regeneron Pharmaceuticals	REGN2810	Phase 1			
3	Celgene	AstraZeneca	Durvalumab	Research			
4	Medivation	BioMarin Pharmaceutical	Talazoparib	Phase 3	410	160	570
5	Bristol-Myers Squibb	Five Prime Therapeutics	FPA008	Phase 2	350	1,390	1,740
6	Novartis	GlaxoSmithKline	Arzerra S.C.	Phase 3	300	734	1,034
7	AstraZeneca	Innate Pharma	Monalizumab	Phase 2	250	1,025	1,275
8	Novartis	Aduro Biotech	MIW815	Preclinical	250	500	750
9	Celgene	Nurix	Celgene-Nurix Immuno-oncology Program	Research	150	405	555
10	Bristol-Myers Squibb	Bavarian nordic	Prostvac	Phase 3	140	835	975

Top 10 Deals by Total Value ($M): 2015

Rank	Company	Deal Partner/ Product Source	Product	Phase	Upfront*	Milestones	Total
1	Amgen	Xencor	Anti CD3 X CD38 MAb Program	Preclinical	45	1,700	1,745
2							
3							
4							
5							
6							
7							
8							
9							
10							

2017: Upfronts in IO Drop, More Backloading – Maturing Vision?

Top 10 Deals by Upfront Value ($M): 2017

Rank	Company	Deal Partner/ Product Source	Product(s)	Phase	Upfront*	Milestones	Total (Upfront + Milestones)
1	Merck	AstraZeneca	Lynparza, Selumetinib with PD-L1/PD-1 inhibitors	Marketed	1,600	6,150	7,750
2	Ipsen	Merrimack	Onivyde	Marketed	575	450	1,025
3	Celgene	BeiGene	BGB-A317	Phase 2	413	980	1,393
4	Bayer	Loxo	Larotrectinib	Phase 2	400	1,200	1,600
5	J&J	Genscript	LCAR-B38M	Phase 1/2	350	Undisclosed	350
6	TerSera	AstraZeneca	Zoladex	Marketed	250	70	320
7	Incyte	MacroGenics	MGA012	Phase 1	150	750	900
8	Bristol-Myers	Halozyme	Multiple	NA	105	1,760	1,865
9	Eli Lilly	CureVac	Multiple	Preclinical	103	1,700	1,803
10	Jazz Pharmaceuticals	ImmunoGen	IMGN632, IMGN779	Phase 1	75	Undisclosed	75

Top 10 Deals by Total Deal Value ($M): 2017

Rank	Company	Deal Partner/ Product Source	Product(s)	Phase	Upfront*	Milestones	Total (Upfront + Milestones)

2019: A Sudden Flip or a Blip – More Upfronts But Least Total Value IO Deals of Past 5 Years (Only 50%!)

Top 10 Deals by Upfront Value ($M): 2019

Rank	Company	Deal Partner/Product Source	Product(s)	Phase	Upfront	Milestones	Total (Upfront + Milestones)
1	BMS	Celgene	Multiple	Multiple	35,000	N/A	74,000
2	Eli Lilly	Loxo Oncology	Multiple	Multiple	7,234	N/A	7,234
3	Ipsen	Clementia Pharmaceuticals	Palovarotene	Phase 3	1,000	263	1,263
4	GSK	Merck KGaA	Bintrafusp alfa	Phase 2	343	3,870	4,214
5	Genentech	Adaptive Biotechnologies	Off-the-shelf TCR cell therapies	Preclinical	300	2,000	2,300
6	Merck	Immune Design	Multiple	Multiple	248	N/A	248
7	Aurobindo Pharma	Spectrum Pharma	Multiple	Multiple	160	140	300
8	Genentech	Xencor	IL-15 antibodies	Preclinical	120	340	460
9	AbbVie	Tizona Therapeutics	TTX-030 and CD39 programs	Preclinical	105	N/A	>105
10	AbbVie	TeneoBio	TNB-383B	Preclinical	90	N/A	90>

Top 10 Deals by Total Value ($M): 2019

Rank	Company	Deal Partner/Product Source	Product(s)	Phase	Upfront	Milestones	Total (Upfront + Milestones)
1	BMS	Celgene	Multiple	Multiple	35,000	N/A	74,000
2	Eli Lilly	Loxo Oncology	Multiple	Multiple	7,234	N/A	7,234
3	GSK	Merck KGaA	Bintrafusp alfa	Phase 2	343	3,870	4,214
4	NJCTTQ	Abpro	Multiple	Preclinical	N/A	4,000	4,000
5	Genentech	Adaptive Biotechnologies	Off-the-shelf TCR cell therapies	Preclinical	300	2,000	2,300
6	Ipsen	Clementia Pharmaceuticals	Palovarotene	Phase 3	1,000	263	1,263
7	Jazz Pharma	Codiak Biosciences	Multiple Exosome Programs	Preclinical	56	1,020	1,076
8	Celgene	Triphase Accelerator	TRPH-395	Preclinical	40	940	980
9	Takeda	LegoChem Biosciences	Undisclosed ADC Targets	Preclinical	7	404	411
10	Aurobindo Pharma	Spectrum Pharma	Multiple	Multiple	160	140	300

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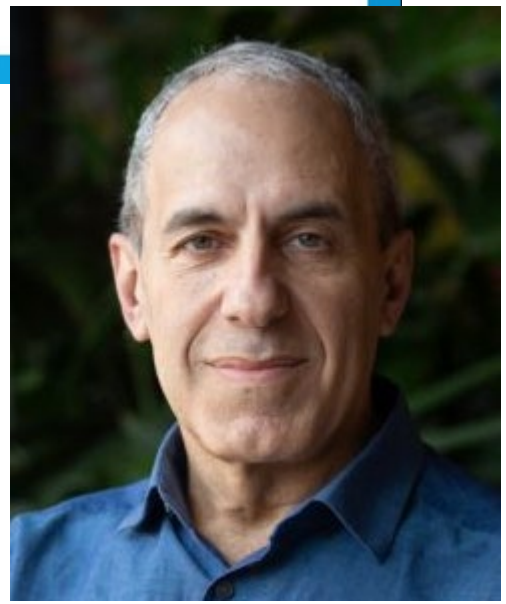
The Biden Cancer Initiative: Helping to build the cancer research and care system you think we already have

Speaker: Gregory C. Simon, President, Biden Cancer Initiative

Analyst/AC

- There is a distinct lack of organization in the healthcare system. Due to its impervious nature, the system has not accepted reforms and improvements in decades. For example, the transition from chronic medications to now curative treatments is raising huge debates since the system itself was not designed for cures.
- The scientific discovery process is highly isolated between labs, becoming more of a competition, rather than a group effort to advance cancer therapeutics.
    - The Biden Cancer Initiative is taking steps towards promoting research data sharing, along with clinical and medical record sharing. Investigators have extreme biases and knowledge solely on their research, but not what is happening outside their labs and in patients. Along with lack of crucial data sharing, a great portion of published data is yet to be successfully replicated.
- Drug pricing is based on pharma's fear of the future market, while insurance companies worry about the present events impacting their revenue.
    - Pharma has immense capital invested in their drugs, and the emergence of competitors in the market forces pharma to frontload their costs onto the price of the drug. Insurance companies cannot hedge their costs the way pharma does.
- Copays for cancer drugs are destroying the patients future. They force patients into choosing between bankruptcy or treatment. Questions arise now on how to help patients avoid these costs when they have zero economic power on the drug market.
- How do we organize the healthcare system such that patients are at the center of attention?



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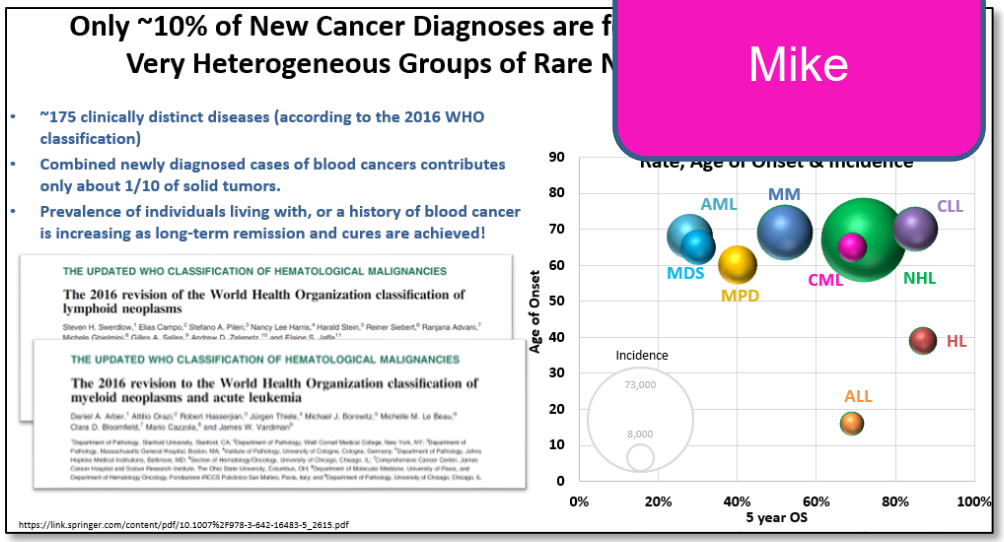
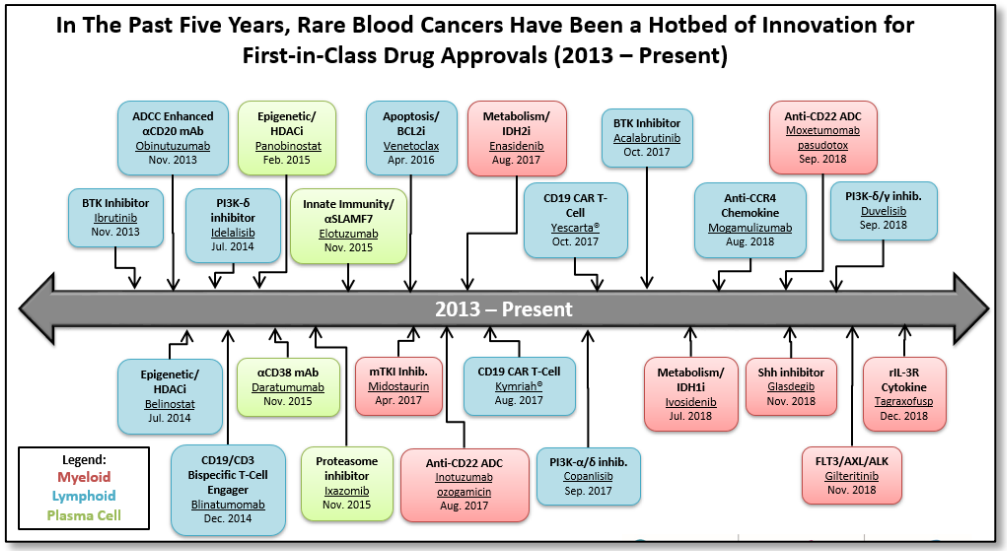
Panel #9: Insights from Heme Malignancies: Making Breakthrough Conventional and Unconventional Therapies Accessible Beyond Niche Blood Cancer Patients

Michael C. Rice (moderator), Chris Bowden, Lee Greenberger, Dan Shoemaker, Vatnak Vat-Ho

- XX

Mike





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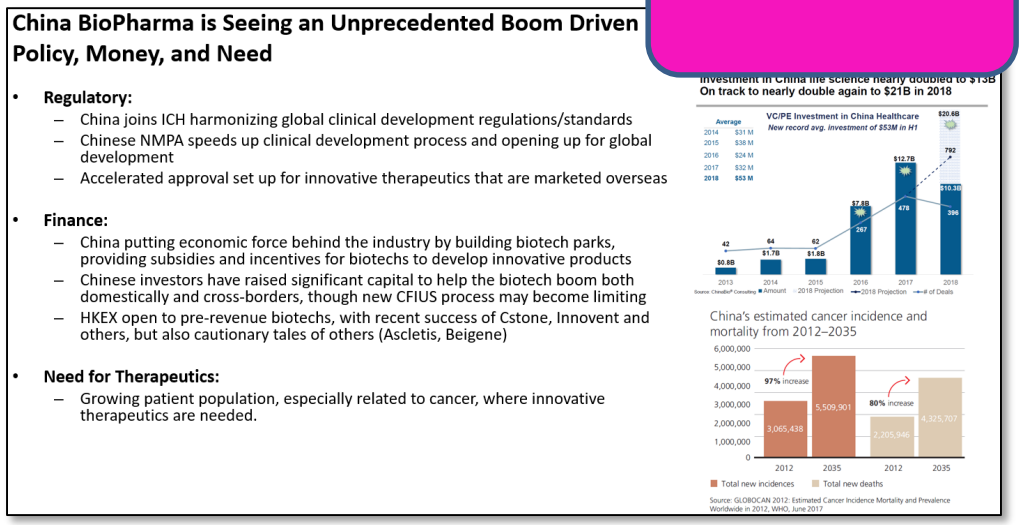
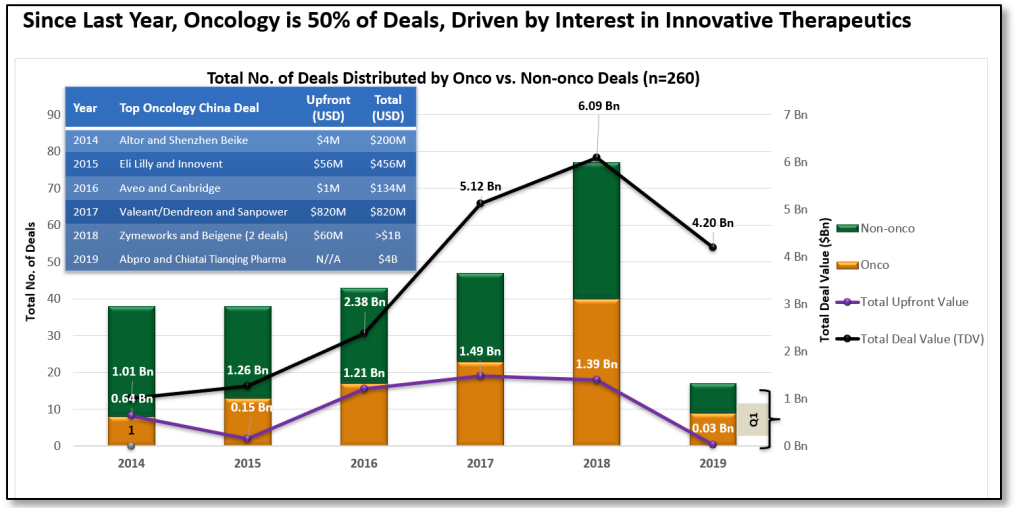
Panel #10: Oncology Innovation Powered by Investments and Competition from China

James T. Lee (moderator), Iris Luo, Ian Somaiya, Ian Woo, Jack Wu

- Significant investments in oncology are coming out of China, from the investors and biotechs, driving competition and valuation in many assets leading to bidding wars on hot innovative oncology assets in the West.
- The interest in China as both a source of dilutive and non-dilutive funds has led many Western companies to form their China strategy on how to engage Chinese companies/firms.
- Conversely, Chinese biotechs are striving to expand their portfolio in China and also globally, and with the recent regulatory changes and financial incentives in building the portfolio with near-term de-risked assets, China is generating significant interest in Western companies that have a new set of partners to align with.
- The duality of the cross-border investments/dealmaking is making China front and center and not to be ignored by the global pharmaceutical and biotech industry.

James





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