BIOMEDICAL SCIENCES INDUSTRY IN SINGAPORE

ROLE OF EDB

JAN 2014
Singapore’s Economic Journey

GDP (US$B)

Year          Event
1960 - 1969  Labour Intensive
1970 - 1979  Skill Intensive
1980 - 1989  Capital Intensive
1990 - 1999  Technology Intensive
2000 - 2009  Knowledge & Innovation Intensive

GDP Per Capita (US$K)

Source: Singapore Ministry of Trade and Industry
Working Collectively For Singapore’s Economic Growth
Singapore EDB

OUR ROLE
Shaping Singapore’s Economic Future

OUR VISION
A Global Leader, A Great City and a Home in Asia, For Business, Innovation and Talent.

OUR MISSION
We create for Singapore, sustainable economic growth with vibrant business and good job opportunities.

- Attract Foreign Investment
- Grow Industry Verticals
- Enhance Business Environment
Singapore’s Economy Today

2012 GDP: S$345 billion
2012 GDP Growth: 1.3%

Sectoral Breakdown
- Biomedical Mfg: 25.5%
- Electronics: 25.0%
- Transport Engrg: 15.7%
- Precision Engrg: 14.6%
- General Mfg: 11.3%
- Chemicals: 7.9%

[Pie chart showing sectoral breakdown]
- Manufacturing: 20.7%
- Finance & Insurance: 11.9%
- Business Services: 14.6%
- Wholesale & Retail Trade: 17.0%
- Transportation & Communication: 11.8%
- Construction: 4.2%
- Information & Communications: 3.8%
- Accommodation & Food Services: 2.5%
- Others: 12.6%
Key Sectors under EDB

- Electronics
- Transport Engineering
- Chemicals
- Precision Engineering
- Biomedical Sciences
- Logistics
- Consumer Businesses
- Infocomms & Media
- Professional Services
- International Organizations
- Water & Environmental Technologies
- Clean Energy
- Lifestyle
- Space
- Natural Resources
Vibrant Bio-Cluster In Singapore

- **50** Manufacturing Plants
  - S$30B output in 2012
  - 16,000 employees

- **50** R&D Centers
  - S$1B R&D expenditure
  - 4,300 Researchers

- **30** leading RHQs
  - Top Pharma & Biotech companies
Building Biomedical Sciences

Phase I (2001-2005)
Foundation of Biomedical Research
Attracting talent, Building infrastructure
Focus on Basic Research
S$7B R&D Budget

Phase II (2006-2010)
Bridging Science and Application
Focus on Translational Clinical Research
Training of clinician scientists
S$13.6B R&D Budget

Phase III (2011-2015)
Forging Academia-Industry Links
Building Public Private Partnership
S$16.1B R&D Budget
(S$3.7B on Biomedical R&D +16% increase)

-Co-location of Public-funded Research Institutes (A*STAR) and Private companies
-Shared scientific facilities
-5 Phases (+ 2 in plans)

Expertise in genomic analysis
Expertise in bio-infomatics
Develop novel Bioprocesses
Cell and tissue Engineering research
Research on cell biology, infectious diseases

-5 Phases (+ 2 in plans)
Industry Partnership Office (IPO)

Responding to changing needs and changing models of Pharma R&D

Public scientific research
- Continued commitment to R&D: S$3.7 billion national BMS R&D budget from 2011 – 2015 (from S$3.3B)
- Industry Alignment Fund

BMS Industry Partnership Office
- Pulls together resources across Singapore R&D landscape
- Coordinates multi-institution private partnership programs

Industry
- Leverage Singapore’s R&D infrastructure to gain insights and develop compounds
- Options to tap on a number of resources in scientific research and clinical development across Singapore R&D landscape

Clinicians
- Clinical insights into Asian populations
- Clinical thought and practice leadership in Asia
Public Private Partnerships

Dr. Karl Ziegelbauer, Head of Global Drug Discovery: “Bayer recognizes that there may be differences in the Asian disease biology compared to other regions in the world. Our collaborations in Singapore help us understand the Asian disease biology better and to develop new therapeutics closer to market.”
R&D Centers

Translational Medicine Research Hub (TMRC)
- 40 Researchers, Scientists and Engineers
- Biomarkers, genomics

Discovery Research Centre
- 60 Researchers
- Neurodegenerative disease research

Chugai’s antibody engineering lab
- Chugai Pharma to invest S$200 million in S'pore
- Money to be used for antibody research over next five years

- 60 men Antibody Engineering corporate lab
- S$200 Million investment over 5 years
Contract Research Organisations

Niche CROs

- **Pre-clinical research organisation with specialised animal models**
  Services including Toxicology & safety pharmacology, PK/PD & biomarker

- **Fully integrated drug discovery, development, and manufacturing services.**
  cGMP Manufacturing, Aseptic Fill & Finish and Project Management

Drug Development Vehicle

- **Alternative drug development model for the Asian market**
  - In-license pre-clinical compounds
  - Bring the compound through to Proof of Concept
  - Out-license compound back to partner

Big 5 CROs

- **Top 5 CROs for pharmaceutical company’s research needs**

  - **Clinical development**
    - Clinical Trial Coordination Hub
    - POC Trial Services
    - Data Management

  - **Commercialisation**
    - Sale Solution
    - Market Access Implementation
    - Medical Science Liaisons

  - **Consulting**
    - Regulatory Filing
    - Market Access Strategy/ Intelligence
    - Late Phase trials
# Medical Devices Developed in Singapore

## Medical Equipment and Diagnostics
- **Hill-Rom**
  - 40-man Asia-Pacific R&D Centre for hospital beds and respiratory care
- **Welch Allyn**
  - 30-man Asia R&D Centre for monitoring devices
- **Vela Diagnostics**
  - 30-man R&D center for novel molecular diagnostics tests development

## Drug Delivery and Critical Care Devices
- **3M**
  - 1st Asian 150-man Drug Delivery Systems R&D
- **BD**
  - 50-man Asia-Pacific R&D Hub for medical delivery devices
  - 9-man R&D Center for Bioscience and Diagnostics
- **Biosensors**
  - Global 150-man Drug-Eluting Stent R&D centre

## Vision and Hearing Devices
- **Menicon**
  - 20-man R&D Centre for contact lens technologies
- **Alcon**
  - 6-man Asian clinical insights R&D hub for contact lens
- **Essilor**
  - 28-man R&D Center to develop Asian-specific spectacle lenses
- **Siemens Medical Instruments**
  - 130-man hearing aids R&D centre
New Translational Grants

New Tools to Clinicians/Researchers to Support Private-Public Partnerships for Translational Research

STRATEGIC PARTNERSHIPS – IAF CAT 1

• Support collaborations with multiple partners and projects
• 30% funding of total qualifying project costs, up to costs incurred by clinical institution
• Grant caps/project
  • S$500,000 - preclinical
  • S$1.0M - clinical
  • S$1.5M - preclinical and clinical
• Grant support for 2 years

CO-DEVELOPMENT GRANT – Co-D

• Risk-sharing to clinically validate new compounds and indications
• 50% funding of total qualifying project costs, up to costs incurred by clinical institution
• Grant cap of S$5M
• Grant support for 3 years
• Shared return on investment to clinical institution on meeting
Manufacturing Investments in Singapore

YEAR
2001 2003 2005 2007 2009 2011

OUTPUT (S$'000)

5,000 10,000 15,000 20,000

Nutritionals facilities

Multi-purpose API, drug product facilities

Cell Therapy and other new modalities

Bioprocess, process development lab

Bulk biologics facilities

AMS, Pfizer, Novartis, Roche, Lonza, GSK, Merck, Abbott, sanofi
Quality Manufacturing Record

Tuas Biomedical Park

- 28 commercial scale manufacturing facilities
- Range of modalities: API, biologics, cell therapy

AMGEN
- Bulk biologics manufacturing plant
- Bulk API plants with pilot facility and pediatric vaccines plant

Lonza Group
- Bulk biologics manufacturing plant
- Cell Therapy Facility
- Tablet facility
- Bulk Biologics plant
- Biologics and recombinant therapies plant

Roche
- Microbial and mammalian bulk biologics facility

- Baxter
- Bulk nutritionals plant

- Abbott
- A Promise for Life

Quality & Operational Excellence
- Zero major observations with regulators
- Track record producing for global markets
- Strong global logistics
- Secure business environment
- Access to talent
Singapore: Strategic Site for Companies

Quality Manufacturing Track Record
FDA & EMEA approved manufacturing facilities with zero major observations with regulators

Partnership in Process R&D
Ensuring the sustainability of Singapore’s pharmaceutical manufacturing industry

Highly-skilled Manufacturing Workforce
Ensuring a pool of highly skilled workforce through education and continuous education

Strong Government Support
Singapore government is committed to growing the manufacturing sector
Charting industry direction together (BMAC)
# MedTech Manufacturing Footprint

## Cardiovascular Implants
- **1st in Asia Mfg site for pacemakers and leads**: (250 men)
- **1st Asia facility for surgical tissue heart valves**: (700 men)
- **Drug eluting stents Mfg site, co-located with product development**: (300 men)

## Hospital Consumables
- **Global Manufacturing Plant Center of Excellence for Medical Surgical Products**: (1000 men)
- **Global site for Medical Products and Bioscience**: (1800 men)

## Ophthalmic Devices
- **1st global mfg site for contacts lens co-located with R&D**: (250 men)
- **Sole global IOL mfg site**: (200 men)
- **1st and largest in Asia for Pharmaceuticals and contacts lens**: (200 men)

## In Vitro Diagnostics
- **Technical teams to manage regional outsourcing and supplier networks**: (12-men)
- **Diagnostics Reagents**: (40-men)
- **Molecular diagnostics mfg**

## Hearing Aids
- **Global Mfg site in Batam**

## Respirators & Masks
- **Global site for Pharmaceuticals and contacts lens**: (200 men)

## Asia Pacific Regional Distribution Centers

**MedTech Manufacturing Footprint**

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**Ophthalmic Devices** including 10% of World’s Contact Lenses

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**Asia Pacific Regional Distribution Centers**
Home in Asia for Top Pharmaceutical Companies

Common Business Activities:
- International Holding Company
- Finance & Treasury
- Supply Chain Management
- Alliance Management
- Leadership training
- IP management
- Brand building
- Regulatory Affairs
- Medical Affairs
- Sales and Marketing
Home in Asia for Top Device Companies

The Top 10 Medical Device Companies have Regional HQs in Singapore

- **Becton Dickinson**
  - **Shared Services Centre**
  - Becton Dickinson’s Shared Services Centre supports all BD’s operations in Asia-Pacific region.

- **Siemens Medical Instruments**
  - **Global Headquarters**
  - Global HQ for hearing aids business. Singapore R&D and Manufacturing facility supplies 30% of the world’s hearing aids.

- **Essilor**
  - **Asia-Pacific Headquarters and R&D Hub**
  - Asia-Pacific R&D centre and coordination hub developing lenses for Asian consumers.
Health & Wellness Program Office (HWPO)

Drive co-innovation of future solutions between companies and healthcare stakeholders

Achieve healthcare transformation and economic growth

Using Singapore’s Healthcare as the Living Lab

Singapore will co-create, conceptualize and test-bed future solutions together with industry to firstly address our healthcare challenges, and be scaled to Asian healthcare markets.

Technology, Ideas
- Companies
- Lead Demand
- Policies, Infrastructure
- New Concepts

Prototype
- Private Sector Partners
  - Research Centres
  - Universities

First Adoption
- Reference site

Export solutions
- Global Markets
- Domestic Market
- Lead Adoption
Establishment of “Superplatforms”

Super Platforms

Dedicated innovation teams within Singapore’s regional healthcare clusters

Help companies navigate the system during solutioning process by providing access to
1. The right patient pool
2. The right clinicians
3. The right data

Focussed and open innovation structures across the entire continuum of care.

Blueprint/template of healthcare solutions

To support companies with necessary capabilities to scale solutions regionally
Thank You

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