Innovative Pharmaceutical R&D in China: Status and Trends

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Founder, President and CEO
Suzhou Yabao Pharmaceutical R&D Company

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Innovative R&D Boom

- Robust public and private funding
- Smoothed investment exit pathway, including new Hong Kong IPO market for biotechs
- Increasing start-up activity
- CFDA regulatory reform
- A diverse talent pool and well-developed infrastructure
Recent CFDA Regulatory Reform

OBJECTIVE

- Solving the backlog of registration applications
- Encouraging innovation, and improving quality of generic drugs
- Improving quality and transparency of review and approval

REFORM

- Personnel expansion
- Clinical data verification
- Registration classification
- Priority review
- MAH
- Joining ICH

ACHIEVEMENT

- Dramatical change in the numbers of INDs and ANDAs filed with CFDA
- 40 NDA approvals in 2017, compared to 9 in 2016
- Accelerated regulatory approvals for innovative drugs, targeting no delay versus US/EU
- Priority review and accelerated regulatory approvals (e.g. NDA review time for AstraZeneca’s Osimertinib was 1.5 months, compared to previous average timeline of 5.3 years)
Distribution of Innovative R&D

Domestic Public Pharmas

Biomedical Science Parks (~500)

Source: CBCA
Growing R&D Spending by Large Domestic Pharmas

R&D Spending of the TOP 10 Domestic Public Pharmas in 2016

R&D Spending of HengRui since 2010 (M, USD)

Source: Corporate annual reports
bioBay: A Best Pharmaceutical Innovation Cluster

- Within bioBay located in SIP (Suzhou Industrial Park, a district of Suzhou City), there are 437 resident companies (as of March, 2018)
- Total INDs approved by CFDA
  - 61 Small molecule drugs
  - 20 Biologics
- Total medical device certificates obtained
  - 34 Manufacturing certificates
  - 256 Product registrations
  - 15 CE certifications
  - 1600+ Invention patents
- SIP: There are >1,000 companies
Emerging Leading Service Providers

Chengdu Hi-Tech Industrial Development Zone

- DNA-encoded library technology for small molecule drug discovery
- Partners including MSD, Pfizer, J&J, Boehringer Ingelheim, Takeda, etc.

Wuxi Hi-Tech Industrial Development Zone

- An integrated service provider for discovery, development and manufacturing of biologics
- FDA-approved commercial manufacturing
- Partners including 13 of the TOP 20 MNCs
- Listed on Hong Kong in June 2017; Market value: >10 billion USD
Key numbers in 2017 vs 2016:

- New VC/PE funds raised – doubled to $40B
- VC investment – doubled to $12B
- Partnering deals – doubled to $8B
- M&A activity – tripled to $65B
- IPOs – record 53 IPOs raising $5B

These numbers were close to those in US

Source: ChinaBio
Emerging Leading Biotech Companies

**BeiGene**
- In-house discovery, with programs out-licensed to Merck Serono and Celgene
- Focused on oncology
- Listed on Nasdaq in 2016
- Market value: ~$9B

**Innovent**
- Combined In-house biologics discovery and collaboration, with programs out-licensed to Eli Lilly via strategic partnership
- Total capital raised to date: $600M
- Corporate valuation: ~$1.5B
- IPO planned

**Hua Medicine**
- Key asset: One GKA program in phase III for diabetes
- Total capital raised to date: $125M
- $400M HK IPO planned

**zaiLab.**
- All programs were in-licensed
- Focused on oncology and immunology
- Listed on Nasdaq in 2017
- Market value: ~$1B

**Key asset:** One HCV program in NDA stage
- Total capital raised to date: $255M
- Corporate valuation: ~$1.5B
- IPO planned
“China Innovations” Out-licensed to Western Companies

- **Fruquintinib (VEGFR inhibitor)** to Eli Lilly
- **SHR-1210 (PD-1 antibody)** to Incyte
- **AK-107 (an antibody)** to MSD
- **A TLR-7 inhibitor for HBV** to J&J
- **Two BTK inhibitors** to TG Therapeutics
- **Jak1 inhibitor** to Arcutis
- **Legend’s CART therapy** to J&J with $350M upfront
- **PD-1 antibody** to Celgene with $263M upfront

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
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<tbody>
<tr>
<td>2013</td>
<td>BGB-283 (B-raf inhibitor) and BGB-290 (PARP inhibitor) to Merck Serono</td>
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<td>2014</td>
<td>Strategic Alliance with Lilly in $456M deal</td>
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<td>2015</td>
<td>Expansion of partnership with Lilly to include PD-1 based bispecific antibodies</td>
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<td>2016</td>
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<td>2017</td>
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<td>Legend’s CART therapy to J&amp;J with $350M upfront</td>
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Hong Kong IPO: A New Booster for China Biotechs

- IPO on Hong Kong Stock Exchange has become possible for pre-profit or pre-revenue biotech companies

### Principles Underlying Biotech Issuer Suitability

- **Product regulated by Competent Authority**
  - US Food and Drug Administration (FDA), China Food and Drug Administration (CFDA), European Medicines Agency (EMA)
  - Other authorities will be considered on a case-by-case basis
- **Past concept stage**
  - Completed Phase I and received no objection to commence Phase II (or later)
  - Product subject to human testing
- **Meaningful investment from at least one Sophisticated Investor**
  - To provide a level of validation from an experienced third party investor

### Proposed Listing Eligibility

- **Suitability for Listing**
  - Product: At least one Core Product(s) beyond concept stage
  - Research and Development: Primarily engaged in R&D of its Core Product(s) for a minimum of 12 months
  - IPO: Primary reason for listing is to raise capital for R&D to bring its Core Product(s) to commercialisation
  - Patents: Durable patent(s), registered patent(s), patent applications(s) and/or intellectual property in relation to its Core Product(s)
  - Sophisticated Investor: Meaningful investment for at least 6 months before IPO (which must remain at IPO)

- **Chinese biotech companies targeting Hong Kong IPO:**
  - Announced: Hua Medicine, Ascletis, Henlius (Fosun’s biotech arm), Shanghai Tasly (Tasly’s biopharma unit), Innovent
  - Many others are considering
Overview of Suzhou Yabao Pharmaceutical R&D Company

Suzhou Yabao is located in Suzhou bioBAY, half hour from Shanghai by train, which is globally recognized as a best pharmaceutical innovation cluster in China.

FACTS
- Founded in 2014 as an innovative R&D-focused subsidiary of Yabao Pharmaceutical Group
- A clinical-stage biopharmaceutical company
- Strong capabilities for pharmaceutical R&D and international collaboration

MISSION & STRATEGY
- To develop transformative medicines
- Collaboration-based
- Leveraging “China Advantages”
## Our Achievements Over Last 3 Years

<table>
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<th>International Collaboration</th>
<th>Pipeline</th>
<th>Development Expertise</th>
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<td>- A total of 8 license deals signed, possibly as many as any company did in China over last 3 years</td>
<td>- A pipeline of 9 drug candidates: 2 in Phase I, 2 INDs filed, and 1 IND being filed</td>
<td>- Management team with rich and full pharmaceutical R&amp;D experience in both US and China</td>
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<td>- Collaborations established with multinational pharma company (Eli Lilly), world-leading organization (MRC Technology, UK), and first class academic labs (UBC, Lawson Institute, and University of South Australia)</td>
<td>- All being first-in-class or best-in-class on new targets</td>
<td>- China IND track record: completing tech transfer and CFDA IND-filing package within 10 months (new CFDA policies should further expedite this process)</td>
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Near-term Strategic Plans

- To collaborate with external investors, we are in a process of spinning-off Suzhou Yabao

- Continuing to enhance our pipeline through collaboration and leveraging “China Advantages” to accelerate drug approval and maximize China market potential

- Leadership team expansion, including C-level executives with Western clinical development, business development and management experience

- Implementing global development strategy and initiating clinical development in US/Australia
Dr. Peng Wang, Founder, President and CEO

- 1990, Ph.D. in Biochemistry from the University of Tokyo, School of Pharmaceutical Sciences
- 1990 - 2008, Allergy/Immunology/Inflammation, Schering-Plough, Research Fellow
  - Major contribution to discovery and early development of 9 development candidates
- 2008 - 2009, WuXi AppTech, Corporate VP and Head of Discovery Biology
  - Business development: established collaboration on >30 projects with >10 Western companies
- 2009 - 2013, Simcere Pharmaceutical Group, Corporate VP and CSO
  - International collaboration: Major contribution to 5 deals (3 R&D, 1 import drug, and 1 commercial JV deal)
  - Innovative R&D in China: 7 INDs approved, with the most advanced program in NDA filing and completing a phase 1 in Australia
- 2013 - 2017, Yabao Pharmaceutical Group, President of R&D and CEO of Suzhou Yabao
  - International collaboration: 11 deals signed (including 8 R&D, 1 import drug, and 2 development/manufacturing/commercialization deals)
  - Innovative R&D in China for global, with 2 INDs approved
- 2017 – current, Yabao Pharmaceutical Group, CSO, and CEO of Suzhou Yabao
- 2015 - current, Adjunct Professor at University of South Australia; 2017 - current, AIMBE Fellow
Other Team Members (1/2)

**Dr. Bing Yan, Chief Medical Officer**
- MD in Clinical Endocrinology/Immunology from Shanghai JiaoTong University Medical School
- Post-doctoral Clinical Fellow (Endocrinology & Immunology) at Johns Hopkins Medical School (1992-1998)
- Working in China for Wyeth then Pfizer since 2009, mostly as Vice President (since 2011)

**Dr. Lin Zhu, VP, Pharmacology, Toxicology and ADME/PK**
- Ph.D. in Biotechnology from Tsinghua University
- Head of Pharmacology and Toxicology at Simcere Pharma Group (2008-2013)
- Led preclinical development and obtained IND approval of 9 innovative drug candidates

**Dr. Fei Zhang, VP, CMC Development**
- Ph.D. from China Pharmaceutical University
- 12 years drug development experience at Simcere Pharma Group (2004-2016) with increasing responsibilities, including head of analytical development and head of CMC development
- Made significant contributions to 1 NDA approval and 8 other NCE programs to IND approval

**Dr. Yan Xia, Head of Medicinal Chemistry**
- Ph.D. in Organic Chemistry from University of Pittsburgh, post-doctoral training at NIH
- Former Senior Principal Scientist with 21-year medicinal chemistry experience at Schering-Plough and Merck
- Major contributions to discovery and early development of 8 development candidates (including 1 launched)
### Other Team Members (2/2)

#### Dr. Yang Song, Director, Medicinal Chemistry
- Ph.D. from Tsinghua University
- 11 years experience in medicinal chemistry, including leading several lead optimization programs collaborated with MNCs

#### Dr. Zhongping Fu, Director, Biologics Development
- Ph.D. from Macao Science and Technology University
- 8 years experience in analytical development and quality control for biologics, including 3 therapeutic antibody programs (1 in phase I and other 2 filed as INDs)

#### Mr. Yiqun Xu, Executive Director, Clinical Development
- MS from Southeast University
- Over 15 years experience in clinical development, including project management, clinical operation and monitoring, protocol development, etc.

#### Dr. Caixia Sun, Director, Clinical Development
- MD from Nanjing University
- 6 years experience in clinical development, including protocol design, clinical operation, medical support, etc.

#### Ms. Zhixin Wang, Director, Clinical Development
- MS from Capital Medical University
- 4 years experience as hospital physician and 8 years experience in managing clinical operation at multinational companies

#### Mr. Lei Yang, Director, Project Management
- MS from Zhongnan University
- 6 years experience in drug discovery and early development, former protein kinase team leader at Genscript and head of in vitro pharmacology and project manager (the BMS-Simcere collaboration program) at Simcere Pharma (2007-2011)

#### Dr. Xiarui Dou, Chief Patent Counsel
- Ph.D. in Pharmacology from Beijing Traditional Chinese Medicine University; Certified lawyer and patent attorney
- 6 years patent experience with large pharma and 2 years with law firm

#### Ms. Weina Liu, Director, Business Development
- MS from China Pharmaceutical University
- 6 years business development experience and made contributions to 10 international collaboration deals
<table>
<thead>
<tr>
<th>Program</th>
<th>Indication</th>
<th>Mechanism of Action</th>
<th>D</th>
<th>P</th>
<th>IND</th>
<th>PI</th>
<th>Progress</th>
<th>Partner</th>
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<tr>
<td>Metabolite Disease</td>
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<td>SY-004</td>
<td>Diabetes</td>
<td>Glucokinase activator</td>
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<td>China phase I on-going, four global (including US) phase I studies completed</td>
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<td>SGLT1 inhibitor</td>
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<td>China phase I initiated, one US phase I study completed</td>
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<td>China IND filed</td>
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<td>SY-007</td>
<td>Stroke</td>
<td>PTEN inhibitor</td>
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<td>China IND filed, US IND filing planned</td>
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<td>Lead optimization</td>
<td>MRC Technology</td>
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<td>SY-003</td>
<td>Oncology</td>
<td>PLK/PI3K/Ras inhibitor</td>
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<td>Preclinical development on-going</td>
<td>Professor at University of South Australia</td>
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<td>SY-012</td>
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<td>Other Areas</td>
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<td>SY-005</td>
<td>Sepsis</td>
<td>Recombinant human Annexin 5 protein</td>
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<td>IND to be filed in Q2 2018</td>
<td>Lawson Health Research Institute</td>
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D = Discovery, P = Preclinical Development, PI = Phase I
Brief Introduction to New Drug Founders Club (1/2)

- Founded in April 2015
- Members are FOUNDERS of companies focusing on innovative pharmaceutical R&D or providing relevant services
- Mission: To advance communication and collaboration among all founders of the relevant companies in China
- Currently there are 218 members
Club activities: annual conference, symposium, salon, member gathering, etc.
How to Establish Drug Discovery Ecosystem in Asia?

- A key to establishing drug discovery ecosystem in Asia would be information exchange and learning.
- China is emerging as a pharmaceutical innovation center in the world.
- China industry will have more and more assets for license-out, and will need to license-in more and more assets.
- A major challenge is the shortage of collaboration partnerships, resulting from shortage of information exchange and learning.
- Everyone should learn harder to gain full information, and to correct misunderstanding.
THANK YOU