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## The Biotechnology Market in India

October 2005



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## **The Biotechnology Market in India**

October 2005

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Prepared by the  
Market Research Centre  
and the  
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**Canada**

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## THE BIOTECHNOLOGY MARKET IN INDIA



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### EXECUTIVE SUMMARY

India is home to 280 biotechnology (biotech) firms with strengths in biopharmaceuticals, agri-biotechnology, stem cell research, bioprocessing and bioinformatics. With a significant pool of skilled researchers and scientists, India is also becoming a key destination for contract research and manufacturing, clinical trials, and collaborative research and development (R&D), particularly in the area of biopharmaceuticals. India's biotech industry, valued at \$1.4 billion<sup>1</sup> in the 2004-2005 fiscal year (FY)<sup>2</sup>, is forecast by the Government to reach \$6.5 billion by 2010.

The market outlook for biotech in India is favourable with the greatest opportunities for foreign companies available in health and agriculture. Emerging areas of research focus include applying transgenic technology to plants and livestock to stamp out diseases and improve productivity rates. The development of innovative biopharmaceuticals, such as pharmacogenomics and drug delivery systems, are also gaining ground. In terms of commercial biopharmaceutical products, demand is high for reagents, diagnostics—particularly high-tech test kits and those customized for the local market—and human, animal and poultry vaccines. Opportunities are also available for bioinformatic technologies that expedite research and development.

Canadian companies are well-positioned to offer a broad range of products resulting from Canadian R&D efforts, as well as provide joint-venture partnerships and commercialization expertise to firms and institutions in India. Canadian firms can benefit greatly from establishing partnerships with local companies as a means of gaining access to and finding success in this large market.

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<sup>1</sup> All monetary amounts are expressed in Canadian dollars, unless otherwise indicated. The conversion to Canadian dollars is based on the Bank of Canada's 2004 annual average exchange rate (Can\$1 = 0.02876 rupee).

<sup>2</sup> Ending on March 31, 2005.

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## THE BIOTECHNOLOGY MARKET IN INDIA



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### MARKET OVERVIEW

With more than 1 billion people, India is the world's second-most populous nation. It is the seventh-largest country in terms of area, measuring approximately 3.3 million square kilometres. India is also a nation of enormous ethnic, linguistic and cultural diversity; it officially recognizes 16 languages and is home to six major religions. Although the country is primarily rural, more than 60 million Indians live in the eight largest cities: New Delhi, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad and Pune. In total, there are 28 self-governing states and 7 union territories in the country. In 2004, real gross domestic product (GDP) growth was measured at 6.2% and totalled \$4.3 trillion.

In recent years, India has emerged one of the world's top up-and-coming biotech hubs. According to Ernst & Young, India was ranked 9<sup>th</sup> in 2004 among the world's leading biotech countries. The top country was the United States, followed by Canada and Germany in second and third place, respectively.

India's biotech industry was valued at \$1.4 billion in FY2004-2005, up 36% from FY2003-2004, with exports accounting for over 40% of revenues during this period. The local market is expected to reach almost \$1.7 billion by the end of 2005.

There are approximately 280 biotech firms in India specializing in biopharmaceuticals, biomanufacturing, agricultural biotech, industrial biotech, contract trials and research, stem cell research, and bioinformatics. Another 120 firms supply technology products to these biotech companies. The 2004-2005 fiscal year alone saw the addition of 46 new firms to the country's growing sector. The local industry employed 11 800 people that year, an increase of 31% from FY2003-2004.

**Table 1. Key Segments of India's Biotechnology Sector, FY2003-2004–FY2004-2005**

Subsector	Market Share 2003-2004 (%)	Market Share 2004-2005 (%)	Year on Year Growth (%)	Domestic Sales (\$ million)
Biopharmaceuticals	79.19	75.24	29.72	612.63
Agriculture	3.74	6.95	153.85	90.78
Services	7.91	8.96	54.55	10.06
Industrial Products	6.85	6.74	34.45	79.51
Bioinformatics	2.30	2.11	25.00	8.27

Sources: BioSpectrum. "Biotechnology: India Handbook 2005." 2005  
 Ernst & Young. "Biotechnology: India—Fastest Growing Free Market Democracy." 2005  
 Financial Express. "Biotech Clocks 39% Growth." April 4, 2005

India's biotech sector has, to date, not produced a significant number of biotech products. This situation is expected to change as local firms and governments focus on innovation while continuing to grow manufacturing capabilities to meet the shortage of biomanufacturing capacity in the world.

Significant expansion is expected from India's biotechnology sector, with a cumulative target of 500% growth over the next five years set by the Indian government. Expansion of the market is expected to be driven by government-backed initiatives to develop the biomedical research sector and add more biotech parks to foster the growth of new firms.

### **Clusters**

There are several regions with significant biotech capabilities in India. Overall, companies in the west of the country dominate in terms of sales with revenues totaling \$713.6 million in 2004-2005. This region is home to 113 biotech firms with major activity in Aurangabad (with strengths in agri-biotech and biomanufacturing), Mumbai (biopharmaceuticals and stem cell research), Ahmedabad/Vadodara (agri-biotech, biopharmaceuticals, enzymes, bioinformatics and contract research), and Pune (agri-biotech, bioinformatics, bioprocessing, stem cell research and vaccines).

The Southern region follows with revenues of \$561.6 million and 119 companies. This region has significant capabilities in bioinformatics, biopharmaceuticals and genomics, as well as marine biotechnology (Chennai), vaccines (Hyderabad), bio-diesels (Mysore) and industrial biotech (Bangalore).

Finally, the industry in the northern region reaped \$128.4 million in sales during 2004-2005 and is home to 48 firms. The key areas of activity are Delhi-Gurgaon-Noida (agri-biotech, biofuels, and genomics) and Lucknow (bioinformatics and biopharmaceuticals).

## **Key Factors Shaping Market Growth**

Key factors contributing to growth in the India biotechnology market include a significant domestic market for biotech products, a large and expanding drug industry, market compliance with internationally recognized regulations, and the forthcoming implementation of a national biotech policy that supports and actively promotes growth of the industry.

### Consumer Power

India's growing middle class and elderly population are having a significant impact on the market for biotech products, particularly biopharmaceuticals. The middle class, which accounts for 300 million Indians (approximately one third of the population), has been expanding since the 1991 government reforms opened the market to private investment. Members of this emerging economic class, as well as those from the upper class, have disposable incomes and can afford to pay for quality health care and products.

Increases in the ageing population and general life expectancy are also influencing market growth. Residents aged 65 and older account for 4.8% of the country's population; this percentage is expected to rise to 5.8% by 2010. In comparison to other developed countries, the percentage growth may seem low; however, in terms of overall population, this increase is significant for India. An increase in the population will contribute to an overall boost in demand for health-care services and, in particular, an expanded market for biopharmaceuticals.

### Intellectual Property Protection

In March 2005, India formally adopted patent protection for pharmaceuticals and biopharmaceuticals in compliance with the World Trade Organization (WTO)'s Trade Related Aspects of Intellectual Property Rights (TRIPS) law. This patent reform, in addition to growing compliance with internationally harmonized standards such as Good Laboratory Practices (GLP) and Good Clinical Practices (GCP), are expected to boost India's standing in the global market, placing it in a key position to expand its research-based industry.

### Government Support

In recent years, several national and state supported initiatives to encourage growth of the biotech sector have been launched in the form of investment incentives, duty exemptions, rebates on R&D, and tariff and non-tariff relief.

Since 2001, several state governments<sup>3</sup> have enacted biotech policies that outline targeted initiatives and goals for the local industry. Only recently has India's Department of Biotechnology (DBT)<sup>4</sup> unveiled the National Biotechnology Development Strategy (<http://dbtindia.nic.in/biotechstrategy.htm>). The draft document, released March 31, 2005, proposes initiatives to proactively foster the expansion of the local industry over the next 10 years. The comprehensive plan addresses concerns about various aspects of the industry with the objective of providing direction for continued growth of and innovation in the sector.

Highlights of the Strategy include:

- an outline for the creation of a single body to oversee regulatory matters. The proposed National Biotechnology Regulatory Authority would be divided in subgroups to take on regulatory issues related to specific biotech subsectors (e.g. agri-food, industrial products, health products);
- measures to unify, streamline and provide clarity on regulatory issues, including the establishment of regional technology transfer cells;
- an action plan for human resource development;
- a proposal to continue all existing fiscal incentives for biotech industries up to 2010, as well as the implementation of new financial and tax incentives for expanding companies;
- the creation of centres of excellence in animal biotech, marine biotech, bioinformatics, and biomedical units focussed on herbal and molecular medicine;
- support for clinical research activities (up to 30% of the biotech R&D budget will be spent through public-private partnership); and
- a recommendation for the establishment of at least 10 new bioparks by 2010 and the creation of the Biotechnology Parks Society of India, which will be modelled after the Software Technology Parks of India—a group that helped to expand India's high standing in the world's information technologies (IT) industry. Grants will also be provided for associated incubators.

The Strategy also proposes measures to:

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<sup>3</sup> Among those states that have adopted their own biotech policies are Andhra Pradesh, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab and Tamil Nadu.

<sup>4</sup> For contact information regarding key organizations mentioned in this report, see **Key Contacts and Support Services**.

- attract foreign direct investments<sup>5</sup>;
- promote India's biotech industry internationally; and
- enhance research focus in emerging areas such as marine biotech and agri-biotechnology.

The final version of the Strategy<sup>6</sup> will include a detailed timetable for the implementation of the various provisions.

### Challenges

Although India's biotech sector shows great promise for continued expansion, there are a few hurdles barring immediate success. For one, there is a need for skilled researchers. India has a significant domestic scientific talent pool to draw from but the expanding industry, particularly in the areas of drug innovation and bioinformatics, requires more trained personnel than are currently available.

In addition, the local industry appears to lack focus when it comes to the R&D. Not only is there significant overlap in research being conducted at institutions throughout the country, but the focus of these research projects is extremely broad; while ambitious, it makes it difficult to both hone strong capabilities in specific areas and target funding, including foreign investments.

The industry is also hindered by a lack of venture capital (VC) funding for emerging companies. Historically, the limited VC funding that has been available in India has not gone to start-up firms. In May 2005, however, the International Finance Corporation committed \$5 million in VC capital to fund start-up biotech firms. Also, in the first quarter of 2005, the Government of Gujarat, through Gujarat Venture Finance Ltd., set up the Rs. 50 crore Gujarat Biotechnology Venture Fund to provide financial investments to early stage companies.

### **Opportunities**

Canada's biotech capabilities in human and animal health, bioinformatics, agri-biotech and bioproducts might all find opportunities in India. Canadian companies have the knowledge and experience to provide joint-venture partnerships and commercialization

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<sup>5</sup> Growth of the biotech sector is largely dependant on foreign direct investment. Total investments directed toward India's biotech sector amounted to \$178.3 million in FY2003-2004, accounting for a 25% increase over the previous year. In FY2004-2005, the total saw a tremendous leap of 79% with investments amounting to \$320 million. With strong sector sales expected during FY2005-2006, investments are projected to increase significantly.

<sup>6</sup> A release date for the final version of the Strategy was not available at the time of publication.

expertise to India's biotech industry, as well as a broad range of products resulting from Canadian R&D efforts.

### Biopharmaceuticals

India's biopharmaceutical sector is expected to undergo significant changes, resulting from its recent adoption of the WTO patent regime. Local firms are gearing up for significant competition from foreign firms but they also aim to capitalize on this change by embarking on ways to prosper under the new regulations. Product development with foreign firms is one key area on which the domestic market will focus. Opportunities for foreign biopharmaceutical firms for joint ventures in R&D are set to increase significantly in the coming years. Collaborative opportunities lie in drug discovery, drug delivery systems, bioprocessing and clinical trials. Research efforts will largely focus on diabetes, infectious diseases and cardiovascular diseases as well as novel treatments, such as those derived through pharmacogenomic research, that target specific populations. Biopharming, the use of pharmaceutical plants, is also a growing area of research. In addition, Indian scientists will be focussing efforts on the improvement of traditional medicines through biotech applications.

Demand is high for a number of biomedical products. In terms of sales in the local market, biopharmaceuticals targeting chronic diseases (cancer, diabetes, cardiovascular diseases, and central nervous system diseases) will see the strongest growth among all segments in the coming years. Also, potential for recombinant therapeutics, particularly for insulin and Hepatitis A and B, will be significant in the market.

The Indian reagent market, now worth \$14-20 million, is growing at an annual rate of 25%. At present, standards by local firms are not fully globally compliant; as a result, imports remain highly desired.

Opportunities for diagnostics, particularly high-tech test kits, are strong, with half of the \$260-million local market coming from imports. Key areas of market growth are for pregnancy tests, immunodiagnostics, as well as diagnostics for infectious diseases such as tuberculosis, Human Immunodeficiency Virus (HIV) and malaria. Significant opportunities are also available for diagnostics that are customized for the local climate and various strains of microbes. Currently, many imported diagnostics have proven ineffective because they were not created with Indian conditions in mind.

India offers a large market for vaccines. Although local production of vaccines is strong, biotech development and production is expected to expand in many areas to meet demand, particularly in the development of effective vaccines to combat Hepatitis A and B, polio, meningitis, typhoid and influenza. Opportunities for animal and poultry vaccines are also rising.

## Bioinformatics

The demand for information processing in biomedical research is rapidly expanding. It is estimated that bioinformatics can reduce the R&D expenditures of pharmaceutical companies by 33% within three years, compared to companies using traditional approaches to drug development without bioinformatics. Likewise, development time for drug discovery can be reduced by 30% over the same period.

India's growing biotech research capabilities, coupled with its established IT infrastructure<sup>7</sup>, has provided to be an ideal environment for the development of bioinformatic tools. The convergence of life sciences and information technologies is helping pharmaceutical and biopharmaceutical companies to overcome the challenge of collecting, storing, processing and analyzing data in the drug development process, while creating market opportunities for bioinformatics and other computer and software companies.

Potential buyers and partners seek technologies that expedite and reduce the cost of their own research and development. Thus, demand for easily integrated, data mining and gene annotation tools is growing. Business opportunities also lie in the development of software bioinformatic interfaces.

Major multinational drug companies, many of which are expanding R&D activities to India, are investing in their own bioinformatics, which could provide significant opportunities to Canadian companies. These firms tend to have larger R&D budgets (as well as larger annual turnovers) than many Indian biotech firms and are, therefore, in a stronger position to purchase products and services from foreign firms. Large firms may look to smaller companies for access to novel technologies and will support the R&D process in order to participate in the commercialization of resulting products.

Bioinformatics is also finding applications in a wide variety of industries beyond pharmaceuticals. Significant commercial potential exists in the use of platform technologies by plant genomics researchers, for example.

## Agricultural Biotech

The Indian government is looking toward biotechnology to increase the production of pulses and grains, and other key crops, to meet demand by the growing population. It is hoped that through improvements and research in biofertilizers, biopesticides and biofortifications, crop yields will increase. Currently, biofertilizers and biopesticides together make up a \$22.5-million market in India.

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<sup>7</sup> India has one of the world's most-advanced IT industries. India's IT revenues in 2004 reached approximately \$23.4 billion.

Canada's strengths in applying biotechnology to agricultural and marine commercialization may be of interest to producers and researchers in India. Opportunities exist for companies producing biotech-derived products that enhance quality and yield and eradicate diseases. The development of innovative pharmaceuticals derived from plant and marine life is also gaining ground. Canada's experience and strength in applying biotechnology to improving output in these areas gives Canadian companies a competitive advantage in the market.

The Government of India announced that it plans to establish three autonomous national institutions for key subsectors of agricultural biotechnology: marine biotech, food biotech and livestock biotech. Opportunities for Canadian scientists for research partnerships could open as the Government expands focus in these areas.

### Additional Opportunities

Enzymes is another notable bioproduct category offering potential opportunities. The pharmaceutical sector is the main consumer of enzymes in India, accounting for roughly 50% of the country's sales in FY2004-2005. Other major sectoral users of enzymes include the food processing, textile, detergent and beverage industries.

## **COMPETITIVE ENVIRONMENT**

### **Local Capabilities**

India's Association of Biotechnology Led Enterprises (ABLE) reports that the strongest areas of exports for the local industry are vaccines, statins and contract research and trial services. Together, these products and services accounted for 42% of India's biotech exports in 2004.

### Biopharmaceuticals

India's biotech exports in FY2004-2005 totalled \$591.9 million with biopharmaceuticals accounting for close to 75% of total exports. This marked a 30% growth from the previous year and is expected to have a positive impact on VC and foreign direct investments into the sector.

Domestic capabilities are strong in vaccines, statins and therapeutics. Development is focussed on recombinant technology-based biologics, biogenerics, diagnostics and veterinary biotechnology.

At \$480 million, vaccines accounted for almost 50% of the country's biopharma sales in FY2004-2005. Strengths lie in treatments for measles, Hepatitis B, oral polio, mumps, rubella, rabies, measles, rabies and polio. Vaccines are currently being developed locally for Hepatitis C and E, tuberculosis, typhoid, malaria and Anthrax. Other notable

innovations in this area are plant-based vaccines by Shantha Biotechnics and Panacea Biotec's ready-to-inject stable liquids, which do not require refrigeration, to replace existing vaccines.

Local R&D in therapeutics focusses on treatments for malaria, cancer, heart diseases, tuberculosis and HIV/AIDS. Approximately 25 licences have been granted for recombinant therapeutic proteins including insulin, human growth hormones and erythropoietin. Recombinant therapeutic proteins accounted for 20% of biopharmaceutical sales in FY2004-2005.

Biocon, specializing in the development of biopharmaceuticals, statins and enzymes, is India's top biotech firm. Other key biopharmaceutical companies include Serum Institute of India (vaccines, therapeutics), Panacea Biotec (vaccines and biopharmaceuticals), Bharat Serums and Vaccines Ltd. (vaccines), Shantha Biotechnics (vaccines and therapeutics), Shantha Marine Biotechnologies Pvt. Ltd. (algae-based nutritional supplements), Manipal Acunova (biopharmaceuticals and stem cell research) and Wockhardt (biopharmaceuticals). Several leading domestic pharmaceutical firms are also active in biotech research including Nicolas Piramal India Ltd., Dr Reddy's and Ranbaxy Pharmaceuticals Inc.

Leading domestic firms have extensive expansion plans set for the coming years. Biocon, for example, will build a new research facility focussing on custom drug development, and Intas Pharmaceuticals is launching a facility for animal cell culture-based protein production.

### Bioinformatics

In 2004, India held 2.5% of the global bioinformatics market. The local industry aims to increase its share of the world market but labour demands will have to be met in order to do so. It is estimated that India will require as many as 6500 persons trained in the field by FY2008-9 with a further expanded sector work force of 26 000 people by 2013 in order to meet targets. Currently, most of the 27 local bioinformatic firms are small and medium-sized companies with 25-200 employees.

Domestic capabilities in bioinformatics centre on information storage, simulated sequences and data mining. The leading firms are BigTec, CytoGenomics, Jalaja Technologies, Infosys Technologies, Ltd., Helix Genomics, Kshema Technologies, SciNova Technologies, VLife Sciences, Strand Genomics and Mascon Life Sciences.

The Department of Biotechnology, through the Bioinformatics Policy of India, has designated bioinformatics as a priority area for growth within the biotech sector. The Policy includes strategies for promotion, partnerships, capacity and human resource building and R&D policies to aid in the international expansion of the local industry. Assuming that the goals are met, the Government hopes to have a \$13-billion industry by 2009.

## Bioproducts and Industrial Biotech

The local bioindustrial industry is largely focused on enzyme production. Companies produce various enzymes such as amylases, proteases, glucoamylases, bromelian, catalases and several other eco-friendly biological products. Biocon is the top player among the 17-20 firms in the market. Other leading local companies are Advanced Biochemicals Ltd., Rossari Biotech, Celestial Labs and Maps India Ltd. Multinational firms such as Novozyme (Denmark), Genencor International (U.S.) and Quest International (the Netherlands) are also active in the market.

Biometrics<sup>8</sup>, currently a \$3.9 million market in India, is slated for significant growth, with annual increases of at least 10-11% anticipated. A biometric terrorist-proof security system was recently developed by the Bhabha Atomic Research Centre (BARC). The Hand Scan Biometric System ensures that work zones are protected from unidentified persons.

## Agricultural Biotech

The livelihood of almost three quarters of India's population is dependant on agriculture. India is a biodiverse country with more than 81 000 species of animals and 47 000 species of plants. Moreover, approximately 1.6 million square kilometres are devoted to crop production in the country. India's leading agricultural products are wheat, rice, cotton, oilseed, tea, sugarcane, potatoes and livestock such as sheep, goats, cattle, and poultry, as well as fish.

In terms of agricultural biotechnology, the focus of the local industry is diverse, with research targeting seeds, fermentation technology, biofuels, biopesticides, biofertilizers<sup>9</sup> and genetically modified (GM) seeds and products. The agricultural biotech sector, while relatively small, saw the largest growth in revenues—154%—among all subsectors in 2004. The growth resulted largely from bacillus thuringiensis (Bt) cotton sales.

GM cotton was first introduced into India in March 2002. In 2004, 500 000 hectares of Bt cotton—the only commercial GM crop permitted in India to date—were grown in the country, representing 1% of total global biotech crops and making India the seventh-largest GM grower in the world.

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<sup>8</sup> Biometrics is becoming more widely used for user authentication in electronic commerce, and by governments for security and verification purposes, such as during elections to ensure persons are not voting twice.

<sup>9</sup> A biofertilizer bill will be tabled during the fall 2005 session of the Andhra Pradesh State Assembly. Biofertilizers are seen as a key component for crop improvement.

The Genetic Engineering Approval Committee (GEAC) approved 20 Bt cotton varieties<sup>10</sup> for sowing India in 2005; a significant increase from the 4 varieties that were permitted in 2004. However, the number of strains available for cultivation varies from region to region within the country. Growers in the central area of India had the most hybrids to choose from, with 12. The southern region had their selection from 9 types with the exception of Andhra Pradesh growers, who had 7 varieties to select from (the State banned 2 varieties that failed there last year). Growers in the north were able to select from 6 varieties. A total of 1.34 million hectares of Bt cotton was planted in Andhra Pradesh, Karnataka, Maharashtra, Gujarat, Chhattisgarh and Tamil Nadu this year.

India is expected to become a more visible participant in agricultural biotech. As in China and other developing countries, agri-biotech is seen as a path to economic sustainability, and a viable option for feeding large and growing populations. Indian officials, however, are exercising caution before widely embracing GM crops, as they balance the commercial potential with potential consequences.

Concerns regarding GM foodstuffs might be alleviated when significant contributions to the sector are made by the local researchers. Tests on GM seeds for potatoes, rice, mustard and tobacco are being conducted in various state-run research institutes<sup>11</sup> throughout the country. It is estimated that these crops will not be sown commercially for at least another three to four years.

Among the leading agri-biotech institutes is the Central Food Technological Research Institute (CFTRI) in Mysore, which is home to 16 food science research departments, including a plant cell biotech department. R&D at the CFTRI focusses on a number of areas that are likely to benefit the agri-biotech industry such as fermentation, pre- and post-harvest technologies and bioprocessing.

Ongoing research is also being carried out by the private sector. The country's leading domestic biotech firms in the agriculture arena include Venkateshwara Hatcheries (poultry vaccines), Mahyco Monsanto (seeds), Rasi Seeds (seeds) and Indian Immunologicals (animal vaccines).

India also has growing capabilities in the development of biofuels. Southern Online Bio Technologies is building the first commercial biodiesel production plant in India. The plant will convert waste from more than 30 farms in the Hyderabad region and will produce environmentally friendly diesel. In terms of research, the International Crops Research Institute for Semi-Arid Tropics signed an memorandum of understanding (MoU) with Nandan Biometrix Ltd. (Hyderabad) in early 2005 for a bio-fuel project. The

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<sup>10</sup> Cotton varieties are provided by Monsanto, Syngenta Seeds India, Nath Seeds and JK AgriGenetics.

<sup>11</sup> A list of research institutes specializing in agri-biotech research can be obtained from the International Service for National Agricultural Research at <http://www.isnar.cgiar.org/arrow/Asia/India.htm>.

two will collaborate on the R&D of medicinal plants and bio-fuel to be grown on wasteland. Also, researchers from Labland Biotech (Mysore) and the National Institute of Technology in Karnataka are together working on improving the quality of bio-diesel derived from jatropha, a sub-tropical shrub. With oil prices rising, several leading domestic oil firms such as Reliance Industries Ltd., ONGC and the Indian Oil Corporation are diversifying into the bio-diesel sector as well.

### Services

Outsourcing is big business in India, particularly for pre-clinical and clinical research. India's exports of bioservices in FY2004-2005 were high with \$115.6 million in sales.

Contract research by Indian biotech and pharmaceutical firms is burgeoning. With R&D costs running at approximately one fifth of costs in the United States, India is a low-cost location for R&D. Moreover, drug development in India takes almost half of the time that it does in the United States (12.5 years). The outsourcing of drug (including biopharmaceuticals) R&D to India, currently valued at \$1.3 billion, may reach \$8-13 billion by 2010 as a result of an increase in spending by international drug companies. In terms of biotech outsourcing, India is expected to garner deals from foreign firms in the areas of genetic research, early-stage drug development and agri-food, specifically in the development of new crop varieties.

A focus on developing expertise and marketing the cost savings in clinical research is also afoot<sup>12</sup>. Clinical trials conducted in India are cost effective—approximately 50-60% less expensive than in North America or Europe—and considerably faster, by several weeks, compared to those markets. And with almost 600 ethnic groups, India offers a broad pool of people with which trials can be conducted, which makes the country a key destination for clinical testing. Trials also benefit from patients who have tried little or no remedies, so that results are not skewed by the influence of other drugs. The country currently has between 500 and 1000 clinical trial investigators but needs more to meet its goal of tripling its trial services to \$390 million by 2010. Indeed, the industry may have to increase personnel in this area six times over.

### Biomanufacturing

India is also becoming one of the top destinations for biomanufacturing due to its high-quality production capabilities, cost effectiveness and recent adoption of international intellectual property protection laws. The country has the largest number of U.S. Food and Drug Administration-approved facilities in the world, outside of the United States. In fact, approximately eight companies in India have the capacity to produce biologics in-house.

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<sup>12</sup> The market for clinical trials is forecast to reach \$1.3 billion by 2010.

Biomanufacturing is largely centred on the production of drugs (proteins, not monoclonal antibodies) and enzymes. Biomanufacturing is expected to see tremendous growth in the coming years with an anticipated 19% increase by 2007 over the forecast 2005 total, \$879.2 million.

### Research and Development

India has strong R&D competencies in a number of areas including stem cell biology, DNA technologies (fingerprinting, molecular markers for plants), genetic engineering, innovative drug design and delivery systems, and bioinformatics. Biotech R&D greatly benefits from the 200 research institutes<sup>13</sup> and the Biotechnology Information System Network (BTISNet), which was established in the early 1990s and now has a network of 61 centres throughout India.

India is home to a scientific community that comprising 4 million people, the second-largest English-speaking scientific work force in the world, behind the United States. Approximately 700 000 post-graduate and 1500 doctoral students complete their education in engineering and biotechnology<sup>14</sup> every year. The sector also profits from India's 221 medical colleges. Moreover, the country is home to a large pool of software programmers and statisticians—ideal for the growing bioinformatics industry.

In terms of research, India's expanding biotech sector is expected to have a huge impact on domestic drug development. Significant growth in the sector may see total revenues reach \$6.9 billion within the next five years. Although the Government has been encouraging the growth of the biotech sector, the country's intellectual protection stance had been a large barrier hindering expansion. With the new TRIPS compliancy, the sector is expected to be highly favoured by foreign firms and investors.

Leading pharmaceutical firms in India invested \$431.4 million in drug delivery and development research in 2004. Raxbury (\$95.2 million) and Dr. Reddy's (\$81.3 million) were the top spenders. The leading biopharmaceutical firms investing in R&D include Wockhardt (\$27 million), Biocon (\$7.7 million) and Panacea Biotec (\$6.9 million).

Genetic engineering is the focus of 165 institutions in India. A little over half of these institutions are involved in basic research, while transgenics (55 institutions) and therapeutics (25 institutions) are the focus of the remainder of the facilities. Advances in genomics, tissue engineering and proteomics will have a significant impact on developing novel therapeutics.

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<sup>13</sup> A list of key research institutes is available in **Key Contacts and Support Services**.

<sup>14</sup> More than 50 biotech programs are offered in higher-education institutes throughout India.

## Stem Cell Research

India has great potential for stem cell research expansion due to its prolific gene pool, which accounts for 6-7% of the world's biodiversity. During FY2004-2005, stem cell projects were conducted in 15 laboratories in India. These projects received a total of \$5.9 million in government funding.

The local health sector is hoping to embrace stem cell therapy for treatments targeting diabetes, stroke, Parkinson's disease, and nerve diseases, as well as other diseases affecting the general Indian public. Among the leading institutes conducting adult and embryonic stem cell research are the National Centre for Cell Science (Pune), LV Prasad Eye Institute (Hyderabad) and the Centre for Cellular and Molecular Biology (Hyderabad). Many institutes in Bangalore are delving into stem cell research including the Indian Institute of Science, Manipal Hospital, Narayana Hrudayalaya, and St. John's Medical College. Sagar Apollo Hospital and MS Ramaiah Hospital are also slated to open stem cell research centres. The All India Institute of Medical Science is focussed on stem cell research targeting cardiac disorders and, in March 2005, pioneered stem cell medicine by injection.

Banks to house stem cells from the umbilical cords of human newborns are growing in popularity throughout India. Parents are opting to have their baby's stem cells stored for use—if needed—later in the child's life. In June 2005, the Government of Maharashtra announced that it had entered into a joint venture with South Korean biotech firm Histostem<sup>15</sup> to establish a national stem cell bank and process centre in Mumbai. Similar centres are also to be set up in Chennai, Kolkata and New Delhi to capitalize on India's large annual birth rate (approximately 25 million births per year).

Under current guidelines, India permits the use of human embryos in stem cell research. Also, therapeutic cloning is permitted but human cloning is not. Updated guidelines for stem cell research in the country will be finalized in 2005 by the Department of Biotechnology.

## Biotech Parks

Under India's Foreign Trade Policy 2004-2009, provisions have also been made to set up biotech parks. With these facilities, the Government of India expects to replicate the same success that was attained by the IT sector following the push to establish IT parks.

Biotech parks are quickly springing up throughout the country. Already there are several notable parks devoted to biotech development: Shapoorji Pallonji Biotech Park

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<sup>15</sup> Histostem has also partnered with Apollo Hospitals (New Delhi) to collaborate on the development and trials of new therapies derived from stem cell technology.

(Hyderabad), ICICI Knowledge Park (Hyderabad), Lucknow Biotech Park (Lucknow), Marin Biotech Park (Visakhapatnam) and Tichel Biotech Park (Chennai). At least 17 states—Andhra Pradesh, Chandigarh, Gujarat, New Delhi, Haryana Pradesh, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttaranchal and West Bengal—are ensuring the growth of their respective industries by establishing bioparks and by providing business incentives. For example:

- Punjab is planning to establish a biotech park through a private-public partnership between the state government and Beckons Industries Ltd., a New Delhi-based industrial biotech company focussed on health food. The park has received grants to set up a biotech incubator, as well. The incubator will house a testing centre for agri-biotech products and will focus research efforts on medicinal plants.
- The International Biotech Park in Pune will open in October 2005. Among the tenants will be a U.S.-based start-up firm.
- Rajasthan is developing three biotech parks and a comprehensive biotech policy for the state.
- The Government of Andhra Pradesh is setting up the Biotechnology Incubator Centre in partnership with the federal government. Andhra Pradesh is also home to the country's first agri-biotech incubator and the first biodiesel plant, which was set up in collaboration with U.S. and Austrian firms.
- Andhra Pradesh is also planning to set up its own department of biotechnology by 2006. The International Institute of Life Sciences will be the first state-run biotech department. The department will support and oversee the expansion of the sector in the state.
- The Government of Gujarat has established the Gujarat State Biotechnology Mission to promote development of the industry in the state. Also, the first phase of the International Pharma and Biotech Park in Gujarat is expected to be completed by December 2005.

It should be noted that under recent amendments to India's Foreign Trade Policy 2004-2009, biotech firms located in domestic parks are eligible for duty exemption on imports of equipment, consumable goods and instruments, as well as tax holidays under Section 10A/B of the federal Income Tax Act.

## International Competition

International collaboration is vital to continued biotech growth in India. The country has signed bilateral agreements with several countries, including Australia, Brazil, Denmark, France, Germany, Israel, Russia, Singapore, Sri Lanka, Sweden, Switzerland, Thailand, Venezuela, the United Kingdom and the United States. Potential agreements with the European Union, Ukraine and Tunisia are under consideration. India has also signed a multilateral agreement with the South Asian Association for Regional Cooperation (SAARC) which includes Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

India faces significant competition from other evolving biotech markets in Asia, particularly China and Singapore. India, however, has so far surpassed China as a destination for manufacturing outsourcing. In April 2005, India and China signed a strategic alliance agreement to end border disputes and facilitate trade between the two countries.

With the local market poised to flourish, foreign biotech firms and governments are looking to strengthen their relationship with India in the area of biotechnology. The United Kingdom, for example, is planning to work with India on stem cell research for the treatment of diseases. Governments in both countries allow human embryos to be used in this type of research, which makes collaborative efforts much easier. In addition, two U.K.-based firms signed memorandums of understanding (MoUs) with Indian firms in the first quarter of 2005. Under the two pacts, between Zenosis Limited (U.K.) and Edu Tech of India Private Limited and Shantha Biotechnics (India) and PolyTherics Ltd. (U.K.), the companies will collaborate on drug development and the U.K. firms will assist in the technology transfer and international marketing of Indian-made biopharmaceuticals.

The U.S. and Indian governments are co-operating in numerous areas of biotech and defence. U.S. firms are particularly active in India, signing joint-venture and in-licensing agreements as well as continuing to outsource trial and manufacturing activities. The Indian industry association ABLE opened a chapter in the United States to further co-operative ties.

Novo Nordisk (Denmark), Sanofi Aventis (France), GlaxoSmithKline (U.K.), Roche (Switzerland), Eli Lilly and Company (U.S.) and Novozymes (Denmark) are among the many drug multinationals with a presence in India.

Recent joint-venture agreements have also been signed with firms in Malaysia, Israel and the United States. Some companies, such as Shreye Life Science (Russia), MWG Biotech (Germany), Syngenta (Switzerland), Pfizer (U.S.) and CHR Hansen (Denmark), are gaining access to the market by opening facilities in India.

The United States is the global leader of genetically engineered crops, growing 47.6 million hectares in 2004. This total far surpassed those of Argentina (16.2 million hectares) and Canada (4.4 million hectares), the next-largest GM crop producers. India ranks eighth in terms of key biotech crop countries<sup>16</sup> but with a 400% increase, saw the largest growth in GM cotton plantings among all nations in 2004. Despite these impressive gains, China remains the leading GM producer in Asia, with 3.7 million hectares planted in 2004.

Indian scientists were among the contributors to the International Rice Genome Sequencing Project. The project, which included 250 researchers from India as well as Brazil, China, France, South Korea, Taiwan, Thailand, the United Kingdom, and the United States, identified a total of 35 000 genes in the rice plants—making rice the first crop to have its genetic blueprint identified.

### **Canadian Position**

Canada has positioned itself as a leader in several fields of biotech research and product development, particularly related to human health and agriculture. This strength can be leveraged to supply India's biotech market with raw materials, and products and services, including contract manufacturing. The Canadian biotech industry has flourished over the last few years. In 2004, there were more than 500 biotech companies in Canada with \$2.6 billion in combined revenues.

Recent agreements have been signed between biotech firms in Canada and India:

- Nicholas Piramal India Ltd. (NPIL), a leading Indian drug producer, announced in July 2005 that it purchased a 17% share of Laval, Quebec-based BioSyntech. The move allows Nicholas Piramal to in-license BioSyntech products for the Asian marketplace. In addition, the companies have agreed to explore opportunities to collaborate on R&D activities with respect to future products by NPIL using BioSyntech's technology platforms.
- NPIL is expected to conduct clinical trials in Canada this year on cancer treatment from medicinal plants.
- Ranbaxy Pharmaceuticals Inc. announced in July 2005 that it would be opening a sales office in Mississauga, Ontario. Ranbaxy investments into Ontario's biotech sector are likely in the offing.
- Saskatoon-based nutraceuticals specialist Bioriginal Food & Science Corp. signed an MoU with Beckons Industries Ltd. for joint research and

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<sup>16</sup> This group includes 14 nations that each plant more than 50 000 hectares of GM crops.

manufacturing. In addition, the two companies are setting up organic seed extraction facilities in Punjab.

Federal and provincial government partners have also been very active in India. Canada's Minister of Natural Resources led a large business delegation to India in November 2002; in February 2003, the President of the National Research Council led a group of senior scientists to India to enhance linkages in science and technology; at the same time, the Ontario Minister for Enterprise, Opportunity and Innovation led a delegation of companies active in the infrastructure and transportation sectors to India; and a number of ministerial visits took place in October 2003, culminating in an official visit by the Prime Minister who, with his Indian counterpart, issued the Canada-India Joint Statement ([http://www.dfait-maeci.gc.ca/new-delhi/can\\_india\\_statement-en.asp](http://www.dfait-maeci.gc.ca/new-delhi/can_india_statement-en.asp)).

Three key announcements were made this year:

- In June 2005, the Government of Canada announced the International Science and Technology Partnerships Program, which will promote collaborative R&D between Canadian and foreign scientists and technologists in areas such as biotechnology, the environment, energy, and information and communications technologies. The Program will also stimulate bilateral science and technology networking and matchmaking activities to further new partnerships and accelerate the commercialization of research and development. The five-year, \$20-million program is aimed at building science and technology relationships with selected countries including India Brazil, China and Israel.
- In May 2005, two MoUs were signed between parties in Saskatchewan and Punjab. Punjab state officials signed an MoU for agricultural biotechnology with the University of Saskatchewan. This 5-year co-operation agreement will focus on technology linkages and joint efforts in crop research and processing improvements, with a focus on cereal and pulse improvements. The second MoU involves the Punjab Biotechnology Park Ltd. and Saskatoon's UMA Engineering Ltd. UMA will assist in the development of a biotech facility in Chandigargh.
- In February 2005, the National Research Council of Canada signed an MoU with the Confederation of Indian Industry for joint ventures of development in the areas of life sciences, renewable energy and industrial nanotechnology. Not only will this agreement assist in opening investment channels, it also places Canada in a key co-operative position to benefit from India's low-cost operations for drug development and trials.

The Government of Canada is also fostering new links between think tanks and similar institutions by working with groups such as the Asia-Pacific Foundation of Canada (APFC). The APFC has completed several major trade studies. The deepening commercial and economic relationship between India and Canada is also embodied in

several bilateral business organizations, such as the Canada-India Business Council and the Indo-Canada Chamber of Commerce.

### **Competitive Advantage through Canadian Government Policies and Initiatives**

Growth in the Canadian biotech sector is fostered by consistent industry investment in R&D, financial support by private and public agencies, a solid regulatory framework, strong human resources, and general public acceptance of biotech-derived products. Canada's positive relations with the world's most prominent economies and its global reputation for scientific excellence give Canadian biomedical companies an advantage in expanding their businesses to the market in India.

#### ***Canada Foundation for Innovation***

The Canada Foundation for Innovation (CFI) is an independent corporation established by the Government of Canada to strengthen Canadian capability for research, including in the biomedical field. Its mandate is to increase the capability of Canadian universities, colleges, hospitals and not-for-profit institutions to carry out world-class scientific research and technology development. The CFI promotes innovation by investing jointly in research infrastructures with institutions and their funding partners. More information is available at <http://www.innovation.ca>.

#### ***Canada Research Chairs Program***

The Canada Research Chairs Program is the most ambitious initiative of its kind in the world, allowing Canadian universities to attract and retain outstanding researchers. Funded by the Government of Canada, the program gives researchers the opportunity to mentor and train top graduate students. More information is available at <http://www.chaires.gc.ca>.

#### ***Canadian Commercial Corporation***

The Canadian Commercial Corporation (CCC) gives Canadian companies access to financing and better payment terms under the Progress Payment Program (PPP). The PPP concept was developed as a partnership between major Canadian financial institutions and the CCC. It enables the exporter's bank to open a project line of credit for the exporter's benefit, based on CCC approval of the project and the exporter's ability to perform. The CCC will also act as a prime contractor on behalf of Canadian small and medium-sized enterprises (SMEs), giving those businesses increased credibility and competitive advantage.

### ***Canadian Institutes of Health Research***

The Canadian Institutes of Health Research (CIHR) is the major federal agency responsible for funding health research in Canada. The CIHR uses a multidisciplinary approach through a framework of “virtual” institutes, each dedicated to a specific area of focus. This links and supports researchers and helps them pursue common goals. The institutes encourage researchers, voluntary health organizations, government and other partners to work together to shape the Canadian research agenda and translate research findings into practice within Canada's health system. The CIHR funds grants and training and actively engages in equal partnerships with the not-for-profit sector, provincial governments, industry and pharmaceutical companies. More information is available at <http://www.cihr-irsc.gc.ca>.

### ***Export Development Canada***

Export Development Canada (EDC) offers export financing and insurance to Canadian exporters. Additionally, insurance can be provided for larger transactions that are subject to the terms and conditions established by the buyer. EDC prefers to work through letters of credit, bank credits or bank guarantees. Approval for financing is considered on a case-by-case basis. Further information is available from EDC's Internet site at <http://www.edc.ca> or by calling, toll-free, 1-866-283-2957 (for companies with annual export sales up to \$1 million) or 1-866-278-2300 (for companies with annual export sales more than \$1 million). EDC also has a representative office in the Canadian High Commission in New Delhi (see the **Key Contacts and Support Services** section for more details).

### ***Genome Canada***

Genome Canada is the primary funding and information resource relating to genomics and proteomics in Canada. This federally funded organization has established five genome centres across the country—in Calgary, Halifax, Montreal, Toronto and Vancouver—at which biomedical research, development and application are key components.

Genome Canada invests in and manages large-scale collaborative research projects aimed at studying and analyzing the ethical, environmental, economic, legal and social issues related to genomics research in agriculture, the environment, fisheries, forestry, health and new technology development. More information is available at <http://www.genomecanada.ca>.

### ***International Business Opportunities Centre***

The International Business Opportunities Centre (IBOC) connects Canadian companies, particularly SMEs, with foreign buyers through its unique company matching service. In providing its business lead service, IBOC works closely with the Canadian Trade

Commissioner Service, which consists of trade officers located in Canadian embassies and consulates around the world. The business opportunities are handled on a case-by-case basis, spanning all markets and all sectors.

The Centre searches the Trade Commissioner Service database and Industry Canada's Canadian Company Capabilities database, as well as the vast resources of the Internet. In addition, IBOC taps into an impressive Canada-wide network of industry-sector experts at Industry Canada, Agriculture and Agri-Food Canada, and other federal Team Canada Inc departments and agencies. The organization also consults regularly with industry associations and provincial trade offices.

IBOC communicates business leads in two different ways: through direct personal contact with individual suppliers or electronically through e-mails sent to appropriate Canadian suppliers. These electronic leads are delivered through the Virtual Trade Commissioner (VTC). For more information or to register for the VTC, visit <http://www.infoexport.gc.ca>.

### ***Natural Sciences and Engineering Research Council of Canada***

The Natural Sciences and Engineering Research Council of Canada (NSERC) helps Canadian companies compete in today's economy by jointly funding collaborative R&D projects with scientists and engineers in universities across the country. More information is available at <http://www.nserc.ca>.

### ***Networks of Centres of Excellence***

Networks of Centres of Excellence are unique partnerships among universities, industry, government and non-governmental organizations aimed at turning Canadian research and entrepreneurial talent into economic and social benefits for all Canadians. An integral part of the Government of Canada's Innovation Strategy, these nationwide, multidisciplinary and multisector research partnerships connect high-quality research with industrial know-how and strategic investment. More information is available at <http://www.nce.gc.ca>.

### ***NRC Industrial Research Assistance Program***

The National Research Council's Industrial Research Assistance Program (NRC IRAP) offers financial assistance for early-stage R&D to help SMEs grow. Increased collaborations and partnerships have triggered the creation of industry partnership facilities at a number of NRC research institutes. More information is available at <http://www.irap-pari.nrc-cnrc.gc.ca>.

### ***Scientific Research and Experimental Development***

The Scientific Research and Experimental Development (SR&ED) program is a federal tax incentive program to encourage Canadian businesses of all sizes and in all sectors to conduct R&D in Canada that will lead to new, improved or technologically advanced products or processes. The SR&ED program is the largest single source of federal government support for industrial research and development. More information is available at <http://www.cra-arc.gc.ca/taxcredit/sred>.

### ***Social Sciences and Humanities Research Council***

The Social Sciences and Humanities Research Council (SSHRC) partners with a variety of government, business and non-profit organizations to develop and fund strategic research programs. These joint initiatives build knowledge and expertise on key social, cultural and economic issues, including bioethics. More information is available at <http://www.sshrc.ca>.

### ***Virtual Trade Commissioner***

The Virtual Trade Commissioner is an on-line service offered by the Trade Commissioner Service of International Trade Canada. Through a personalized and password-protected Web page, VTC-registered Canadian exporters will receive timely and relevant information on contacts and business opportunities in targeted foreign markets. The VTC offers registered users direct on-line access to market information, including market reports, business news, events and business leads related to the companies' industry sectors and markets of interest. Users can request services on line from a trade commissioner responsible for the industry sector in their target markets. They will also automatically receive new information as it becomes available. Canadian exporters can register for a Virtual Trade Commissioner at <http://www.infoexport.gc.ca>.

### ***Going Global Science and Technology Fund***

The objective of the Going Global Science and Technology Program is to promote Canada's international science and technology collaboration by assisting Canadian researchers in the identification and establishment of new international collaborative R&D initiatives with foreign partners. Going Global contributes up to 50% of eligible project costs to a maximum of \$50 000 per project. Eligible project costs include travel, accommodation and other non-research expenses associated with the establishment of collaborative R&D initiatives. For more information, see <http://www.infoexport.gc.ca/science>.

## **PRIVATE-SECTOR CUSTOMERS**

Private-sector enterprises, particularly large biopharmaceutical companies, tend to have larger R&D budgets (as well as larger annual turnovers) than public-sector research centres and as such, are in a stronger position to purchase products and services from foreign firms. Contracts may be awarded for clinical or product testing, product development or enhancement, and manufacturing, among other services. A number of larger firms also look to smaller companies for access to novel technologies and will support the R&D process in order to participate in the commercialization of resulting products. Canadian companies are also advised to contact local industry associations and attend local trade shows to establish specific private-sector contacts.

## **PUBLIC-SECTOR CUSTOMERS**

Research institutes throughout India receive funding primarily from public sources and may be commissioned for specific research projects by the state or federal governments. Although the public sector may not purchase biotech-derived products directly, governments may award research grants to local firms on a tender basis for R&D of biomedical or bio-agricultural technologies. Canadian companies should contact the trade section at the Canadian High Commission in India or one of the Canadian consulates in India for assistance in identifying specific contacts and opportunities.

## **Government Organizations**

The Department of Biotechnology is the key government body overseeing all aspects of biotechnology in the country. The DBT has provided more than 2000 R&D grants to local firms since 2000 and has supported the establishment of 57 biotech infrastructure facilities in the country. It also oversees 74 biotech programs in the nation's universities.

The other major agencies that support research and provide funding to the biotech sector are:

- Council of Scientific and Industrial Research;
- Department of Science and Technology;
- Department of Scientific and Industrial Research;
- Indian Council of Agricultural Research;
- Indian Council of Medical Research; and
- University Grants Commission.

The Indian government also runs a few public firms, including Indian Vaccines Corporation Ltd. (Gurgaon) and Bharat Immunologicals & Biologicals Corporation Ltd. (Bulandshahar).

## **MARKET LOGISTICS**

There is no single method of distribution in the biotech sector. Distribution varies according to the type of product or service marketed. However, as the biotech sector is heavily dependent on joint venturing, Canadian firms can benefit greatly from establishing partnerships with local companies as a means of gaining access to or knowledge of common channels.

As well, many domestic companies are partnering with and sourcing technologies from—to an ever-increasing extent—foreign firms in order to diversify their product lines and available services. This approach may provide opportunities for small Canadian biotech enterprises to benefit from the strengths of larger firms, particularly in the early research stage. Other methods of penetrating the market include technology-transfer arrangements, equity investments, acquisitions and research contracts.

### **Channels of Distribution**

Approximately 75% of pharmaceuticals sold in India are channelled to retailers through wholesalers and distributors; the remainder are procured directly by public and private hospitals and clinics. Further details on distribution strategies for biopharmaceuticals may be obtained from “The Pharmaceuticals Market in India” brief available at <http://www.infoexport.gc.ca>.

### **Market-entry Considerations**

#### ***Suggested Business Practices***

Most Indian importers and traders are very well travelled and sophisticated. They tend to be familiar with Western culture and business practices. Conducting business in English is common. There is a strong ethic of hospitality and it is expected that visitors will accept tea or a soft drink when one is offered. Gifts are not expected but are appreciated.

Business hours tend to begin around 10 a.m. and continue well into the evening hours. Business meetings tend to go on for much longer than scheduled. It is important, therefore, to allow plenty of time between appointments. It is often considered impolite to appear rushed or hurried. Indians do, however, expect meetings to begin on time. Breakfast meetings are not well received. Exporters should note that many Indian traders and importers are vegetarians.

Most Indian cities including Mumbai, the business hub, have subtropical or tropical climates and are hot and humid all year round. In some cities, like Delhi, summer temperatures can climb as high as 43 degrees Celsius. It is important to check the current weather conditions and have appropriate lightweight business clothing. In

extremely hot temperatures, many Indians will choose not to wear sport or suit jackets. In general, business women should dress conservatively in pants or long skirts.

### ***Import Regulations***

Regulatory authority for biotech investments and technology activities rests with the Ministry of Science and Technology's Department of Biotechnology. Additional regulatory bodies oversee specific aspects of the country's biotech regulatory environment. These include GEAC, which is responsible for biosafety aspects of the sector and is the designated authority for trials and for the use and commercial release of GMOs<sup>17</sup>; the Drug Controller of India, which administers the evaluation of biomedical products; and the Department of Agricultural Research and Education, which oversees R&D and field testing of transgenic crops. Regulatory details are available on the DBT Web site (<http://www.dbtindia.nic.in/policy/reg.html>).

As part of the National Biotechnology Development Strategy, the Indian government has been urged to streamline the regulatory process. Significant changes to the country's biotech regulatory process are expected in the near future.

In the meantime, a few recent changes to trade laws have been made to assist in the expansion of the sector. For example, a reduction of the customs duty, from 20% to 5%, for specified equipment used by the biotech sector was introduced by the federal government in early 2005. Also, the exemption date for the 150% weighted deduction of in-house R&D expenditure has been extended by two years to March 31, 2007. As well, it should be noted that drugs and materials exported to India for clinical trial purposes are exempt from customs and excise duties.

In an attempt to lessen industrial clearances, an amendment to the Industries Development and Regulations Act 1951 took place in August 2005. This includes the withdrawal of a mandatory industrial licence for the production of pharmaceuticals derived from DNA technologies and from specific tissues and cells.

To date, there are no labelling requirements for GM food products in the country. However, the GEAC must approve all GM foods, additives and ingredients that are sold, produced or imported in India. Since 2004, the GEAC has waived the need for approvals on biotech products that have not been processed significantly in their country of origin.

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<sup>17</sup> GMOs are subject to rules outlined in the Environmental (Protection) Act 1986.

## ***Intellectual Property***

India is a member of the World Intellectual Property Organization and is a signatory to the Paris Convention for the Protection of Industrial Property, the Patent Co-operation Treaty and the Berne Copyright Convention.

India's Patent Act was promulgated in 1970 and revised in 1999 (but backdated to 1995) and 2003. The Act covers general principles for the granting of patent rights, examination, approval and protection of patents.

In December 2004, the Indian government issued an ordinance that amended its Patent Act to comply with the January 1, 2005 deadline to meet its WTO TRIPS obligations. This ordinance was ratified by the Indian parliament on March 23, 2005. The patent regime resulting from this decree extends complete TRIPS coverage to pharmaceuticals, including biopharmaceuticals. As such, patents will be granted to the drug product, rather than to the process that resulted in the production of the drug. The ordinance also extends the duration of patent protection to 20 years from the date of filing and protects all drug products with patents issued after January 1995. These changes are expected positively affect India's attractiveness to foreign investors in the global biomedical market, particularly for R&D.

## ***Local Standards, Certificates or Registrations***

Research guidelines on various areas of biotech, including stem cell research, pharmacogenomics and r-DNA vaccines, are available on the DBT Web site at <http://www.dbtindia.nic.in/policy/poli.html>.

For regulatory information specific to exporting biopharmaceuticals to India, refer to "The Pharmaceuticals Market in India" at <http://www.infoexport.gc.ca>.

## ***Export Credit Risks, Restrictions on Letters of Credit, Currency Controls***

Letters of credit terms are recommended for initial transactions. Credit terms of 60-90 days are the most common. Foreign exchange bank delays average one month, as do local currency delays. The import cover is currently approximately 12 months.

For information on institutional funding sources, refer to "Sources of Project Financing: India" at <http://www.infoexport.gc.ca/ie-en/DisplayDocument.jsp?did=38311>.

## PROMOTIONAL EVENTS

Event/Description	Organizer
<b>BIO-Asia Partnering Conference</b> January 30-31, 2006 (Annual) Grand Hyatt Tokyo Tokyo, Japan	Biotechnology Industry Organization 1225 Eye St. NW, Suite 400 Washington, DC 20005 Tel.: (202) 962-6655 Fax: (202) 589-2545 E-mail: bioasia@bio.org Internet: <a href="http://bioasia.bio.org/opencms/bioasia/2006">http://bioasia.bio.org/opencms/bioasia/2006</a>
<b>Hospimedica India</b> March 2006 (Annual) World Trade Centre Complex Mumbai, India	Messe Duesseldorf GmbH Messeplatz 40474 Duesseldorf, Germany Tel.: (211) 4560-7762 or -7715 Fax: (211) 4560-7740 Internet: <a href="http://www.messe-duesseldorf.de">http://www.messe-duesseldorf.de</a>
<b>BIO 2006 Annual International Convention</b> April 9-12, 2006 (Annual) Chicago, Illinois	Biotechnology Industry Organization As above E-mail: bio2006@bio.org Internet: <a href="http://www.bio.org/events/2006">http://www.bio.org/events/2006</a>
<b>Bangalore Bio 2006</b> June 7-9, 2006 (Annual) Bangalore, India	Vision Group on Biotechnology UNI Building, Ground Floor Thimmaiah Road, Millers Tank Bed Bangalore, India 560 052 Tel.: (91-80) 5113-1912/3 Fax: (91-80) 5113-1914 E-mail: info@bangalorebio.in Internet: <a href="http://www.bangalorebio.in">http://www.bangalorebio.in</a>
<b>Pharma India 2006/Biotec India International 2006</b> October 2006 (Annual) IEC, Greater Noida Delhi, India	CIDEX Trade Fairs Pvt. Ltd. 1 Commercial Complex, 2nd Floor Pocket H & J, Sarita Vihar New Delhi, India 110 076 E-mail: info@cidex-tradefairs.com Internet: <a href="http://www.messe-duesseldorf.de">http://www.messe-duesseldorf.de</a>
<b>Chem Summit and Expo</b> October 2006 (Annual) Hotel Intercontinental Mumbai, India	Confederation of Indian Industry 105, Kakad Chambers, 132, Dr. A. B. Road Worli, Mumbai, India 400 018 Contact: Darryl Dasilva, Head-Business Fairs Tel.: (91-22) 2493-1790 Fax: (91-22) 2493-9463 or 2494-5831 E-mail : darryl.dasilva@ciionline.org Internet: <a href="http://www.chempharmaexpo.biz">http://www.chempharmaexpo.biz</a>
<b>Pharma Expo 2006</b> October 2006 (Annual) Mumbai, India	Confederation of Indian Industry (See above)

## KEY CONTACTS AND SUPPORT SERVICES

### Canadian Government Contacts

#### Canadian High Commission in India

7/8 Shantipath, Chanakyapuri  
New Delhi, India 110 021  
Contact: Ashwani Nanda, Senior Trade  
Commissioner  
Tel.: (91-11) 5178-2000  
Fax: (91-11) 5178-2041  
E-mail: ashwani.nanda@international.gc.ca  
Internet: <http://www.india.gc.ca>

#### *Consulate General of Canada in Chandigarh*

SCO 54-56, Sector 17-A  
Chandigarh, India 160 017  
Contact: Gurbans Sobti, Advisor (Trade)  
Tel.: (91-172) 505-0300  
Fax: (91-172) 505-0341  
E-mail: gurbans.sobti@international.gc.ca

#### *Consulate General of Canada in Mumbai*

41/42 Maker Chambers VI  
Jamnalal Bajaj Marg, Nariman Point  
Mumbai, Maharashtra, India 400 021  
Contact: Amitabh Arora, Commercial Officer  
Tel.: (91-22) 2287-6027  
Fax: (91-22) 2287-5514  
E-mail: amitabh.arora@international.gc.ca

#### *Canadian Consulate in Chennai*

No.18 (Old 24), III Floor, YAFA Tower  
Khader Nawaz Khan Road  
Nungambakka, Chennai 600 034  
Contact: Kishore Kumar, Trade Commissioner  
Tel. : (91-44) 2833-0888  
Fax: (91-44) 5215-9393  
E-mail: kishore.kumar@gocindia.org

#### *Canadian Government Trade Office in Bangalore*

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#### Agriculture and Agri-Food Canada (AAFC)

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#### Canadian Commercial Corporation (CCC)

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#### Canadian Food Inspection Agency (CFIA)

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Internet: <http://www.inspection.gc.ca>

#### *Plant Products Directorate*

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#### Export Development Canada (EDC)

Counsellor and EDC Representative  
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#### Health Canada (HC)

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## Canadian Government Contacts, Cont.

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### *Canada Business*

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### **International Trade Canada (ITCan)**

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## Canadian Industry Contacts

### Association of Health Technologies Industry (AHTI)

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### BC Biotech

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### BioAlberta

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### Canadian Foundation for Innovation (CFI)

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### **Council for Biotechnology Information**

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### Consulate General of India in Toronto

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### Consulate General of India in Vancouver

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### Bureau of Indian Standards

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### Central Food Technological Research Institute

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### Council of Scientific and Industrial Research

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### Indian Council of Medical Research

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### Ministry of Agriculture

#### Department of Agricultural Research and Education

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### Ministry of Chemicals and Fertilizers

#### Department of Chemicals and Petrochemicals

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Contact: U.N. Malik, Secretary  
Tel.: (91-11) 2921-1487, 2922-0546 or -0446  
Fax: (91-11) 2922-9166 or -3089  
E-mail: unmalik@aibaonline.com  
Internet: <http://www.aibaonline.com>

### All India Small Scale Pharmaceutical Manufacturers Association

26, Bhargav Lane, Vivil Line  
Nityanand Marg, New Delhi, India 110 054  
Tel.: (91-11) 291-9140, 291-8567  
Fax: (91-11) 252-4302, 293-7857

### Asian and Pacific Centre for Transfer of Technology

APCTT Building  
C-2 Qutab Institutional Area  
PO Box 4575  
New Delhi, India 110 016  
Tel.: (91-11) 2696-6509, -6619 or -6629  
Fax: (91-11) 2685-6274  
E-mail: postmaster@apctt.org  
Internet: <http://www.apctt.org>

### Association of Biotechnology Led Enterprises (ABLE)

No. 13, 2nd Floor, 4th C Block  
10th Main Road  
Koramangala, Bangalore, India 560 034  
Tel.: (91-80) 2553-3938  
E-mail: info@ableindia.org  
Internet: <http://www.ableindia.org>

### Biotech Consortium India Limited

Anuvrat Bhawan, 5th Floor  
210 Deendayal Upadhyay Marg  
New Delhi, India 110 002  
Tel.: (91-11) 2321-9064  
Fax: (91-11) 2321-9063  
E-mail: bcildelhi@vsnl.com  
Internet: <http://www.biotech.co.in>

### Central Council for Research in Homoeopathy

Anusadhan Bhavan, No. 61-65  
Institutional Area, Opposite D Block  
Janakpuri, New Delhi, India 110 058  
Internet: <http://ccrhindia.org>

### Central Research Institute

Kasauli, India 173 204  
Tel.: (91-17) 927-2114  
Fax: (91-17) 927-2016  
E-mail: director@crikasauli.com  
Internet: <http://www.crikasauli.com>

### Confederation of Indian Industry

23 Industrial Area  
Lodi Estate, New Delhi, India 110 003  
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Tel.: (91-11) 462-9994  
Fax: (91-11) 463-3168  
E-mail: sandhya.tewari@ciionline.org  
Internet: <http://www.ciionline.org>

### Federation of Indian Chambers of Commerce and Industry

Federation House  
Tansen Marg, New Delhi, India 110 001  
Tel.: (91-11) 373-8760  
Fax: (91-11) 332-0714  
E-mail: ficci.bisnet@gems.vsnl.net.in

### Indian Council of Agricultural Research

Krishi Bhavan, Dr. Rajendra Prasad Road  
New Delhi, India 110 001  
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E-mail: gkalloo.icar@nic.in  
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Worli, Mumbai, India 400 018  
Tel.: (91-22) 2494-4624 or 2497-4308  
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E-mail: idma@vsnl.com or idma@idma-assn.org  
Internet: <http://www.idma-assn.org>

#### *Delhi Office*

2nd Floor, B-4/115, Safdarjung Enclave  
New Delhi, India 110 029  
Tel.: (91-11) 617-1367  
Fax: (91-11) 617-1369  
E-mail: idma\_del@vsnl.net

### **Indian Pharmaceutical Association**

Kalina, Santacruz (E)  
Mumbai, India 400 098  
Tel.: (91-22) 2667-1072  
Fax: (91-22) 2667-0744  
E-mail: ipacentr@mtnl.net.in  
Internet: <http://www.indianpharma.org>

### **National Centre for Trade Information**

NCTI Complex, Pragati Maidan  
New Delhi, India 110 001  
Tel.: (91-11) 2337-1948  
Fax: (91-11) 2337-1979  
Internet: <http://www.ncti-india.com>

### **National Institute of Pharmaceutical Education and Research**

Sector 67, S.A.S. Nagar  
Mohali, Punjab, India 160 062  
Tel.: (91-172) 2146-8287  
E-mail: niper@chd.nic.in  
Internet: <http://niper.nic.in>

### **National Research Council on Plant Biotechnology**

*Indian Agriculture Research Institute*  
New Delhi, India 110 012  
Tel.: (91-11) 2578-8783  
Fax: (91-11) 2584-3984  
E-mail: contact@nrcpb.org  
Internet: <http://www.nrcpb.org>

### **Organisation of Pharmaceutical Producers of India**

Peninsula Chambers, Ground Floor  
Ganpatrao Kadam Marg, Lower Parel  
Mumbai, India 400 013  
Tel.: (91-22) 2491-8123, -2486 or 5662-7007  
Fax: (91-22) 2491-5168  
E-mail: indiaoppi@vsnl.com  
Internet: <http://www.indiaoppi.com>

### **Patent Facilitating Centre**

Technology Information, Forecasting and  
Assessment Council  
A Wing, Vishwakarma Bhavan, Shaheed Jeet  
Singh Marg  
New Delhi, India 110 016  
Tel.: (91-11) 2685-9581 or 5569-2986  
Fax: (91-11) 2686-3866  
E-mail: tifac@nda.vsnl.net.in  
Internet: <http://www.pfc.org.in>

### **Pharmaceutical and Allied Manufacturers' and Distributors' Association Ltd.**

MacKinnon MacKenzie Building, Ballard Estate  
Mumbai, India 400 038  
Tel.: (91-22) 261-4681  
E-mail: pamdal@pamdal.com  
Internet: <http://www.pamdal.com>

## Clinical Trials Laboratories in India

### **Central Drug Research Institute**

Chattar Manzil Palace  
Post Box No 173  
Lucknow, India 226 001  
Tel.: (91-522) 232-411  
Fax: (91-522) 243-405  
Internet: <http://www.cdriindia.org>

### **Centre for Cellular and Molecular Biology**

Campus, Uppal Road  
Hyderabad, India 500 007  
Tel.: (91-40) 2716-0222  
Fax: (91-40) 2716-0591  
E-mail: [lalji@ccmb.res.in](mailto:lalji@ccmb.res.in)  
Internet: <http://www.ccmb.res.in>

### **Indian Institute of Chemical Biology**

4 Raja S.C. Mullick Road  
Kolkata, India 700 032  
Contact: Siddhartha Roy, Director  
Tel.: (91-33) 2413-1157  
Fax: (91-33) 2473-5197  
E-mail: [siddhartharoy@iicb.res.in](mailto:siddhartharoy@iicb.res.in)  
Internet: <http://www.iicb.res.in>

### **Institute of Microbial Technology**

Post Box No 1304, Sector 39-A  
Chandigarh, India 160 036  
Tel.: (91-172) 695-225  
Fax: (91-172) 690-632  
Internet: <http://imtech.res.in>

### **Metropolis Health Services (India) Pvt. Ltd.**

250 D, Udyog Bhavan  
Hind Cycle Marg (Behind Glaxo)  
Worli, Mumbai, India 400 025  
Tel.: (91-22) 5662-2040  
Fax: (91-22) 5662-2080  
E-mail: [support@metropolisindia.com](mailto:support@metropolisindia.com)  
Internet: <http://www.metropolisindia.com>

### **SRL Ranbaxy Limited**

Plot 113, MIDC 15th St., Andheri (East)  
Mumbai, India 400 093  
Tel.: (91-22) 5690-3851  
Fax: (91-22) 5690-3865  
E-mail: [cservice@srlranbaxy.com](mailto:cservice@srlranbaxy.com)  
Internet: <http://www.srlranbaxy.com>

## Leading Research Institutes

### Central Drug Research Institute

See **Clinical Trials Laboratories in India** above

### Centre for Cellular and Molecular Biology

See **Clinical Trials Laboratories in India** above

### Centre for DNA Fingerprinting and Diagnostics

Nacharam

Hyderabad, India 500 076

Tel.: (91-40) 2715-1344

Fax: (91-40) 2715-5610

Internet: <http://www.cdfd.org.in>

Internet: <http://www.cdfd.org.in>

### Indian Institute of Chemical Biology

See **Clinical Trials Laboratories in India** above

### Indian Institute of Chemical Technology

Uppal Road

Hyderabad, India 500 007

Contact: Shri G. Sampath Kumar, Head, Business Management

Tel./Fax: (91-40)-2719-3943

E-mail: [sampath@iict.res.in](mailto:sampath@iict.res.in)

Internet: <http://www.iictindia.org>

### Indian Institute of Science

Bangalore, India 560 012

Tel.: (91-80) 2293-2001/5

Fax: (91-80) 2360-0683 or -0085

E-mail: [regr@admin.iisc.ernet.in](mailto:regr@admin.iisc.ernet.in)

Internet: <http://www.iisc.ernet.in>

### Industrial Toxicology Research Centre

Post Box No. 80, Mahatma Gandhi Marg

Lucknow, Uttar Pradesh, India 226 001

Tel.: (91-522) 262-1856 or 261-3357

Fax: (91-522) 262-8227 or 261-1547

E-mail: [itrc@itrcindia.org](mailto:itrc@itrcindia.org)

Internet: <http://www.itrcindia.org>

### Institute of Genomics and Integrative Biology

Mall Road

New Delhi, India 110 007

Tel.: (91-011) 2766-6156/7 or -7602

Fax: (91-011) 2766-7471

E-mail: [info@igib.res.in](mailto:info@igib.res.in)

Internet: <http://www.igib.res.in>

### Institute of Life Sciences

Nalco Square, Chandrasekharpur

Bhubaneswar, India 751 023

Tel.: (91-674) 230-1900 or -0137

Fax: (91-674) 230-0728

Internet: <http://www.ilsc.org>

### Institute of Microbial Technology

Sector 39-A

Chandigarh, India 160 036

Tel.: (91-172) 269-5225 or -5226

Fax: (91-172) 269-0632

Internet: <http://www.imtech.res.in>

### International Centre for Genetic Engineering and Biotechnology (ICGEB)

ICGEB Campus

Aruna Asaf Ali Marg

New Delhi, India 110 067

Tel.: (91-11) 2619-5007

Fax: (91-11) 2616-2316

Internet:

<http://www.icgeb.trieste.it/RESEARCH/ND/ndrsprg.htm>

### International Crops Research Institute for the Semi-Arid Tropics

Patancheru

Hyderabad, India 502 324

Tel.: (91-40) 3071-3071

Fax: (91-40) 3071-3074/5

E-mail: [webmaster-icrisat@cgiar.org](mailto:webmaster-icrisat@cgiar.org)

Internet: <http://www.icrisat.org>

## Leading Research Institutes, Cont.

### **Jawaharlal Nehru Centre for Advanced Scientific Research**

Jakkur, Bangalore, India 560 064  
Tel.: (91-80) 2208-2777  
Fax: (91-80) 2208-2766  
E-mail: [academic@jncasr.ac.in](mailto:academic@jncasr.ac.in)  
Internet: <http://www.jncasr.ac.in>

### **National Botanical Research Institute**

Rana Pratap Marg  
Post Box No. 436  
Lucknow, Uttar Pradesh, India 226 001  
Tel.: (91-522) 220-5831-5 ext. 208/9  
Fax: (91-522) 220-5673  
Internet: <http://www.nbri-lko.org>

### **National Brain Research Centre**

c/o Deemed University  
Manesar, Gurgaon District  
Haryana, India 122 050  
Tel.: (91-124) 233-8922/6  
Fax: (91-124) 233-8910 or -8928  
E-mail: [info@nbrc.ac.in](mailto:info@nbrc.ac.in)  
Internet: <http://www.nbrc.ac.in>

### **National Centre for Biological Sciences**

UAS-GKVK Campus, Bellary Road  
Bangalore, India 560 065  
Tel.: (91-80) 2363-6421  
Fax: (91-80) 2363-6662 or -6862  
E-mail: [info@ncbs.res.in](mailto:info@ncbs.res.in)  
Internet: <http://www.ncbs.res.in>

### **National Centre for Cell Science**

NCCS Complex, University of Pune Campus  
Ganeshkhind, Pune, India 411 007  
Tel.: (91-20) 2569-0922, -0941 or -0951  
Fax: (91-20) 2569-2259  
E-mail: [infonccs@nccs.res.in](mailto:infonccs@nccs.res.in)  
Internet: <http://www.nccs.res.in>

### **National Chemical Laboratory**

Dr. Homi Bhabha Road  
Pune, India 411 008  
Tel.: (91-20) 2589-3300  
Fax: (91-20) 2589-3619  
Internet: <http://www.ncl-india.org>

### **National Dairy Development Board**

Post Box No. 40  
Anand, Gujarat, India 388 001  
Tel.: (91-26) 9226-0148/9, -0159 or 0160  
Fax: (91-26) 9226-0157 or -0165  
E-mail: [anand@nddb.coop](mailto:anand@nddb.coop)  
Internet: <http://www.nddb.org>

### **National Institute of Immunology**

Aruna Asaf Ali Marg  
New Delhi, India 110 067  
Tel.: (91-11) 2671-7121 to -7145  
Fax: (91-11) 2616-2125 or 2617-7626  
Internet: <http://www.nii.res.in>

### **National Institute of Nutrition**

Jamia-Osmani P.O  
Hyderabad, India 500 007  
Tel.: (91-40) 2700-8921 or -8927  
Fax: (91-40) 2701-9074 or -8234  
Internet: <http://icmr.nic.in/000229/nin.htm>

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## **OTHER REFERENCE MATERIAL**

### **Useful Internet Sites**

Bio.com (Biotech and pharmaceutical news): <http://www.bio.com>

Biodiversity Information System: <http://www.bisindia.org>

BioPharm International (Biopharmaceutical news): <http://www.biopharminternational.com>

BioSpectrum India (Indian and international sectoral news): <http://www.biospectrumindia.com>

Biotech Ontario: <http://www.biotechontario.com>

Biotechnology Human Resource Council: <http://www.bhrc.ca>

CanadaIndiaBusiness.ca: <http://canadaindiabusiness.ca>

CenterWatch (Clinical trials listing service): <http://www.centerwatch.com>

Clinical Trials.gov: <http://www.clinicaltrials.gov>

ExportSource: <http://exportsource.ca>

Foreign Affairs Canada: <http://www.fac-aec.gc.ca>

Government of Canada. BioPortal: <http://www.bioportal.gc.ca>

Government of India Directory: <http://goirectory.nic.in>

Health Canada: <http://www.hc-sc.gc.ca>

India. Directorate General of Foreign Trade: <http://dgft.delhi.nic.in>

India Image (Government portal of on-line information on India): <http://indiaimage.nic.in>

India. International Life Science Institute: <http://india.ilsa.org>

India. "National List of Essential Medicines 2003": <http://cdsco.nic.in/NEDL.PDF>

Indiatradezone.com (Directory of trade and business leads): <http://www.indiatradezone.com>

Infodrive India (Information on Indian international trade): <http://www.infodriveindia.com>

InfoExport: <http://www.infoexport.gc.ca>

Innovation in Canada: <http://innovation.ic.gc.ca/gol/innovation/site.nsf>

International Service for the Acquisition of Agri-Biotech Applications: <http://www.isaaa.org>

International Service for National Agricultural Research: <http://www.isnar.cgiar.org/arow/Asia/India.htm>

International Trade Canada: <http://www.itcan-cican.gc.ca>

Medindia.com (Indian medical industry news): <http://www.medindia.com>

Pharmabiz.com (Indian pharmaceutical portal): <http://www.pharmabiz.com>

Stem Cell Network: <http://www.stemcellnetwork.ca>

Strategis: <http://strategis.gc.ca>

Trade-India.com: <http://www.trade-india.com>

Web-based Information Services for Agricultural Development: <http://www.wisard.org>

World Trade Organization: <http://www.wto.org>