



# INDIAN BIOTECHNOLOGY INNOVATION & GROWTH

Presented by

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# **INDIA : The changing environment**

- **Increasing availability of trained & skilled Human Resource: Returning Indian Scientists with Regulatory expertise**
- **Improving Regulatory infrastructure**
- **Improving standards of bio-manufacturing**
- **Increasing capabilities in clinical development**
- **Increasing R&D collaborations with US/EU companies**
- **Increasing acceptance of Indian clinical data by USFDA/ EMEA**

**Indian BT is rapidly climbing up the drug development path**

# **INDIA : paving the road ahead**

- **Discovery research: Transition from generics to new molecules**
- **Pre-clinical development: Large animal house facilities**
- **Regulatory infrastructure: GM Crops & NDAs**
- **Risk capital: Private and Public funding**
- **VC investment in innovation**
- **Specialized skills: IND development**

**Innovation is replacing the generics and services mindset**

# Current Global Strategies

**India's cost and skill base supports affordable drug development**

**India is fast attaining global leadership in Bt cotton cultivation**

**India is an emerging preferred hub for CROs & CMOs**

**Trans-national partnership models with Indian cos. is on the rise**

# INDIAN BIOTECHNOLOGY: 2007

## ABLE-Biospectrum Survey

SEGMENT	REVENUES (2006-07)	% GROWTH	REVENUES (2005-06)	REVENUES (2004-05)
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• BioPharma	~Rs 5600	20	4,700	3570
• BioServices	~Rs 1000	38	720	425
• BioAgri	~Rs 1100	50	580	330
• BioIndustrial	~Rs 400	20	375	320
• Bioinformatics	~Rs 130	20	110	100
• Total	<b>Rs 8300</b>	<b>30</b>	<b>6,485</b>	<b>4745</b>

- Biotech industry touches \$2 billion (\$1.45 billion).
- BioPharma sector crosses \$1.4 billion (\$1b).
- BioServices sector touches \$250 million.
- BioAgri sector crosses \$250 million.
- Industry grows at 30 percent .  
Bio-agri scores globally with highest global growth rate @ 50% and largest acreage (9 million)

**Industry Revenues Cross US \$ 2 Billion  
Doubles from \$ 1 Billion in 2004-05  
On track to meet \$5 billion by 2010**

# INDIAN BIOTECHNOLOGY: 2007

## ABLE-Biospectrum Survey

### INVESTMENT GROWTH

YEAR	INVESTMENT (Rs: crores)	GROWTH
FY 2000-01	Rs. 250	---
FY 2001-02	Rs. 504	101%
FY 2002-03	Rs. 635	26%
FY 2003-04	Rs. 850	34%
FY 2004-05	Rs. 1215	43%
FY 2005-06	Rs. 1650	36%
FY 2006-07	Rs. 2270	37%

- Investment crosses \$580 million in 2006-07
- Bangalore alone saw > Rs:1000 crores investment (Biocon, Jubilant, Advinus, AstraZeneca, GE Healthcare, Avesthagen, Agilent, SRA Security)
- Biotechnology Companies R&D spend at an average 3% of Sales.

# BIOTECHNOLOGY 2007

- **MILESTONES:**
- **Biotechnology finishing school with PES College being initiated**
- **Karnataka Government to partner with Australia's Deakin University to start Post Graduate and Ph. D. programs to build high end skills for the Biotechnology sector.**
- **Karnataka based Biotech companies touch Rs:2000 crores in turnover.**
- **BANGALORE HELIX PHASE I TO BE COMPLETED BY END JUNE 2007.**
- **Exports cross Rs: 1000 crores (\$250 m)**
- **Industry scientific head count doubles to 16,000**

# SURGE IN BT SCHOOLS: BANGALORE DOMINATES

## ABLE-Biospectrum Survey

India's Top Private BT Schools, 2006

Name of the Institute	City, State	Overall Score	Overall Rank	Faculty Score	Faculty Rank	II Score	I Score	Infrastructure Score	Infrastructure Rank	Placement Score	Placement Rank
Jaypee Institute of Information Technology	Noida, Uttar Pradesh	41.18	1	97.00	1	10.56	1	73.00	2	16.86	0
Satyam University	Noida, Uttar Pradesh	40.13	2	95.78	2	5.23	2	57.01	7	13.85	14
The Oxford College of Science	Bangalore, Karnataka	40.27	3	43.14	4	0	15	68.00	3	23.75	3
Birla Institute of Technology, Mesra	Ranchi, Jharkhand	41.25	4	34.61	11	50	3	82.5	5	0	25
Jaypee Institute of Information Technology, Solan	Solan	21.8	5	88.14	8	3.74	3	98.49	4	18.48	12
Amrita Engineering College	Hyderabad, Andhra Pradesh	31.05	6	19.73	24	0.71	10	73.57	1	3.35	30
Seedling Academy of Design, Technology and Management, G-SIMS	Jabpur, Rajasthan	20.92	7	05.18	3	0	15	10.70	22	4.24	19
Shree Narayana Vignya & Sri. Narayana Vignya Science College	Raichur, Karnat	20.21	8	42.48	7	0.79	5	61.24	5	40.45	2
Bharosa Institute of Technology	Bangalore, Karnataka	22.45	9	87.22	6	0.74	10	82.04	8	18.89	8
Kennedy College of Engineering & Technology	Mysurumagan, Tamil Nadu	24.91	10	17.92	20	0.93	12	58.24	6	0	23
Garden City College	Bangalore, Karnataka	24.45	11	40.22	5	0	12	48.22	10	2.32	28
RV College of Engineering	Bangalore, Karnataka	22.25	12	88.22	12	2.01	7	42.08	11	12.72	11
Rajalakshmi Engineering College	Chennai, Tamil Nadu	22.22	13	22.86	22	82	3	18.0	17	21.2	20
Presidency College	Bangalore, Karnataka	20.13	14	3.7	29	3.24	8	2.77	27	66.95	1
Jawahar Institute of Science & Technology	Hyderabad, Andhra Pradesh	16.3	15	10.75	13	0	15	15.56	18	10.16	6
T.J. Somaiya College	Bangalore, Karnataka	17.2	16	29.02	17	0	12	17.11	16	12.89	10
Sri Theagan Mahavasa Jain College	Bangalore, Karnataka	13.22	17	81.44	10	0	12	14.02	15	12.2	12
Saraswathi College of Technology	Chennai, Tamil Nadu	16.47	18	22.17	21	0	15	22.74	12	13.37	13
Maharani Lakshmi Bai Memorial College for Women	Bangalore, Karnataka	16.43	19	75.14	20	0.18	14	17.45	15	17.50	7
BNB College of Engineering	Bangalore, Karnataka	16.17	21	25.01	15	0	15	13.55	20	20.90	5
GL Institute of Technology	Bangalore, Karnataka	15.81	22	18.51	25	0	15	18.27	13	23.27	4
Archana College of Engineering	Bombay, Orissa	14.25	23	32.27	14	0	15	8.05	25	10.80	16
Adityanath Institute of Information Sciences	Bangalore, Karnataka	14.47	24	35.04	10	0.57	17	3.77	23	0	25
GIS College of Management Studies	Mumbai, Maharashtra	14.22	25	45.24	4	0	15	0	31	0	25
Reliance Institute Management College	Bangalore, Karnataka	12.33	26	22.65	18	0	15	11.54	21	0	25
SRM Institute of Science	Bangalore, Karnataka	10.55	27	13.2	28	0	12	18.25	14	3.22	21
Rave Institute of Science & Technology	Bangalore, Karnataka	9.8	28	17.42	27	0	12	4.12	24	8.71	17
AI-Research Arts Science & Commerce College	Bangalore, Karnataka	6.10	29	20.26	23	0	15	6.17	26	6.10	17
SKM Institute of Management & Science	Bangalore, Karnataka	4.55	30	7.92	31	0	15	4.82	28	3.10	22
Guru Nanak Khalsa College of Arts Science & Commerce	Mumbai, Maharashtra	4	31	4.47	30	0	12	3.22	20	0	25

15 of the Top 30 BT Schools are from Bangalore

Note: The Bangalore Top 30 BT Schools are as follows: 1) Oxford College of Science, 2) RV College of Engineering, 3) Garden City College, 4) Kennedy College of Engineering & Technology, 5) Birla Institute of Technology, 6) Jaypee Institute of Information Technology, 7) Sri Narayana Vignya Science College, 8) Bharosa Institute of Technology, 9) T.J. Somaiya College, 10) Sri Theagan Mahavasa Jain College, 11) Saraswathi College of Technology, 12) Maharani Lakshmi Bai Memorial College for Women, 13) BNB College of Engineering, 14) GL Institute of Technology, 15) Archana College of Engineering, 16) Adityanath Institute of Information Sciences, 17) GIS College of Management Studies, 18) Reliance Institute Management College, 19) SRM Institute of Science, 20) Rave Institute of Science & Technology, 21) AI-Research Arts Science & Commerce College, 22) SKM Institute of Management & Science, 23) Guru Nanak Khalsa College of Arts Science & Commerce.

## THE BIO-SCENARIO: INDIA 2007

- **E&Y ranks India No:3 after Japan & Korea in the Asia Pacific Region in Biotechnology.**
- **M&A**
- **Reliance Life Sciences acquires 74% stake in GenMedix, Nicholas Piramal acquires UK's Avecia Biopharma, Biocon acquires IP assets of US based Nobex Corpn.**
- **Merriex Alliance picks up 60% stake in Shantha Biotechnics for global vaccine production**
- **PARTNERED RESEARCH**
- **Advinus inks \$150 million research deal with Merck**
- **Biocon co-develops Intranasal Insulin with Bentley Pharma, USA.**
- **INVESTMENT**
- **Avesthagen attracted €20 million from a leading European VC fund**
- **INNOVATION**
- **Biocon launched BIOMAb EGFR as India's first proprietary biotech drug for head and neck cancers**
- **Biocon announced commencement of Phase II trials for: Oral Insulin and Anti-CD6 MAb for RA.**

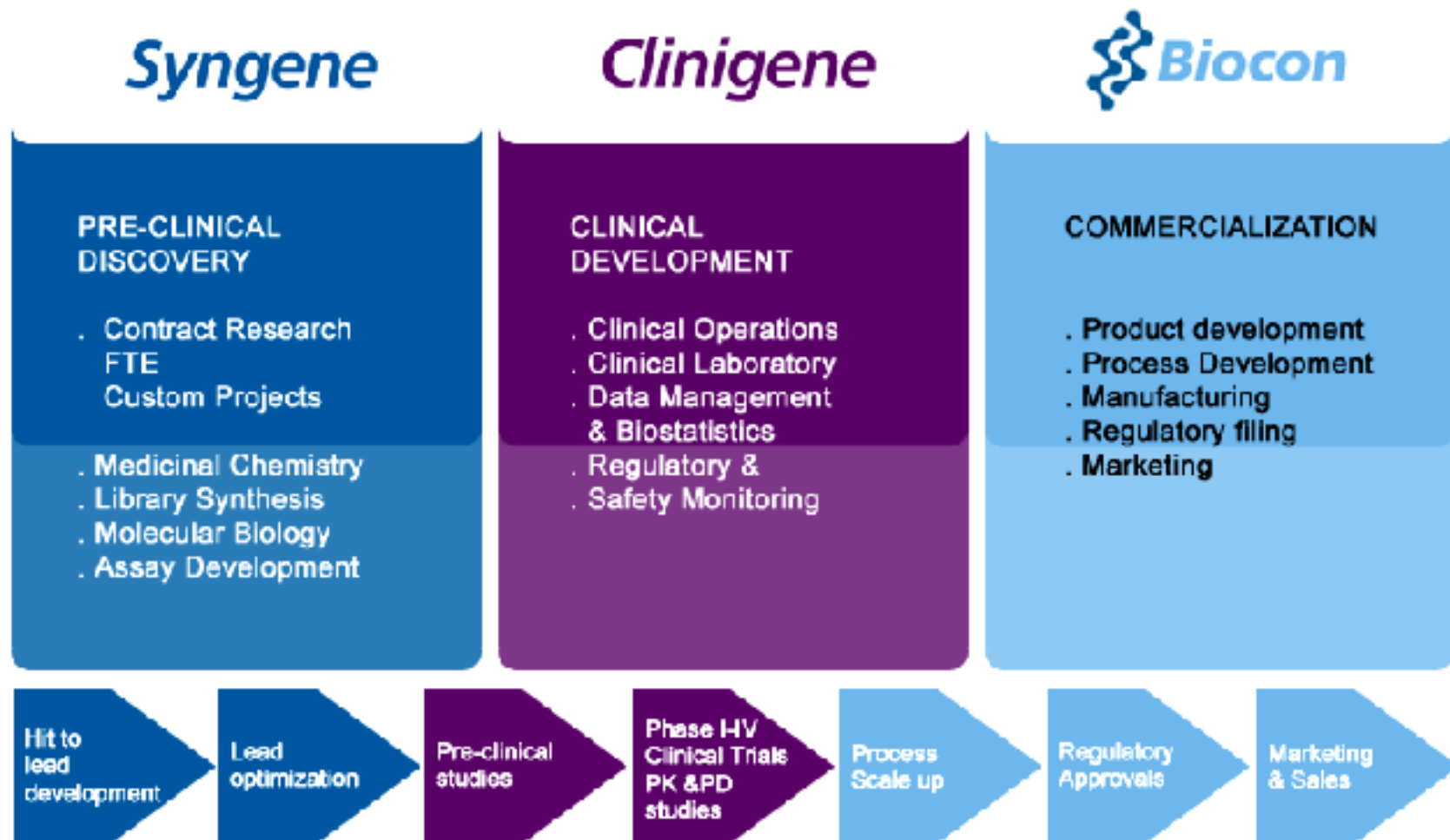
**THE INDIA INVESTMENT MODEL:  
M&A & PARTNERING FOR GLOBAL COMPETITIVENESS**



# impacting human health globally

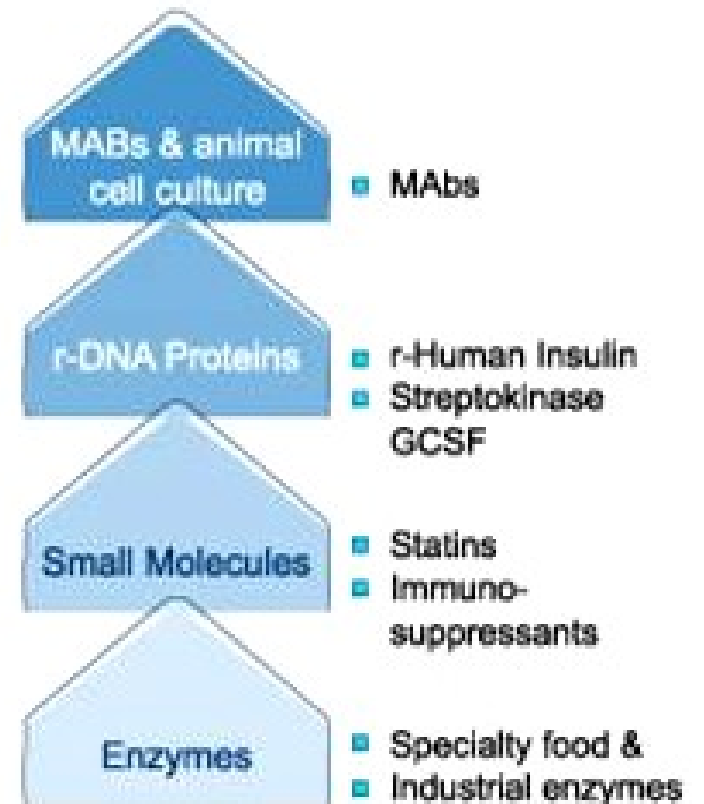
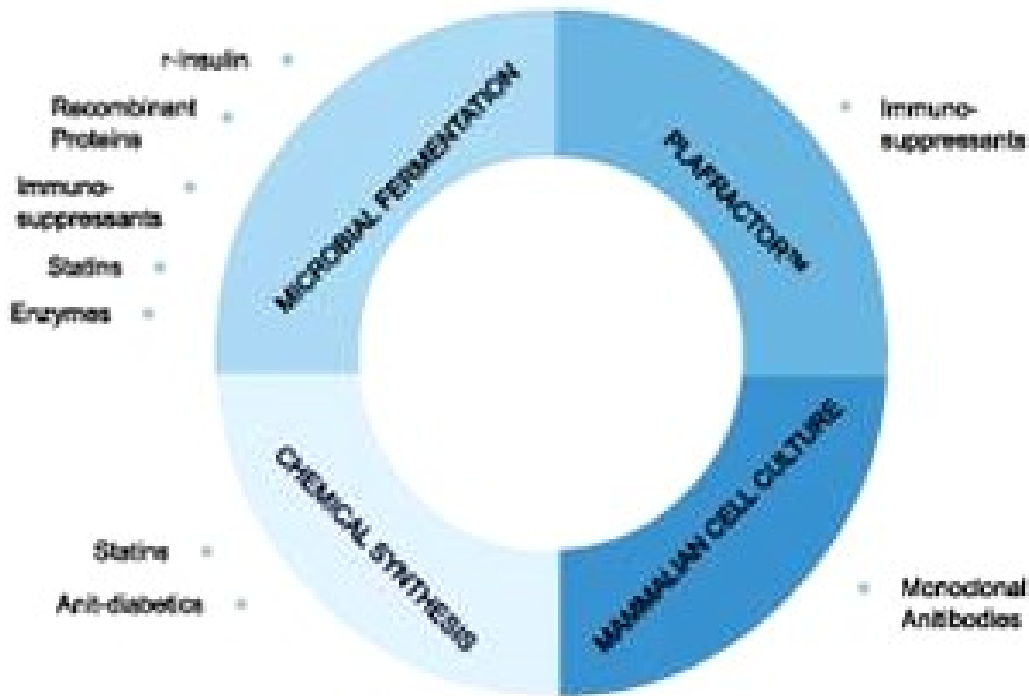


# Biocon is a fully integrated Bio-pharma company



Biocon is positioned to become a global player within the bio-pharmaceuticals space

# biocon's technology edge



**GENERIC  
BIOPHARMACEUTICALS  
(Short to medium term)**

- Develop non-infringing process technology
- Focus on drug molecules coming off patent
- Develop globally competitive process technologies

**COLLABORATIVE  
DEVELOPMENT/  
INLICENCING  
(Medium to long term)**

- Develop products in collaboration with other partners
- Share or contribute to part of the development costs-  
either clinical development or process development  
e.g.oncology MAbs

**DISCOVERY  
(long term)**

- Discover and develop New Drug Molecules  
(Small molecules, proteins and monoclonal antibodies)

# Oral insulin: Value added innovation

- **Non-invasive Insulins (Inhaled & oral) are emerging as potential growth drivers of the Insulin segment.**
  - **Oral insulin is reckoned to be the most acceptable of all insulin delivery routes both in terms of patient convenience as well as therapeutic benefit.**
- \*
- **Oral Insulin has the potential to enhance patient acceptance, patient compliance and thereby improved diabetes management.**
  - **Biocon will initiate Phase II Human Clinical Trials in 2007.**
  - **Biocon believes that its Oral Insulin will be an affordable Insulin.**

## **Biocon's first antibody: *BIOMAb EGFR*<sup>®</sup>**

- **BIOMAb EGFR<sup>®</sup> a novel Monoclonal Antibody, was launched on 16<sup>th</sup> September as India's first proprietary Biotech drug.**
- **BIOMAb EGFR<sup>®</sup> has received Regulatory Approval for the treatment of head & neck cancers**
- **Therapeutic advantages will be extended to Pancreatic, Colo-rectal, Lung, Breast & Brain tumors**
- **BIOMAb EGFR<sup>®</sup> has been priced as an affordable drug for Indian cancer patients.**

**Reaching the first goal post of the corporate mission**

## COMBINING INDIA'S COST ADVANTAGE WITH QUALITY



**Established one of the largest USFDA qualified Statins facility globally.**

## COMBINING INDIA'S COST ADVANTAGE AND INNOVATION



Commercialized the world's first *Pichia* derived rh-Insulin

## LEVERAGING INDIA'S COST ADVANTAGE TO DELIVER SCALE



**Installed Asia's largest rh-Insulin facility with in-house design and technology development**

## LEVERAGING INDIA'S COST ADVANTAGE TO BIO-MANUFACTURING



**Commissioned Asia's largest perfusion based mammalian cell culture facility for the production of antibodies**

# LEVERAGING COST & INNOVATION TO DELIVER AFFORDABILITY



**Biocon's first  
onco-therapeutic**

presenting

**BIOMAb** EGFR<sup>TM</sup>

TARGETS CANCER, EXTENDS LIFE

**Developed an affordable antibody for Indian cancer patients  
through indigenous clinical & technology development**

## MPACTING GLOBAL HEALTHCARE THROUGH AFFORDABLE DRUGS

<b>THERAPEUTIC</b>	<b>AVERAGE GLOBAL PRICE per DOSE (US\$)</b>	<b>AVERAGE INDIAN PRICE per DOSE (US\$)</b>	<b>PRICE DIFFERENTIAL%</b>
<b>R-HUMAN INSULIN</b>	<b>\$ 30 / 100 IU vial</b>	<b>\$ 6.50 / 100 IU vial</b>	<b>80%</b>
<b>EGFR ANTIBODY</b>	<b>\$25,000 PER TREATMENT</b>	<b>\$ 6000 PER TREATMENT</b>	<b>75%</b>
<b>RECOMBINANT STREPTOKINASE</b>	<b>\$ 150 / vial</b>	<b>\$ 10/ vial</b>	<b>95%</b>
<b>EPO</b>	<b>\$ 200 /2000 IU</b>	<b>\$ 10 /2000 IU</b>	<b>95%</b>

Thank You