Seminar on the Relationship between Patent Systems and the Availability of Medicines in Developing Countries and Least Developed Countries

World Intellectual Property Organisation (WIPO), Geneva, Switzerland
2 December 2015
Dr Brian Tempest advises Companies, Banks, High Net Worth Individuals and Mutual Funds on their Strategy in the Emerging World based on his wide experience in China, Japan and India. Brian is the Editor of the Journal of Generic Medicines and represents the global generic industry as a Non Executive Director on the United Nations Patent Pool. Previously he worked for Ranbaxy Laboratories since 1995 holding the position of Managing Director and Chief Executive Officer until 2005. He was then Chief Mentor and Non Executive Director until 2008 when he retired. He is one of the few westerners to have led a Sensex Nifty 50 Indian blue Chip MNC and as a result has a valuable insight into India. Brian has also worked for Glaxo as Regional Director Far East and Regional Director Middle East & Africa from 1985 to 1992.

Brian has worked in the Pharmaceutical Industry for the last 44 years and has managed Healthcare businesses in North America, South America, Europe, Africa, Middle East, Australasia, China, Japan and India. He has also led many Investor Meetings held around the world from Tokyo to Las Vegas. He is now a Non Executive Director of Religare Capital Markets, Fortis Healthcare, SRL Diagnostics and Glenmark Pharmaceuticals. He is a member of the SCRIP Global awards panel. Brian speaks at global conferences and more information on these presentations can be found on his website www.briantempest.com. He is also an international advisor to UNCTAD and MAPE.

Brian has a PhD in Polymer Chemistry from Lancaster University in 1971 and in 2009 he became Chairman of the Advisory Board for the Lancaster University Management School, UK. He is a Fellow of the Royal Society of Medicine and a Fellow of the Royal Society of Chemistry and is a Chartered Chemist. He is also Executive Chairman of Hale & Tempest Co Ltd.
• Does a 20 year patent work in the Health sector?

• Are patented cancer medicines too expensive?

• How will the poor access the expensive patented cancer medicines?

• If only the super wealthy can access the new patented cancer medicines… Does the free market function?... Is there something wrong?
USA Medicines getting More Expensive

source: Evaluate 2014

Count of Drugs in USA Top 100 by Revenue per Patient per Year Price Band in 2014

Source: EvaluatePharma® (22 SEP 2014)

<table>
<thead>
<tr>
<th>Revenue per Patient (Band)</th>
<th>2010</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100,000+</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>$50,000 - $100,000</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>$25,000 - $50,000</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>$10,000 - $25,000</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>$5,000 - $10,000</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>$1,000 - $5,000</td>
<td>27</td>
<td>24</td>
</tr>
<tr>
<td>$0 - $1,000</td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

Revenue per Patient per year Banding ($)
Japan Drug Price Increases
source: Evaluate 2015

Count of New Drugs in Japan by Cost per Patient per Year Price Band in 2010-14 vs. 2005-09
Source: EvaluatePharma® (9 MAR 2015)

2010-14: Highest Cost per Patient
- Vpriv: ¥50m/$465k
- Solaris: ¥45m/$383k
- Byclot: ¥38m/$357k
- Vyndaqel: ¥21m/$184k

Reimbursed Cost per Patient per Year Banding ($):
- $100,000+ to $10,000
- $10,000 to $5,000
- $5,000 to $1,000
- $1,000 to $0

Hale & Tempest
Americans Who Battle Cancer Are Twice As Likely To Go Bankrupt, Even If They Have Health Insurance
Monoclonal Antibodies Complexity

source: Roche 2014

**atovastatin**
Molecular weight
= 558 Daltons
0 amino acids

**Interferon-alpha**
Molecular weight
= 19,625 Daltons
~165 amino acids

**Antibody (IgG)**
Molecular weight
= 150,000 Daltons
~1,300 amino acids

Source: [http://www.path.cam.ac.uk/~mrc7/mikeimages.html](http://www.path.cam.ac.uk/~mrc7/mikeimages.html)
In 2016, Biologics will be Half the Top 20

Source: Cowen

Biologics vs. small molecule therapeutics by 2016 sales and 2011-2016E CAGR

source: Cowen & Co/Thomson Pharma estimates
Big Pharma Profit Margins from Biologics

source: Fiscal Year 2011 Roche 2014

### Core operating profit margin

<table>
<thead>
<tr>
<th>Company</th>
<th>Profit Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfizer</td>
<td>43%</td>
</tr>
<tr>
<td>Astra</td>
<td>39%</td>
</tr>
<tr>
<td>Amgen</td>
<td>37%</td>
</tr>
<tr>
<td>Roche</td>
<td>36%</td>
</tr>
<tr>
<td>Sanofi</td>
<td>34%</td>
</tr>
<tr>
<td>Merck</td>
<td>34%</td>
</tr>
<tr>
<td>BMS</td>
<td>33%</td>
</tr>
<tr>
<td>GSK</td>
<td>31%</td>
</tr>
<tr>
<td>Novartis</td>
<td>27%</td>
</tr>
<tr>
<td>Eli Lilly</td>
<td>27%</td>
</tr>
<tr>
<td>Abbott</td>
<td>23%</td>
</tr>
<tr>
<td>Bayer</td>
<td>17%</td>
</tr>
</tbody>
</table>
40% Brazil Hospital Contract Sales 2014
source: Evaluate August 2015

Key Products:
Ranked on 2014 government Contract Sales

<table>
<thead>
<tr>
<th>Product</th>
<th>R$ million</th>
<th>US$ million</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Humira</td>
<td>$603.60</td>
<td>$257.12</td>
</tr>
<tr>
<td>2. Enbrel</td>
<td>$322.05</td>
<td>$137.17</td>
</tr>
<tr>
<td>3. Herceptin</td>
<td>$243.21</td>
<td>$102.07</td>
</tr>
<tr>
<td>4. Soliris</td>
<td>$211.85</td>
<td>$90.25</td>
</tr>
<tr>
<td>5. Remicade</td>
<td>$179.50</td>
<td>$76.38</td>
</tr>
</tbody>
</table>

Top 5 Products in 2014 account for 40% of total government contract sales.

Soliris not approved in Brazil, but eligible for import due to therapeutic benefit over current alternatives.

Government contract sales prices are often lower than the reimbursement prices which operate as a price guide.

Government sales contracts cover predominantly hospital and specialty channel sales.
Rising Cancer Drug Spending
source: FT 3 June 2015
By 2020, Patent Expiries 40% Biologics


Global originator sales¹ in the year of US patent expiry

USD billions

Source: Evaluate Pharma, McKinsey, 2014
Eight Hurdles with Biosimilars

source: Brian Tempest Research September 2015

• Cost of manufacturing facility
• Cost of clinical trials including innovator costs
• Cost of sales reps to encourage doctor usage
• Strong interface between patent company and patients
• Doctor anxiety on changing therapy for very ill patients
• Multiple competitors in biosimilars
• Pharmacy interchangeability, except Australia
• Break even on investment
Sandoz Business Model by an Analyst

Source: Pharmacloud June 2012

Positive return on investment achieved
EBITDA profitability achieved

Source: Pharmacloud
Market uptake barriers are likely to limit biosimilars sales potential

Source: Data Monitor for 2009 estimate
Sanofi R&D - 72% Biologics & 50% mAbs

source: Pharma Times 15 January 2015

Sanofi and BI ink biologics manufacturing deal

Sanofi has signed up Boehringer Ingelheim as its partner to manufacture monoclonal antibodies.

Under the terms of the agreement, the French drugmaker will have access to Boehringer's capabilities in Biberach, Germany to transfer and manufacture therapeutic mAbs. Initial product transfers will begin in early 2015.

Sanofi says that the rationale behind the deal, the financial terms for which were not disclosed, is to reinforce its manufacturing capacity "to support upcoming product launches". Some 72% of its R&D projects are in biologics, nearly half of which are mAbs.

Wolfram Carius, head of biologics at Sanofi, said Boehringer is "a highly capable and experienced partner to complement our continued alliance with Regeneron and the investments we are making in building our own internal capabilities".

Links

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Tags

biologics | Boehringer Ingelheim | Sanofi | manufacturing
USA FDA NME Approvals Doubling
source: Evaluate July 2015

**FDA Approval Count vs. Total USA Product Sales 5 Years After Launch**

<table>
<thead>
<tr>
<th>Year</th>
<th>Approved Drugs</th>
</tr>
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<tbody>
<tr>
<td>2004</td>
<td>Avastin (Roche), Cymbalta (LLY), Spiriva (BI/ PFE), Lyrica (PFE)</td>
</tr>
<tr>
<td>2010</td>
<td>Prevnar 13 (PFE), Victoza (Novo N), Prolia/Xgeva (AMGN)</td>
</tr>
<tr>
<td>2011</td>
<td>Xarelto (J&amp;J/BAY), Eylea (REGN/BAY)</td>
</tr>
<tr>
<td>2012</td>
<td>Eliquis (BMS/PFE), Stribild (GILD)</td>
</tr>
<tr>
<td>2013</td>
<td>Sovaldi (GILD), Tecfidera (BII/B)</td>
</tr>
<tr>
<td>2014</td>
<td>Opdivo (BMY), Harvoni (GILD)</td>
</tr>
<tr>
<td>2015</td>
<td>Orkambi (VRTX), Ibrance (PFZ)</td>
</tr>
</tbody>
</table>

*Data as of July 10*
BAYER CEO: ‘WE DON’T MAKE MEDICINE FOR POOR INDIANS’

POSTED BY N. BROWN ON FEBRUARY 2, 2014 IN AFRICA, ASIA, ECONOMICS, HISTORY, IMPERIALISM, INDIA, LATIN AMERICA, NEWS AND ANALYSIS, SCIENCE AND TECHNOLOGY, THEORY, US/CANADA, WWII | 14 COMMENTS
Access in EU Improving from Biosimilars

Source: IMS December 2011

**Figure 6:** As shown by G-CSF, the introduction of biosimilars can generate a spill-over effect on off-patent biologic molecules. Opportunity for biosimilars players only or also for innovators?

**Volume effect after the introduction of biosimilars**

<table>
<thead>
<tr>
<th>% of SU vs. t-1 (year prior to the introduction of biosimilars)*</th>
<th>Volume effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>130%</td>
<td></td>
</tr>
<tr>
<td>120%</td>
<td></td>
</tr>
<tr>
<td>110%</td>
<td></td>
</tr>
<tr>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>80%</td>
<td></td>
</tr>
</tbody>
</table>

**Years before biosimilars introduction**

- France
- Germany
- Italy
- Spain
- Sweden
- UK

Source: IMS MIDAS, MAT Q4 2010, NHS. *t-1 = 100%, t0 = year of biosimilars introduction

**UK case study**

Physicians moved G-CSF back in 1st line cancer treatment due to lower biosimilars cost.

G-CSF prevents hospital readmission due to infections.

Similar evidence is collected in other countries (e.g. Sweden)
Global Biosimilars
source: brian tempest research 1 September 2015

• Celltrion from South Korea with 2 brands/huge capacity
• Samsung Biopsis from South Korea with 2 brands
• Novartis/Sandoz
• Pfizer
• Amgen/Actavis/Allergan
• Innovator with authorised generic

• now 10th brand and beyond
• India - DRL, Intas, Zydus, Hetero, Cipla, Emcure, Biocon
• Europe – Polpharma, Biocad, E Merck
• USA - Epirus, Harvest Moon
• Latam – Bionovis,
• China – FosunPharma, Gen Sci etc
• Asia – Incepta Biotech, Kalbe, Hanwha Chemical
Pfizer Biosimilars
source: Pfizer presentation January 2015
Fujifilm is using its cutting-edge research to open up new horizons in medicine.

Fujifilm is researching innovative drugs that have the potential to improve lives of patients suffering from Alzheimer’s disease, cancer and other conditions.

Fujifilm is developing a candidate drugs for Alzheimer’s disease, thanks to research in collaboration with the Center for IPS Cell Research and Application(CIRA) at Kyoto University in Japan. These efforts have been made possible through the integration of Fujifilm Group’s medical technology with proprietary technology developed over the years in its imaging technology field.

Fujifilm’s goal is to create new hope for people through medical research.

Value from Innovation™
Modi In New York

source: October 2015
Modi promises to protect patents

Says India committed to protecting IPR, bring creativity; CEOs express enthusiasm

IPR is a major concern for some US companies, especially in the pharma sector, who have sought to mount pressure on the Indian government to bring it in line with their commercial interests. However, it’s a separate conversation India having with these firms and their backers in the US, who have appealed for changes.

Government spokesperson Vikas Swarup said the Prime Minister urged media barons to think of starting a communications university or a chair for further progress in this sector.

Modi met Wall Street leaders such as J P Morgan’s Jamie Dimon, KKR’s Henry Kravis, who told him his government was on the right track. He heard pretty much the same later at a dinner he hosted for 42 CEOs of Fortune 500 companies, with an appeal to speed up the pace of change.

Prime Minister Narendra Modi poses for a group photo with CEOs of US companies in New York on Thursday
Access by the poor of expensive patented medicines

• Compulsory license eg India, Thailand - single controversial events

• Voluntary license from Innovator to Generic Companies eg Gilead

• UNITAIDS Patent Pool eg HIV, Hep C, TC – multiple events, 59 generic licenses for HIV medicines in 5 years

• Exports from one LDC Country to another LDC country eg Bangladesh, Uganda
Thank You

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