Oncology investment & partnering trends – today and tomorrow

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May 9th, 2019
Agenda

• Setting the pace for 2019
• Licensing trends and Top 10 Deals
• Competitive landscape
• M&A deals
• The rest of the year
• Biopharma VC Funding Trends
• Oncology VC Funding Trends
• IPOs
• BIO Investor Event Partnering Landscape
• Q&A /Closing
Q4 2018-Q1 2019: Setting the pace for the year

- Oncology captured 42% of deal activity in 2018
- Continuing to see volume and large deals in 2019
- Most deal activity occurs in first and last quarter
- Last two quarters have seen a flurry of “mega deals”
- What does this mean for the year to come?

from Cortellis 2018 Biopharma Deals & Portfolio Review
Oncology deals in the last two quarters

Oncology Deals, Q4 2018-Q1 2019

Oncology Drug Deals, Q4 2018-Q1 2019

Data from Cortellis Deals Intelligence
Oncology drug licensing activity
Oncology drug licensing deals, Q4 2018-Q1 2019

Oncology Deals by Clinical Phase

- Discovery
- Preclinical
- Phase 1 Clinical
- Phase 2 Clinical
- Phase 3 Clinical
- Launched

Avg Size
Volume

AZ deal with Daiichi Sanyko
$6.9B, HER2 ADC

Data from Cortellis Deals Intelligence
Top Phase II deals
Oncology drug licensing deals, Q4 2018-Q1 2019

- 3 of the Phase II deals of the last 2Q are >$1B
  - 2 have an Orphan Drug designation
  - 50% of the Phase II deals are Orphan Drugs
    - 1 Breakthrough, 2 Fast Track
  - 12.5% of the Phase III deals are Orphan Drugs
    - 2 Fast Track

>1B Phase II Licensing Deals

Data from Cortellis Deals Intelligence
Predicted Success Rates of the top Phase II Deals

Forecasts from Cortellis Analytics: Drug Timeline & Success Rates module
Competitive landscape by indication
Oncology drug licensing deals, Q4 2018-Q1 2019

Drug Licensing Volume by Indication

Avg Deal Size by Indication

NB: some drugs address >1 indication

Data from Cortellis Deals Intelligence
Competitive landscape by drug type
Oncology drug licensing deals, Q4 2018-Q1 2019

Licensing Volume by Drug Type

- Monoclonal antibody: 45%
- Small molecule: 16%
- Cell therapy: 10%
- Cancer vaccine: 7%
- Multispecific antibody: 3%
- Antibody drug conjugate: 2%
- Multispecific fusion protein: 2%
- Other biologic: 10%

Avg Deal Size by Drug Type

- Multispecific fusion protein: $2,000
- Antibody drug conjugate: $2,000
- Multispecific antibody: $1,750
- Other biologic: $700
- Cancer vaccine: $700
- Cell therapy: $700
- Small molecule: $700
- Monoclonal antibody: $700

Data from Cortellis Deals Intelligence
Multispecific fusion protein deals
Oncology drug licensing deals, Q4 2018-Q1 2019

- GSK to license Merck’s *bintrafusp alfa*: $4.2B
  - Anti-PD-L1 antibody (avelumab) fused to TGFβR extracellular domain
  - Currently 16 trials ongoing: Phase I and Phase II (CRC, breast, pancreas, lung)

- LG Chem to license Cue Biopharma’s **CUE-101/2** molecules: $1.1B
  - Recombinant IL-2 fused to peptide/MHC complex
  - In preclinical testing, $400M in milestones
  - LG retain right to name next peptide for development

- Amgen to license Molecular Partner’s **MP-0310**: $547M
  - DARPin family (designed ankyrin repeats)
  - Has one FAP and two CD137-binding domains, “bead on a string”
  - In preclinical testing
Top 10 licensing deals of the last 2Q
Oncology drug licensing deals, Q4 2018-Q1 2019

Data from Cortellis Deals Intelligence
Drug discovery platforms
Oncology drug licensing deals, Q4 2018-Q1 2019

• The top 4 deals in discovery phase are for drug discovery platforms
  • **$4.0B**: Nanjing Chia Tai Tianqing licenses Abpro’s antibody discovery and engineering platforms (multivalent binders)
  • **$2.3B**: Genentech licenses Adaptive Biotechnologies’ TruTCR screening platform to discover TCRs directed against tumor neoantigens
  • **$1.75B**: Gilead licenses Tango Therapeutic’s CRISPR-based target discovery platform with an option on 5 targets
  • **$1.38B**: Roche licenses SQZ Biotech’s cancer vaccine discovery platform (antigen-loaded APCs)

(All of these are Immuno-oncology)
M&A Deals
Oncology M&A deals, Q4 2018-Q1 2019

• 38 M&A announced over this period
• 6 had values >$1B
  • **BMS** announced intention to acquire **Celgene** for $74.0B
    • I/O pipeline: CAR-T program (Orphan Drugs)
  • **Eli Lilly** announced intention to acquire **Loxo Oncology** for $8.0B
    • Precision medicine, driver mutations
  • **Ethicon** announced intention to acquire **Aurus** for $5.75B
    • Lung cancer diagnostics medical device
  • **GSK** announced intention to acquire **TESARO** for $5.1B
    • I/O pipeline: PD-1, LAG-3, TIM-3; PARP inhibitor
  • **Boston Scientific** announced intention to acquire **BTG** for $4.3B
    • Drug delivery (drug eluting beads); launched anti-cancer small molecules
  • **Novartis** announced intention to acquire **Endocyte** for $2.1B
    • I/O pipeline: CAR-T; radioligand therapy

Data from Cortellis Deals Intelligence
Competitive Landscape: Companies
Oncology M&A and licensing deals, Q4 2018-Q1 2019

Top 10 Oncology Buyers, Q4 2018-Q1 2019

Data from Cortellis Deals Intelligence
What to expect for the rest of the year

- What will we see more of this year?
  - Discovery platforms for novel targets and neoantigens
    - CRISPR revolution, bioinformatics, machine learning
  - Multispecific drugs and new technologies for creating them

"Neoantigen" appearing in Scientific Literature

Preclinical & Discovery Stage Licensing in Oncology
Inflation-adjusted to 2018

Data from PubMed.gov

Data from Cortellis Deals Intelligence
Continuing to see more from I/O

I/O Deals, Licensing & M&A
Inflation-adjusted to 2018

Data from Cortellis Deals Intelligence

Business Development and Finance
Immuno-oncology Investment: Building Biology
1:00 PM–2:15 PM Jun 3, 2019
107AB, Level 100
Biopharma Venture Capital Funding Trends
More funding flowing into fewer companies
## U.S. Venture Capital Funding by Disease Area
(Amounts in millions USD)

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<thead>
<tr>
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<td><strong>TOTAL</strong></td>
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<td><strong>$4,286</strong></td>
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<td><strong>$4,484</strong></td>
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<td><strong>$5,970</strong></td>
<td><strong>$7,879</strong></td>
<td><strong>$12,328</strong></td>
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</tbody>
</table>

*Data above reflects U.S. therapeutic companies
Source: BIO Industry Analysis, Cortellis Competitive Intelligence
U.S. Therapeutic Company VC Funding by Disease Area

*Data above reflects U.S. therapeutic companies
Source: Cortellis Competitive Intelligence, BIO Industry Analysis
U.S. Therapeutic Company VC Funding by Series

*Data above reflects U.S. drug & delivery companies
Source: Cortellis Competitive Intelligence, BIO Industry Analysis
U.S. Oncology: Investment Decade Trend

*Data above reflects U.S. companies only

Source: Cortellis Competitive Intelligence, BIO Industry Analysis

BIO’s 5th Annual Emerging Therapeutic Company Investment and Deal Trends Report released at end of May!

*Data above reflects U.S. companies only
U.S. Oncology: Venture Funding Trend by Novelty

New Drug R&D: Innovative, unique, and potentially disease-modifying agents for diseases with current unmet medical need.

Drug Improvement R&D: New delivery methods/formulations, or using approved drugs for new indications

*Data above reflects U.S. oncology therapeutic companies
Source: Cortellis Competitive Intelligence, BIO Industry Analysis
In 2018-1Q 2019, investment has increasingly focused on larger investments flowing into a smaller number of companies.

*Data above reflects U.S. oncology therapeutic companies
Source: Cortellis Competitive Intelligence, BIO Industry Analysis
U.S. Oncology: Venture Capital Funding by Phase

*Data reflects U.S. therapeutic oncology companies
Source: Cortellis Competitive Intelligence, BIO Industry Analysis
Q1 2019 Oncology IPOs

<table>
<thead>
<tr>
<th>Company</th>
<th>Amount (USD)</th>
<th>Research Focus</th>
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<tbody>
<tr>
<td>Gossamer Bio</td>
<td>$276M Priced</td>
<td>Oncology, immunology, inflammation</td>
</tr>
<tr>
<td>Anchiano Therapeutics</td>
<td>$35M Filed</td>
<td>Gene therapy for bladder cancer</td>
</tr>
<tr>
<td>Poseida Therapeutics</td>
<td>$115M Priced</td>
<td>CAR-T for solid tumors and hematological malignancies</td>
</tr>
<tr>
<td>TCR2 Therapeutics</td>
<td>$75M Priced</td>
<td>T-cell therapies for hematologic cancers and solid tumors</td>
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<tr>
<td>Harpoon Therapeutics</td>
<td>$75.6M Priced</td>
<td>I/O: T-cell engagers that leverage immune system to treat cancer and other disease</td>
</tr>
<tr>
<td>Precision BioSciences</td>
<td>$126.4M Priced</td>
<td>Gene editing platform to treat cancer and cure genetic disease</td>
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</table>

Source: BioSpace 2019 Life Science IPOs
<table>
<thead>
<tr>
<th>Company</th>
<th>Amount (USD)</th>
<th>Research Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle Therapeutics</td>
<td>$86.25M</td>
<td>Filed Multiple oncology targets</td>
</tr>
<tr>
<td>Codiak BioSciences</td>
<td>$86.25M</td>
<td>Filed Exosome tx in I/O and ID</td>
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<td>Hookipa Biotech</td>
<td>$84M</td>
<td>Priced Immunotherapies for cancers and ID</td>
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<tr>
<td>IDEAYA Biosciences</td>
<td>$70M</td>
<td>Filed Precision medicine targeting oncogenetic pathways and synthetic lethality</td>
</tr>
<tr>
<td>NextCure</td>
<td>$86.25M</td>
<td>Filed Immunomedicines for cancer</td>
</tr>
<tr>
<td>Peloton Therapeutics</td>
<td>$115M</td>
<td>Filed Modulating HIF-2-α for cancer and other diseases</td>
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<tr>
<td>Turning Point Therapeutics</td>
<td>$166.5M</td>
<td>Filed Targeted oncology therapies, largely in NSCLC and advanced solid tumors</td>
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</table>

Source: BioSpace, 2019 Life Science IPOs
2018 BIO Investor Forum: Meetings by Root Therapeutic Area

Neoplasm
Neurological Disease
Infectious Disease
Immune Disorder
Cardiovascular Disease
Inflammatory Disease
Gastrointestinal Disease
Endocrine Disease
Dermatological Disease
Respiratory Disease
Hematological Disease
Metabolic Disorder
Degeneration
Psychiatric Disorder
Ocular Disease
Musculoskeletal Disease
Genitourinary Disease
Genetic Disorder
Surgical Procedure
Nutritional Disorder

Source: BIO One-on-One Partnering™
98% of preclinical assets were unpartnered—ripe for opportunity!

2018 BIO Investor Forum: Assets by Phase

2018 BIO Investor Forum: Assets by Type

Source: BIO One-on-One Partnering™
2019 BIO CEO & Investor Conference: Meetings by Root Therapeutic Area

- Neoplasm
- Neurological Disease
- Inflammatory Disease
- Gastrointestinal Disease
- Hematological Disease
- Infectious Disease
- Immune Disorder
- Endocrine Disease
- Respiratory Disease
- Dermatological Disease
- Psychiatric Disorder
- Cardiovascular Disease
- Metabolic Disorder
- Genitourinary Disease
- Genetic Disorder
- Ocular Disease
- Degeneration
- Gynecology and Obstetrics
- Musculoskeletal Disease
- Injury

Source: BIO One-on-One Partnering™
2019 BIO CEO & Investor Conference Assets

**Assets by Type**
- Small molecule
- Antibody, protein, peptide
- Antisense, RNA
- Cell therapy
- Gene therapy
- Vaccine
- Antibiotic
- Drug delivery
- Medical Device
- Other
- Formulation
- Generics, Biosimilar
- Molecular diagnostics

**Assets by Phase**
- On market
- Registered
- Pre registration
- Phase 3
- Phase 2
- Phase 1
- Preclinical testing
- Lead discovery/optimization
- Target identification/validation

Source: BIO One-on-One Partnering™
What to Expect in 2019

- Large VC investments in a smaller number of companies
- Focus on immune therapies, especially in oncology
  - Allogeneic immune treatments
- More unicorns (Alector, Gossamer, who next?)
Partnering Best Practices
The Power is in the Profile

*Use Your Company Profile to Show*

- Clinical trial successes
- Geographic areas of interest
- In v. out-licensing intention
- Partner type sought (commercialization, geographic distribution, etc.)
- Scientific milestones

*Use Potential Partner’s Profile to Evaluate*

- Clinical trials
- Deal history and types
- Financials/investors
- Relevant assets and match potential
- Therapeutic areas and indications of focus
The Proof is in the Personalization

- At BIO 2018, over 2/3 of meeting requests that were declined had generic subject lines:
  - Meeting request
  - Introduction at BIO
  - Meet with (company name)
  - Collaboration

- Over ¾ of meeting requests that were accepted & scheduled had targeted subject lines:
  - Ph2 clinical stage first-in-class anti-FGFR3 antibody in metastatic bladder cancer
  - Interest in your compound AAA-001 in Phase II – In silico clinical trials
Thank you!

Q & A
More questions? Contact us

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Willie Reaves
WReaves@BIO.org
Forward-Looking Statements

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