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# Life Sciences in Israel



## Israel: A Powerhouse of Opportunities

Over the last decade, Israel has introduced a wealth of groundbreaking and valuable innovations in Life Sciences. Israel's Life Sciences sector is supported by a strong foundation of academic excellence, including some of the world's leading research institutes, renowned R&D facilities and cutting-edge medical centers. Bolstered by a highly skilled workforce, a flourishing high-tech environment, and an entrepreneurial spirit, Israeli companies have been joined by leading multinationals in making Israel a recognized force in the Life Sciences industry worldwide. Global giants, including J&J, Perrigo, GE Healthcare, Phillips Medical, together with local companies such as Teva, itself now a multi-national company, Given Imaging, Insightec, Medinol, Disc-o-tech, Brainstorm and others have been continuously developing and marketing life-changing medical breakthroughs and innovations.

Prior to 1996, Israel was home to 186 Life Sciences companies. By 2009, this number had passed 1,000. With some 80 new companies being formed each year, 41% of all Life Sciences companies operating in Israel today were established during the last 5 years. In a relatively short period of time, an astounding 34% of these companies have already begun to generate revenue, demonstrating that Israel has crossed the threshold from an attractive startup arena to a source of advanced commercially viable and promising businesses. The bridge connecting excellent science to revenue generating companies has been established. A rich pipeline of seed companies promises to perpetuate current growth.



Three Israeli academics have won the Nobel Prize in Chemistry. Professor Ada Yonath of the Weizmann Institute received the Nobel Prize in 2009 for showing how ribosomes function, which has important implications for developing antibiotics. Professors **Aaron Ciechanover** and **Avram Hershko** of the Technion received the Nobel Prize for Chemistry in 2004 for their discovery of Ubiquitin-mediated protein degradation, leading to breakthroughs in the understanding and treatment of diseases such as Cancer, Alzheimer's, Parkinson's disease and Cystic Fibrosis.

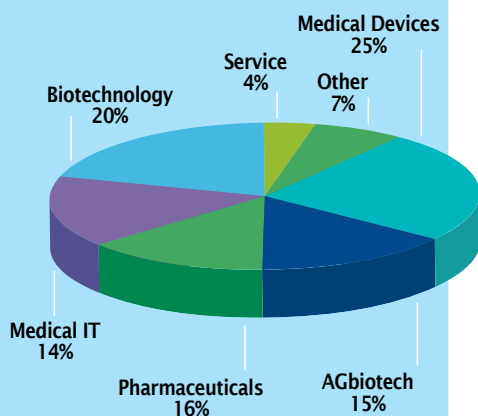
## Why Israel's Life Sciences

- ▶ More than 1,000 Life Sciences Companies - Biopharma and Medical Devices
- ▶ Over 1/3 of LS Start-Ups already generate revenue
- ▶ Source of numerous blockbuster drugs such as Copaxone and Rebif generating over \$5B in annual sales
- ▶ 2nd in the world in availability of Engineers and Scientists (IMD 2009)
- ▶ 1st in the world for Medical Device Patents per capita, 4th for Bio-Pharma (US Patents Office)
- ▶ Israel is 4th in global scientific activity, ranking just behind Switzerland, Sweden and Denmark for the number of scientific publications per citizen (Council for Higher Education)
- ▶ Pioneers in Stem Cell Research & Therapeutics
- ▶ Extensive International R&D and Commercial Partnerships
- ▶ World renowned academic research institutes such as The Technion and The Weizmann Institute
- ▶ 2nd in Europe in per capita of private biotech companies' products in pipeline (E&Y's Beyond Borders)
- ▶ Unique financing tools and incubator frameworks for young companies



## Israeli Life Sciences Sectors

### Israel's Life Science Industry - Sectors



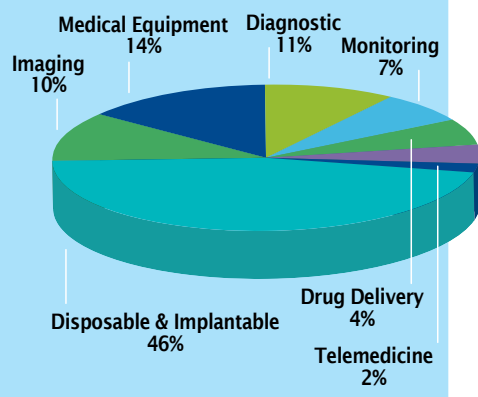
Source: ILSI Data Base - 2009

Today, Israel is home to a thriving Life Sciences industry in which the major sectors are Medical Devices and BioPharma. Over the last 5 years, more companies were established in life sciences than in any other sector, with the rate of investments (including Angels, Venture Capital and Corporate) greatly outpacing all other segments of the economy.

### Medical Devices

In the area of Medical Devices, Israel's scientists and engineers have integrated advanced technologies in electronics, communications, and electro-optics in the development of world-class innovations in digital imaging, medical lasers, electro-medical devices, telemedicine, surgical equipment, diagnostic kits, and rehabilitation equipment. According to the US Patent Office, Israel has the highest rate of registered medical device patents per capita in the world, with cutting edge innovations such as ingestible cameras, portable cardiac ultrasound systems and instant CT scanners helping to significantly improve global health and well being while at the same time, creating significant investor value.

### Israel's Medical Device Companies - Sub Sectors (448 companies)



Source: ILSI Data Base - 2009

The largest sub sector in the medical device arena is therapeutic devices, both implantable and disposable.

Many of Israel's innovations in Medical Devices have already been adopted worldwide. Others have been more recently introduced and are undergoing clinical trials both in Israel and other countries. The list of advances and breakthroughs cuts across many sub sectors in the Medical Devices arena.

### Noted Israeli Breakthroughs in the Medical Devices field Imaging

- The Pillcam, the first miniature ingested camera which diagnoses and photographs abnormalities in the gastrointestinal tract was introduced by **Given Imaging** (NASDAQ: GIVN).
- A comprehensive image of a patient can be taken in seconds instead of minutes with the introduction of the **Philips** Brilliance CT scanner, developed in Israel.



# Life Sciences in Israel



## Disposable and Implantable

- The closed cell stent design which facilitates blood flow to the heart was pioneered and developed by Medinol in the early 1990's. **Medinol** continues to introduce additional innovations in the field of heart catheterization.
- A highly advanced and cost efficient surgical sealant or "biological glue", Quixil, which facilitates haemostasis and reduces operative and post-operative bleeding, was developed by **Omrix Biopharmaceuticals**.


## Other Medical Device Technologies

- ExAblate 2000, a non-invasive surgery which uses MR guided focused ultrasound to treat uterine fibroids was developed by **Insightec**.
- A minimally invasive cryotherapy solution - the freezing and ablating of benign and cancerous tissues, thus enhancing a patient's recovery process and comfort, was devised by **Galil Medical**.

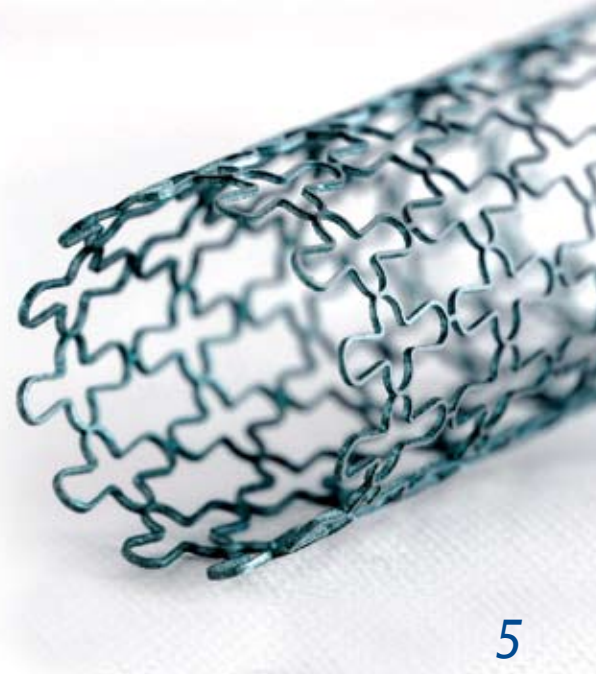
## Healthcare IT

Israel is a world leader in the utilization of IT for healthcare purposes. An astonishing 100% of primary care physicians in Israel use computerized patient records. With a very strong IT and Communications industry on the one hand and a highly developed national healthcare system on the other Israel is uniquely placed to develop, test and operate new IT Healthcare products and systems. One specific area in which Israel excels is Telemedicine. More than 70 companies are involved in this sector.

Leading companies in the Healthcare IT sector include: Roshtov, a leader in enterprise medical information systems that manages patient-file oriented software solutions, Medic4All Group, which develops wireless technology for medical data transmission from the patient's environment to a monitoring center by phone or Internet, web measurements viewer and a web medical file, eWave, a system integrator and software system provider that developed Web based solutions for among others electronic health record applications, and dbMotion, which provides clinicians access to real-time, integrated clinical information systems.



**NESS** Neuromuscular Electrical Stimulation Systems was awarded the Medical Design Excellence Award for its L300 leg neuroprosthesis, a noninvasive device which delivers electrical stimulation to nerves and muscles in the leg, improving the walking ability of those suffering from foot drop associated with central nervous system injury or disease.





**Neurosonix** received the European Association of Cardiac-

Thoracic Surgery Techno-College Innovation Award for its EmBlocker, which uses ultrasonic energy to non-invasively divert emboli flow away from the cerebral arteries in order to reduce the risk of post-operative brain injury and can provide protection against cerebral embolism during open heart procedures.

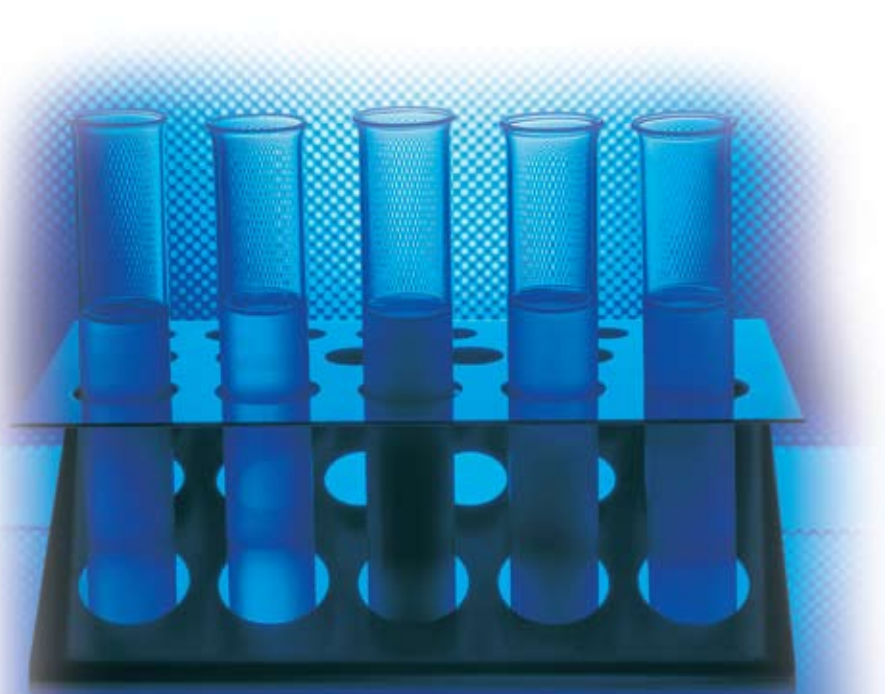
### *Cutting Edge R&D*

- As a substitute for biopsies, **Incure** is completing the development of a kit that can detect cancerous cells with a simple blood test.
- A treatment using a breathing instrument to determine the patient's liver function has been introduced by **Exalenz**. The device has already been successfully tested on Hepatitis C and NAFLD (Non-Alcoholic Fatty Liver Disease) patients and is expected to be on the market soon.
- The Accordion Pill, a new approach to the slow release of medication, which provides significant benefits to both patients and drug companies, was developed by **Intec Pharma**.
- Microneedle based systems for the painless intradermal delivery of drugs was implemented by NanoPass. **NanoPass** collaborated with **GlaxoSmithKline** on optimization of its platform for vaccine delivery.



A live-tissue memory and processing chip was created

at Tel Aviv University to demonstrate how our brain learns and stores information, an important advancement toward sophisticated artificial intelligence solutions. This chip was cited by Scientific American Magazine as one of the 50 most significant scientific breakthroughs of 2007.





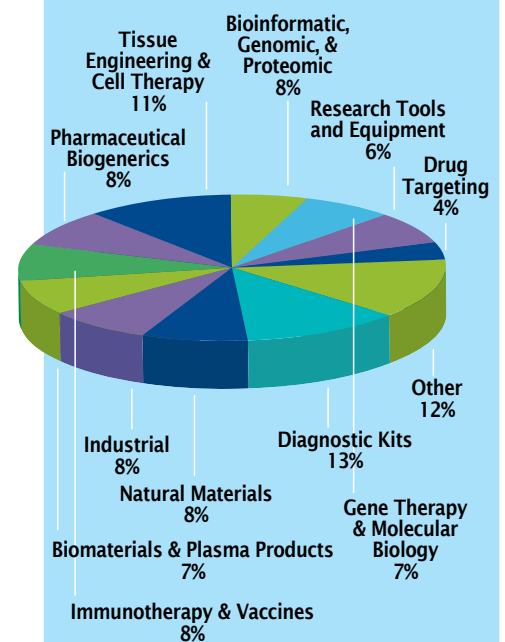
## Biopharmaceuticals

Backed by outstanding academic and research institutes (ranked # 3 in the world by **WEF 2008-9**), Israel is recognized as one of the world's leaders in biopharmaceuticals, comprised of Israeli biotech and pharmaceutical companies engaged in drug discovery, stem cell research, immunology and more. Israel's pharmaceuticals and biotechnology industries have benefited greatly from each other. Biotechnology serves as a key driver for growth in the entire pharmaceutical industry: introducing new and improved products, innovative technologies, extending patent life, adding revenue streams and shortening the time to FDA approval and the market. Israel is a global leader in the number of new patents filed in biopharma, in new companies founded, and in the number of companies taken public over the past 5 years.

## Biotechnology

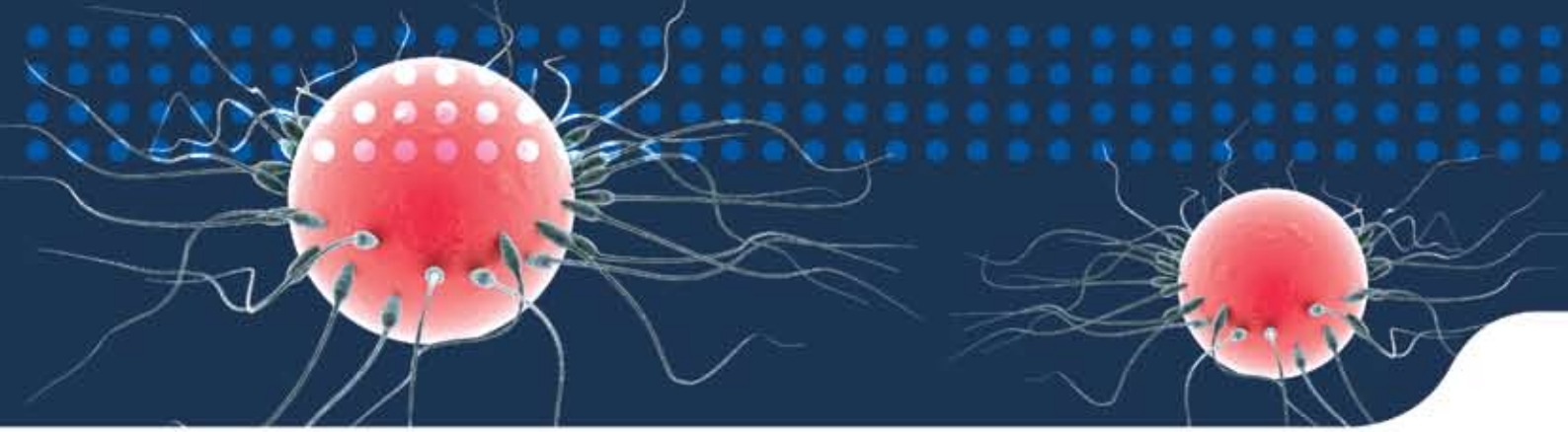
The promise of new cures and the continual progress from laboratory to application keeps Israel's biotechnology industry flourishing, with novel breakthroughs and discoveries already helping millions of patients worldwide. Within the last decade the Israeli biotechnology sector has grown impressively, with the number of companies increasing at a rate of 17% annually. Biotechnology research in Israel is carried out at all major universities, technical colleges, research institutes and hospitals throughout the country.

**Israel's Biotech Companies - Sub Sectors (155 companies)**

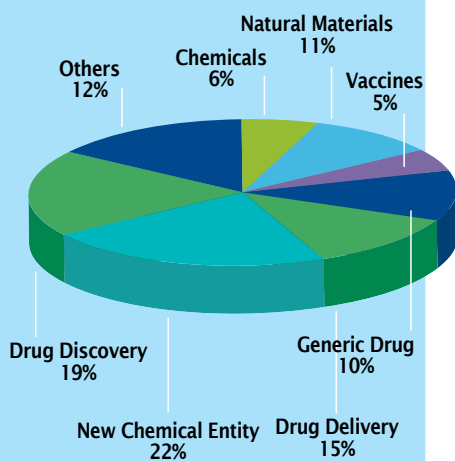


Source: ILSI Data Base - 2009

Israel is 2nd in Europe in per capita private biotech companies' products in pipeline (E&Y's Beyond Borders)



### Israel's Pharmaceutical Companies - Sub sectors



Source: ILSI Data Base - 2009

## Pharmaceuticals

Israel's thriving pharmaceutical industry includes some of the country's largest, most mature and profitable corporations, with more than 60 companies and over 25,000 workers.

The combination of Israeli research expertise and continued clinical progress has led to the emergence of blockbuster drugs and promising treatments for cancer, MS and Alzheimer's disease. Home grown companies such as Taro, Dexcel/Dexxon and Rafa focus primarily on generic drug manufacturing. Teva Pharmaceutical Industries, established in 1901 and with \$11.1 billion in annual sales (2008), is today the world's largest generic drug manufacturer and one of the 20 largest international pharmaceutical companies in the world.

## Noted BioPharma Breakthroughs

### Oncology

- A chemotherapy drug of the treatment for ovarian cancer, Doxil, was developed at the Hadassah Medical Center and was sold to **Johnson & Johnson**.

### Multiple Sclerosis and Diseases of the Central Nervous System

- **Teva Pharmaceuticals**, together with the Weizmann Institute, developed Copaxone, for the treatment of Multiple Sclerosis. This drug significantly improves the quality of life for MS sufferers by reducing relapses and/or lengthening the time between them.
- Another treatment for Multiple Sclerosis, Rebif, was developed by the Weizmann Institute in conjunction with **Serono**. Rebif also has broader antiviral applications in the field of Central Nervous System disorders.

### Parkinson's and Alzheimer's Diseases

- **Exelon**, a drug for the treatment of Alzheimer's originated from research conducted at the Hebrew University and was developed and marketed by Novartis.
- Another Teva drug, Azilect, was developed together with the Technion for the treatment of Parkinson's Disease.





## Life Sciences in Israel



### Cutting edge R&D

#### Oncology

- **Can-Fite** has developed a platform technology that targets the A3 Adenosine Receptor for treatment of inflammatory, ophthalmic, cancer and viral diseases. The company's lead drugs CF101 and CF102 are small-molecule oral drugs. CF101 has shown activity in Psoriasis, Dry Eye Syndrome and Rheumatoid Arthritis in Phase II studies, while CF102, is currently being tested in two Phase I/II studies: one in hepatocellular carcinoma and the other in patients with hepatitis C viral infection.
- **Gamida Cell Ltd.**, a world leader in stem cell expansion technologies and therapeutic products, is developing a pipeline of products in stem cell transplantation and in tissue regeneration to treat cancer, hematological, autoimmune and ischemic diseases. Its populations of adult stem cells are selected from umbilical cord blood and bone marrow, and expanded in culture. Gamida Cell's flagship product, StemEx, is now being studied as a therapy for patients with blood cancers such as leukemia and lymphoma in an international, Phase III, pivotal registration trial at leading transplant centers in the U.S., Europe and Israel. The market launch of StemEx is anticipated in 2011.
- **Vaxil BioTherapeutics Ltd.** develops novel, therapeutic vaccines for the treatment of cancer and key intracellular pathogens. Vaxil's lead therapeutic vaccine, ImMucin™ received regulatory approval to enter a phase IIA clinical trial in Multiple Myeloma patients in 2010. The company is also developing a vaccine against mycobacterium Tuberculosis (Mtb) and is entering preclinical invivo studies.

#### Stem cell therapy to cure Parkinson's disease

- Two Israeli companies lead the quest to develop a stem cell therapy for Parkinson's disease. **BrainStorm Cell Therapeutics** uses autologous (self generated) bone marrow derived adult stem cells, while **Cell Cure** employs human embryonic stem cell technology. Both companies have had success in reducing symptoms of the disease in mice and rat models and will soon be ready for clinical trials. In 2007, Cell Cure was awarded significant funding from the Michael J. Fox Foundation for Parkinson's research, for its work on various neural disorders.



The Spheno-Palatine Ganglion (SPG) stimulation platform which can be used to treat stroke victims and a host of CNS related indications was developed by **Brainsgate**, which was selected by **Red Herring** as one of the most promising 100 private companies in Europe.



Scientific American Magazine listed Dr. Beka Solomon of Tel Aviv University and her research into the use of antibodies in the treatment of Alzheimer's Disease as one of the 50 most significant scientific breakthroughs in 2007.



**NuLens**, selected as one of **Red Herring's 100 most promising**

**companies in Europe for 2009**, researches, develops, and markets technologies for ophthalmic markets. It offers IOL, an accommodative intra-ocular lens, which enables the restoration of post-cataract vision at various distances.

## Diabetes

- An oral insulin capsule, by **OraMed Pharmaceuticals**, a developer of oral delivery systems, has successfully undergone Phase IB clinical trials.

## Other Biopharma Technologies

- Together with Yissum, the Technology Transfer Organization of the Hebrew University, **Protalix BioTherapeutics**, developed prGCD, a plant manufactured enzyme that serves as treatment for Gaucher Disease.
- **D-Pharm's** DP-b99 drug to aid recovery following an acute stroke has received FDA approval for Phase III trials.
- An improved prophylactic intranasal hepatitis B vaccine was developed and commercialized by **Nasvax**, in collaboration with **SciGen** of Singapore.
- Debrase Gel Dressing, a revolutionary gel for the treatment of burns by means of enzymatic action, minimizing flesh removal, bleeding, scars and the need of plastic surgeries for burn victims, was developed and commercialized by **Mediwound**.
- Global drug company, **Pfizer**, acquired the exclusive worldwide license to the human gene RTP-801 discovered by **QBI** and molecules that modify its expression. The gene is involved in the development of pathologic blood vessels, which accelerates the progression of age related macular degeneration (AMD), the leading cause of blindness in the developed world.



## Israel's Biomedical Engineering: Spotlight on Stem Cell Research

Israel's position as a world center of excellence in stem cell research is well established. Israeli scientists have been recognized among the earliest pioneers in stem cell research and have been at the forefront of global efforts to isolate human embryonic stem cells (hESC). These scientific achievements are at the forefront of medical research and upon commercialization, the resulting products will have a profound impact on countless treatments for a variety of diseases.

### Ongoing Progress and Accomplishments

There are **twenty active stem cell companies in Israel**, four of which are already involved in clinical trials, with one currently in Phase III.

The rapid development from research to trial is testimony to a highly supportive, regulatory environment, established in line with strict medical ethics and an impressive government grant program.

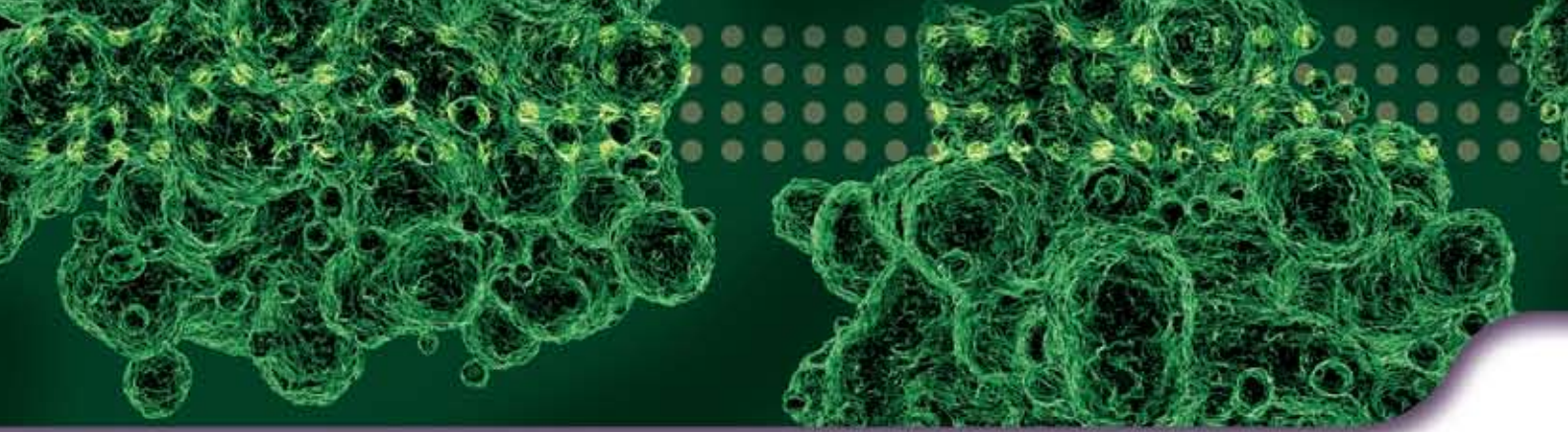
- Among the therapeutic stem-cell technologies close to clinical trials is a procedure to reverse heart failure and another that enables diabetics to produce insulin.
- Trials to assist Parkinson's sufferers to manufacture their own dopamine and tests on leukemia victims to radically ease and improve the outcome of bone marrow transplants are in process as well.

Israel is the 2nd leading publisher of stem cell research, in absolute numbers, after the U.S. Israel leads the UK, Korea, China and Singapore in the number of research papers published on this subject, with 11 out of the 20 most cited papers in recent years published by Israeli authors. Three of the best hESC papers ever published in peer-reviewed journals were written by Israelis.

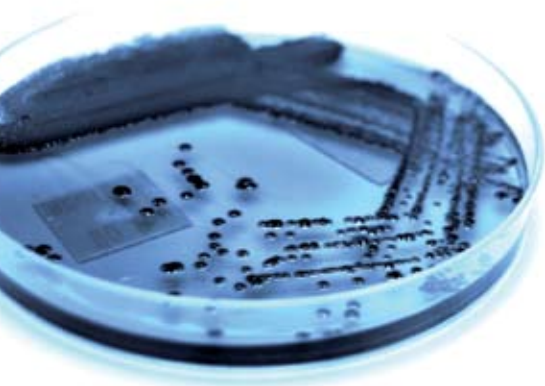


### Israeli Stem Cell Firsts:

- ▶ 1st to demonstrate in-vitro differentiation of human ES cells and generation of human embryonic bodies.
- ▶ 1st to demonstrate the ability of human embryonic stem cells to improve behavior in animals injected with Parkinson's Disease
- ▶ 1st to demonstrate the generation and isolation of hepatic cells from the induction of in-vitro differentiation of human stem cells
- ▶ 1st to genetically modify hESCs, including a line that represented a model for human disease (Lesch Nyhan disease).
- ▶ 1st clinical trials of cell therapy treatments.



Dr. Shulamit Levenberg, Head of the Biomedical Engineering Faculty at the Technion - Israel Institute of Technology, was named in 2007 one of 50 top research contributors by Scientific American Magazine for implanting blood vessels in muscle tissue without the body's rejection of the implanted muscles and for her work in tissue engineering using embryonic stem cells.



According to Red Herring magazine, Israel's stem-cell-oriented companies have raised a total of \$75 million over the last decade, mostly from pharmaceutical companies and venture capital firms. Forecasts for the next 10-15 years place stem cell therapeutic product sales in global markets at \$40 Billion.

Much of the research and development in this groundbreaking sector is currently carried out on the campuses of leading university hospitals in Israel, mainly at Hebrew University/Hadassah (Jerusalem) and the Technion/Rambam (Haifa). Hadassah has recently inaugurated a Human Embryonic Stem Cell Research Center, which is led by prominent figures in the field including Professors Reubinoff and Ben-Hur.

### ***Stem Cell Research Collaborations***

#### **Local Support**

The Israel Academy of Scientists and Humanities supports stem cell research in several ways:

The **Genesis Consortium** was created five years ago in order to create and advance a cluster of cell therapy companies in Israel that share information and aspire to acquire global leadership positions in the field, by providing generic technologies for cell therapy, stem cell derived products and new Embryonic Stem Cell lines. This initiative, supported by Israel's Ministry of Industry, Trade and Labor, is made up of leading academic institutions and industry leaders. In addition, the Ministry of Health and the President of the Academy of Sciences and Humanities created the Israel Stem Cell Research Forum (ISCRF) to advance cell therapy, research and development in Israel.

#### **International Partners in Stem Cell Research**

Israeli research bodies have teamed up on cell therapy and stem cell projects with major research centers in the US such as UCLA, UCSD, UCSF, UC Irvine, Stanford and Cedars Sinai in California, as well as institutions in the UK, France, Czech Republic, Australia, Singapore and South Korea.

# Life Sciences in Israel



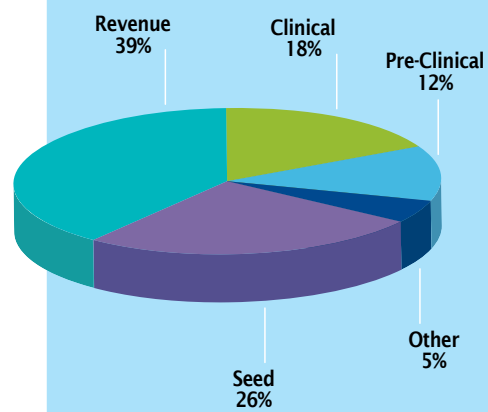
## Rapid Research to Revenue

The last few years have witnessed an unprecedented wave of Israeli Life Sciences "exit" transactions with investors realizing impressive returns via IPO's, mergers and acquisitions. Approximately 35 life science companies went public on the Tel Aviv Stock Exchange (TASE) in recent years, among them BiolineRx, Biomedics, Hadasit Bio Holdings, Elutex and Nasvax, and approximately 15 Israeli companies have gone public on foreign exchanges, mainly in the U.S. According to the IVC Research Center the value of M&A's and IPO's in Israeli Life Sciences companies totaled \$822 million in 2009.

## Mergers and Acquisitions

Acquirer	Israeli Company	Sum in \$ millions	Date
Perrigo	Agis	900	2004
Sun Pharmaceuticals	Taro Pharmaceuticals	454	2007
Johnson & Johnson	Omrix	447	2008
Medtronic	Ventor	325	2009
St. Jude	MediGuide	300	2008
Kyphon	Disc-O-Tech	220	2006
Guidant	X-Technology	160	2003
Johnson & Johnson	Colbar	159	2006
Candela	Inolase	150	2007
Stryker	Sightline	140	2006
Dentsply	Uri-Dent	100+	2006
McKesson Corp LS	Medcon Telemedicine Technology Ltd	105	2005
Teva	CoGenesys	100	2008
Alpha BioTech	Nobel BioCare	95	2008
Boston Scientific	Remon Medical Technologies	80	2007

## Companies Developmental Stage





Israel has the largest number of companies listed on the NASDAQ outside of the United States and approximately 70 Israeli companies are traded on various European exchanges.

Ranked 3rd in the world for Venture Capital availability, Israel provides its entrepreneurs with the necessary backing to turn their innovative ideas into profitable businesses (IMD World Competitiveness Yearbook 2009).

### IPO's and Publicly Traded Companies

Noted examples of IPO's and publicly traded companies listed on foreign exchanges:

Omrix	(OMRI)	\$272M
Keryx	(KREX)	\$30M
Protalix	(PLX)	\$200M
XTL	(XTL.B)	\$71M
Compugen	(CGEN)	\$65M
Rosetta	(ROSG)	\$60M
Given Imaging	(GIVN)	\$473M
Syneron Medical Ltd.	(ELOS)	\$430M

### TASE Listings

In recent years, the Biotechnology and Medical Device sectors have become more prominent on the Tel Aviv Stock Exchange. During 2005, TASE regulating authorities realized that life science companies have different "track records", timelines and financing requirements. In order to attract such companies - listing requirements (and costs) were changed accordingly. This subsequently led to an influx of 40 companies into the market, solving a large financing gap while providing transparency and liquidity to a wide investor audience that was not earlier exposed to this sector. Beginning in 2010 TASE will establish a new index to track biotechnology companies.

### Venture Capital

Exhibiting a strong vote of confidence in the Life Sciences, venture capital investment from local and foreign VC companies amounted to \$318 million in 2008, and is estimated slightly lower at \$280 million in 2009, weighed down by the pressures of the global financial crisis. Israel's investment infrastructure also includes a range of options from University technology transfer units and incubators to bi-national funding, such as BIRD (US), SIIRD (Singapore), KORIL (Korea), CIIRD (Canada), the European 7th Framework as well as strategic partnering and joint ventures.



## Israel's Competitive Edge

Much of Israel's achievements in the Life Sciences sector stems from the fact that over 90% of the population resides within two hours driving time of each other and within close proximity to seven major universities and nearby industrial clusters that help drive the industry. This cluster effect creates economies of scale, and allows for better information sharing and synergies between the companies.

### Highly Educated, Highly Skilled

50% of the population aged 25 to 34 has attained at least tertiary education, placing it 6th in the world behind among others Singapore, Japan, and Korea (IMD Competitiveness Yearbook 2009), and approximately 24% of Israel's workforce holds university degrees - placing it 3rd in the industrialized world after the USA and the Netherlands. Israel is ranked #2 in the world in % of engineers and scientists in the work force by the IMD (2009).

### Entrepreneurial Spirit and Ingenuity

The exceptional volume of Life Science startups and patents attests to the entrepreneurial and risk-taking climate in Israel. Israeli researchers and entrepreneurs overcome technological barriers and solve development problems within a short period of time and at a fraction of the cost of some of their larger and more affluent competitors overseas.

### Academia and Research

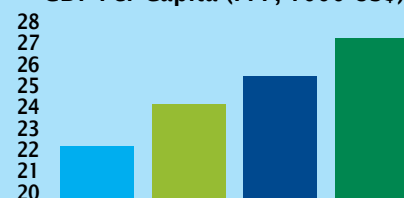
Approximately 50% of all academic research funding in Israel is in the field of Life Sciences and institutions such as the Hebrew University of Jerusalem, Tel Aviv University, Ben Gurion University of the Negev, the Technion-Israel Institute of Technology and the Weizmann Institute of Science have played dominant roles in advancing biotech R&D. In fact, according to a poll conducted by The Scientist magazine the two top International Academic Institutions in the world for scientists to conduct research in the Life Sciences in 2008 were 1. The Weizmann Institute and 2. The Hebrew University of Jerusalem. In 2009 the Weizmann Institute was ranked second. This stems from impressive levels of R&D funding and highly skilled and creative manpower, which continues to generate new patents in the field.

## Economic Indicators

Sources: Bank of Israel, Ministry of Finance, IMF

■ 2005 ■ 2006 ■ 2007 ■ 2008

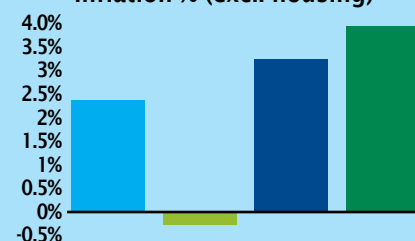
### GDP Per Capita (PPP, 1000 US\$)



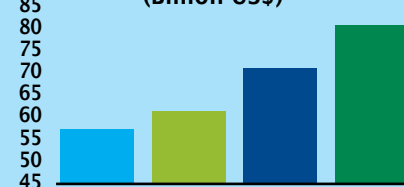
### Unemployment (%)



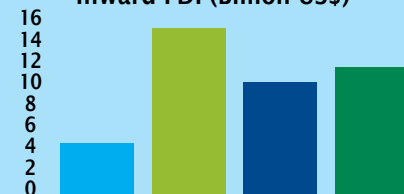
### Inflation % (excl. housing)

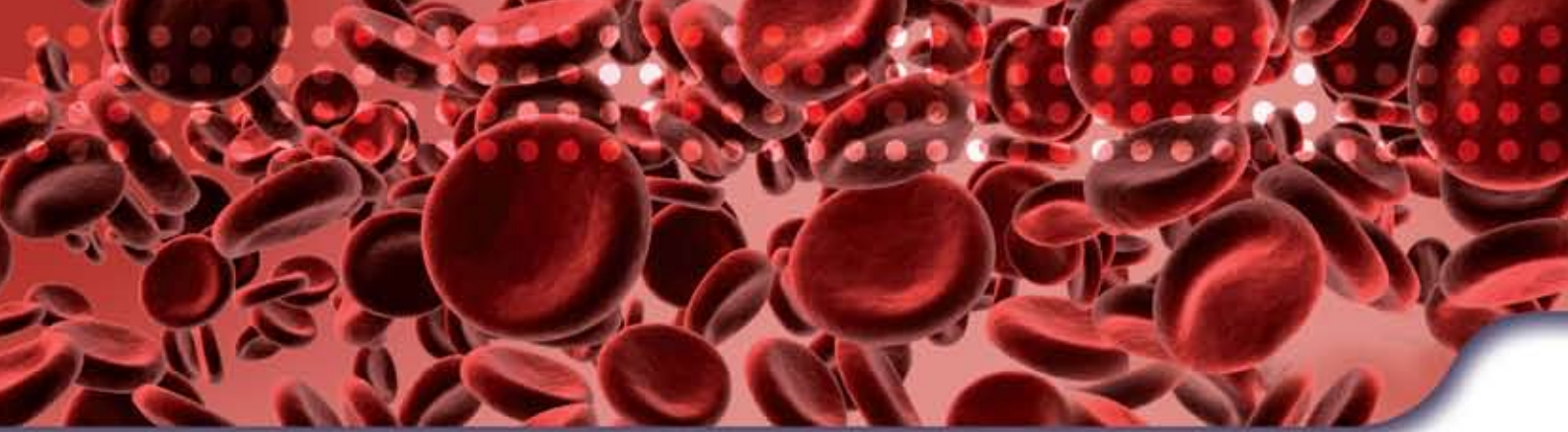


### Exports - Goods & Services (Billion US\$)



### Inward FDI (Billion US\$)





### *The Yissum TTO has over:*

- ▶ 6,100 patents
- ▶ 1,750 inventions
- ▶ 450 licenses
- ▶ 68 spin-offs

## Technology Transfer Organizations (TTOs)

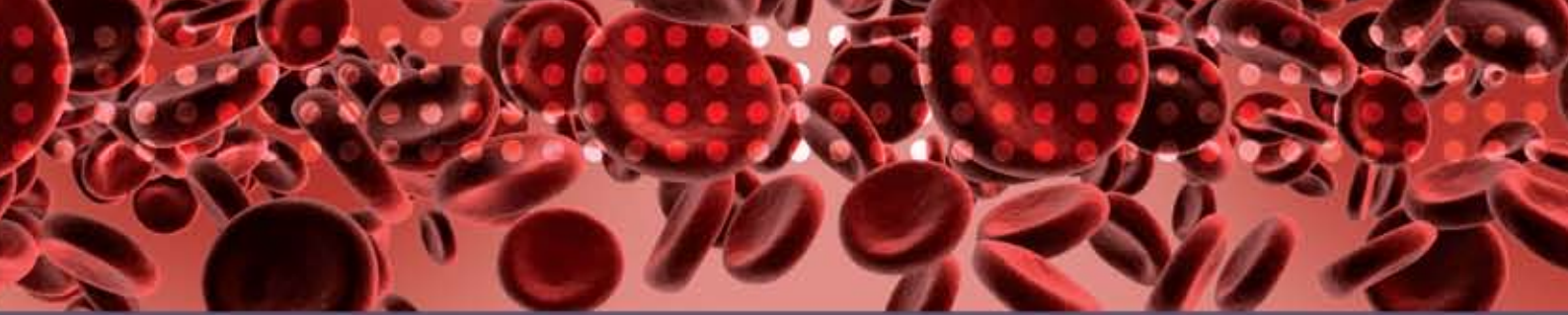
Seven university-associated and 5 hospital-linked Technology Transfer Organizations (TTO) provide a valuable forum for connecting Israeli researchers and early stage projects with the industry through their commercialization efforts - investments, sponsorships and partnerships from multi-national companies eager to benefit from Israeli innovations. Israeli universities were among the first in the world to develop technology transfer organizations (TTO's) and Israel is home to the largest and oldest (over 45 years) TTO. The Hebrew University's Yissum, the oldest and one of the largest TTOs in Israel, reported revenues of \$59 million in 2008. Yissum generates a similar output as its counterparts at MIT and Stanford, with 6,100 patents to date.

**Hadasit**, the TTO of Hadassah Medical Organization, has established a number of start-up companies, 9 of which have already gone public within the framework of Hadasit Bio-Holdings. Recently, one of these companies announced a new oncology treatment in the form of a drug with the potential to kill specific cancer cells directly, quickly, and efficiently and another has completed a clinical trial for the treatment of Lupus. Hadasit is currently developing an innovative drug for the treatment of strokes - eliminating current side effects and tripling the "therapeutic window".

**Ramot**, the TTO of Tel Aviv University, and Johnson & Johnson recently established a joint research fund at TAU to promote projects relating to metabolic disorders such as diabetes, diseases of the central nervous system, cancer and stem cell research. Ramot has developed Organo-Boron antifungal molecules used for the topical and systemic treatment of fungal disease and has recently announced new findings in hepatitis C virus immunology.

The Association of University Technology Managers (AUTM) has included two Israeli technologies among its list of the top 100 Technologies that promote world health: A novel treatment for the treatment of Alzheimer's Disease and a new anti-viral treatment with a cinnamon base, both developed at Ramot.





## Life Sciences in Israel



**Yeda Research and Development Company** is responsible for technology transfer from the Weizmann Institute of Science. The drug, Copaxone, a breakthrough treatment for Multiple Sclerosis, was developed at Yeda and generated annual sales of \$2.26 billion in 2008. Also at Yeda, researchers have developed CCL2, a chemokine for the treatment of inflammation in Rheumatoid Arthritis and Asthma and have identified associated genes and markers in the early detection of susceptibility to Schizophrenia. Scientists, using computer simulations, have provided an explanation as to why certain genetic diseases caused by repeats in the code are “genetic time-bombs” whose onset and progression can be accurately predicted.

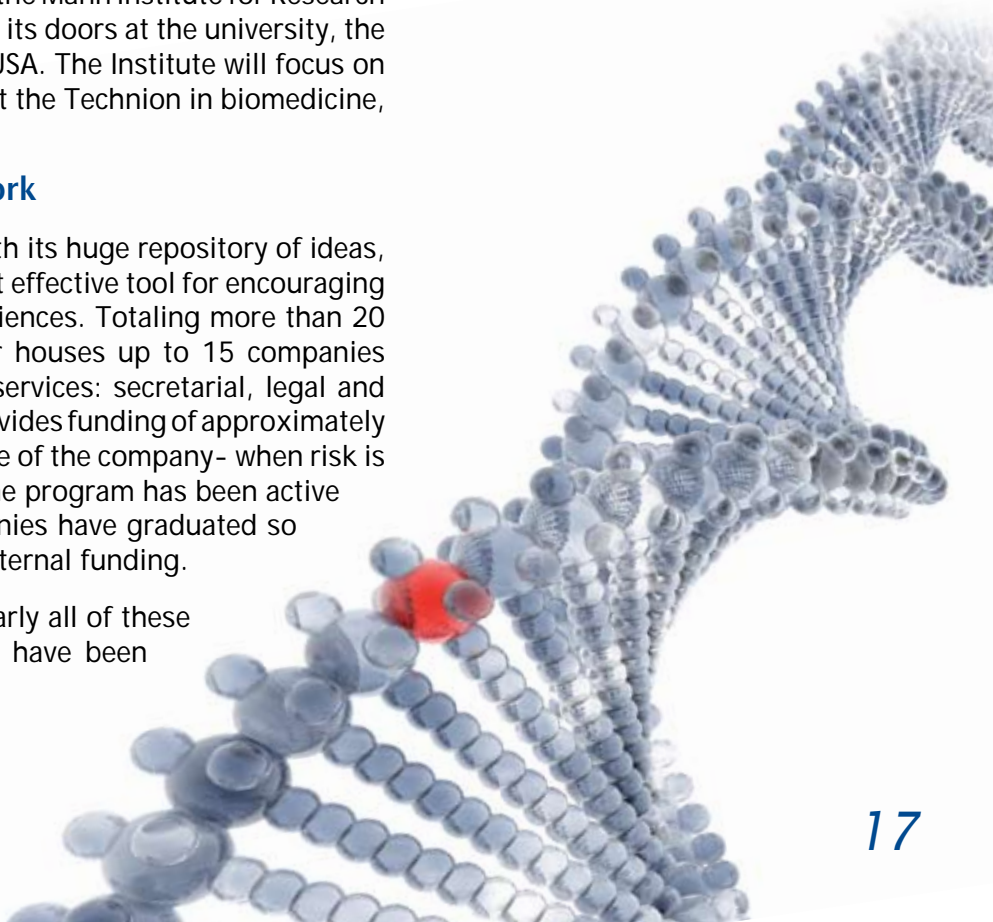
The Technion Israel Institute of Technology, the largest center of applied research in the country, houses the **Technion R&D Foundation**. Last year, following a \$100 million allocation, the Mann Institute for Research and Development in Biomedicine opened its doors at the university, the only Mann Institute located outside the USA. The Institute will focus on the development of knowledge created at the Technion in biomedicine, medical equipment and life sciences.

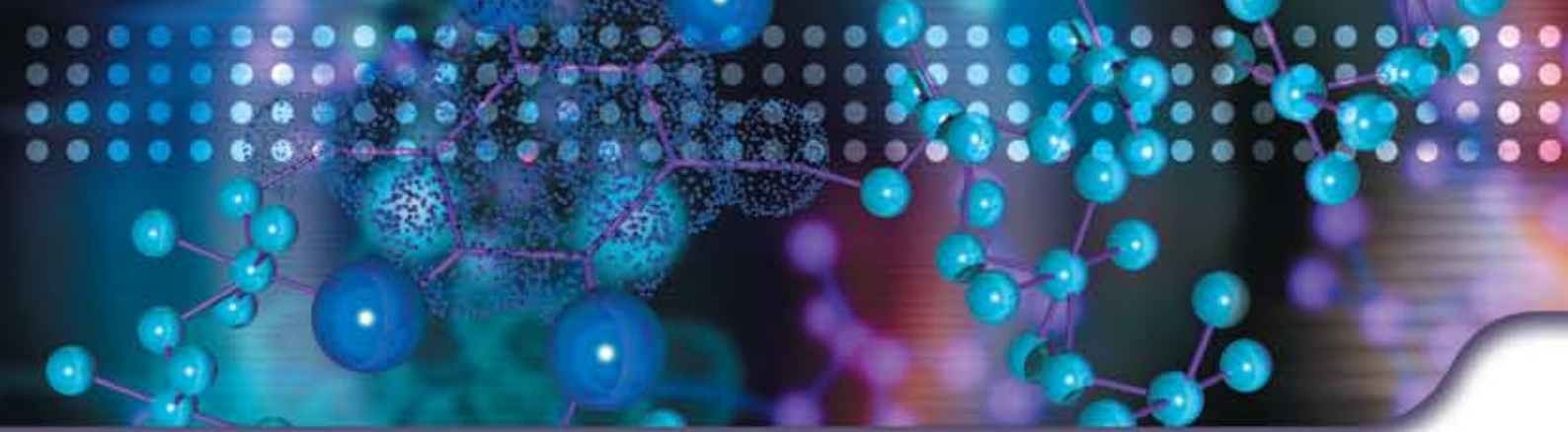
### The Technological Incubator Network

The technological incubator network, with its huge repository of ideas, is a virtual “start-up machine” and a most effective tool for encouraging research and development in the Life Sciences. Totalling more than 20 throughout the country, each incubator houses up to 15 companies and provides them with a full suite of services: secretarial, legal and business development. The incubator provides funding of approximately \$500,000 for the first 2-3 years of the life of the company- when risk is highest and private funding is scarce. The program has been active since the early 1990’s and 1000 companies have graduated so far, successfully raising independent, external funding.

Thanks to the success of this model, nearly all of these tech incubators, once government run, have been privatized.

Israel invests 4.7% of its GDP in R&D, which is the highest ratio in the world (IMD World Competitiveness Yearbook 2009)





### **Customized Research Infrastructure**

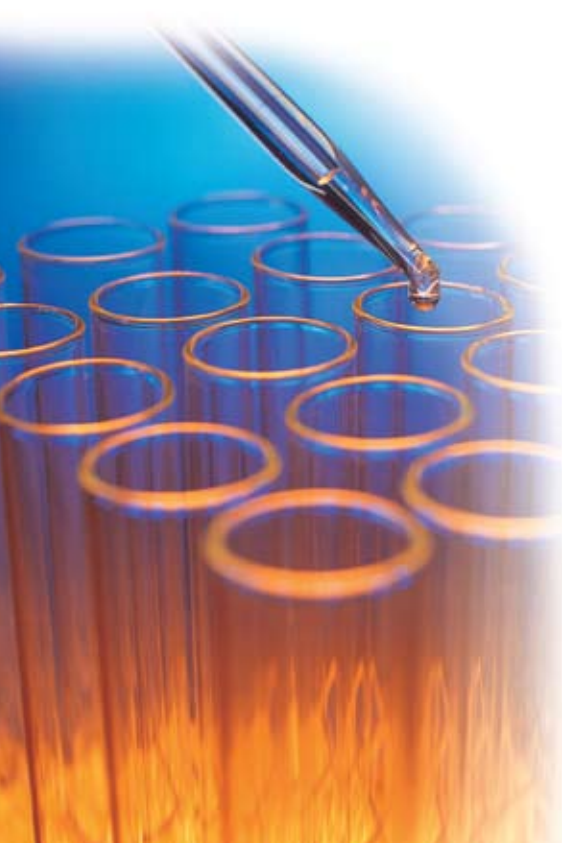
Israeli Life Science leaders and investors have begun to address the specific needs and opportunities of the local market by creating unique and functional solutions. For example, having recognized the difficulties involved in attempting to commercialize small biotech projects emerging from Israeli universities, Teva, Hadasit and two leading VCs established BiolineRX in 2003. Under the guidance of an elite management team, the best early-stage projects are licensed to BiolineRx and developed through to the second stage of clinical trials. At this more advanced stage, a product can be commercialized with a large pharmaceutical company, returning the highest ratio of value increase to investment. Furthermore, this can be achieved within five years and the variety of projects involved spreads the inherent risks associated with biotech development. BiolineRx has recently announced positive interim results from its Phase 2b clinical trials of BL-1020, a treatment for schizophrenia.

BiolineRx has screened close to 900 projects so far and its pipeline includes 15 active projects. It is traded on the Tel Aviv Stock Exchange (BLRX).

### **Interdisciplinary Connections**

A number of Israeli achievements in Life Sciences are based on expertise developed in other disciplines and industries. Market leadership in communications technology, electronics, computer science and even advanced materials has been key to the development of innovative Life Sciences products. Medinol's original cardiovascular stents were based on principles learned in the development of metals and structures for the aviation industry.

Many advances stem from innovations developed within the defense technology industry. Given Imaging, Galil Medical, and Topspin are just a few examples, and since cooperation works in both directions, the Rafael Development Corporation was set up to serve as a think-tank / incubator to identify and develop new medical uses for Israel's defense technologies.





# Life Sciences in Israel



## Support Comes from the Government

The Israeli government is involved in various efforts to encourage global companies to increase their direct involvement in the Life Sciences in Israel. Generous incentive packages are provided to companies interested in developing R&D or manufacturing facilities in Israel.

The Law for the Encouragement of Industrial R&D, administered by the Office of the Chief Scientist in the Ministry of Industry, Trade and Labor is the principal government tool for supporting R&D. According to the guidelines, Biotechnology is defined as a Preferred Sector by the OCS. The support available:

### Criteria

Sector	Preferred Sectors (Biotechnology)	Regular Sectors
Grant per project	50% of approved R&D budget	Between 20%-40% of the approved R&D
Duration of project	2 years	1 year
Accelerated depreciation of new equipment that is a part of the R&D expenses and costs more than NIS 100K	66% during the first year	33% during the first year
Timing for submitting a request for R&D support	During the entire year (flexible)	Once a year (a fixed date)

\*Other benefits in the biotechnology sector are related to start-ups and incubator companies or to academia-industry collaboration and include increased grant and longer project support

The Law for the Encouragement of Capital Investments includes a competitive "Grants Program" administered by the Israel Investment Center and a "Tax Benefits" program administered by the Tax Authorities, both of which offer substantial advantages for foreign investors.



**Invest in Israel** is the investment promotion center of Israel's Ministry of Industry, Trade and Labor. The center serves as a focal point for foreign based companies and individuals interested in investigating direct investment and joint venture opportunities in Israel. **Invest In Israel** provides a wide range of personalized services, assistance to potential investors and serves as a resource for investment related information about Israel. For more information or services, foreign investors are invited to contact Israel's economic representatives or Invest in Israel directly at: [investinisrael@moital.gov.il](mailto:investinisrael@moital.gov.il)



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