

THE LIFE SCIENCES INDUSTRY IN ISRAEL



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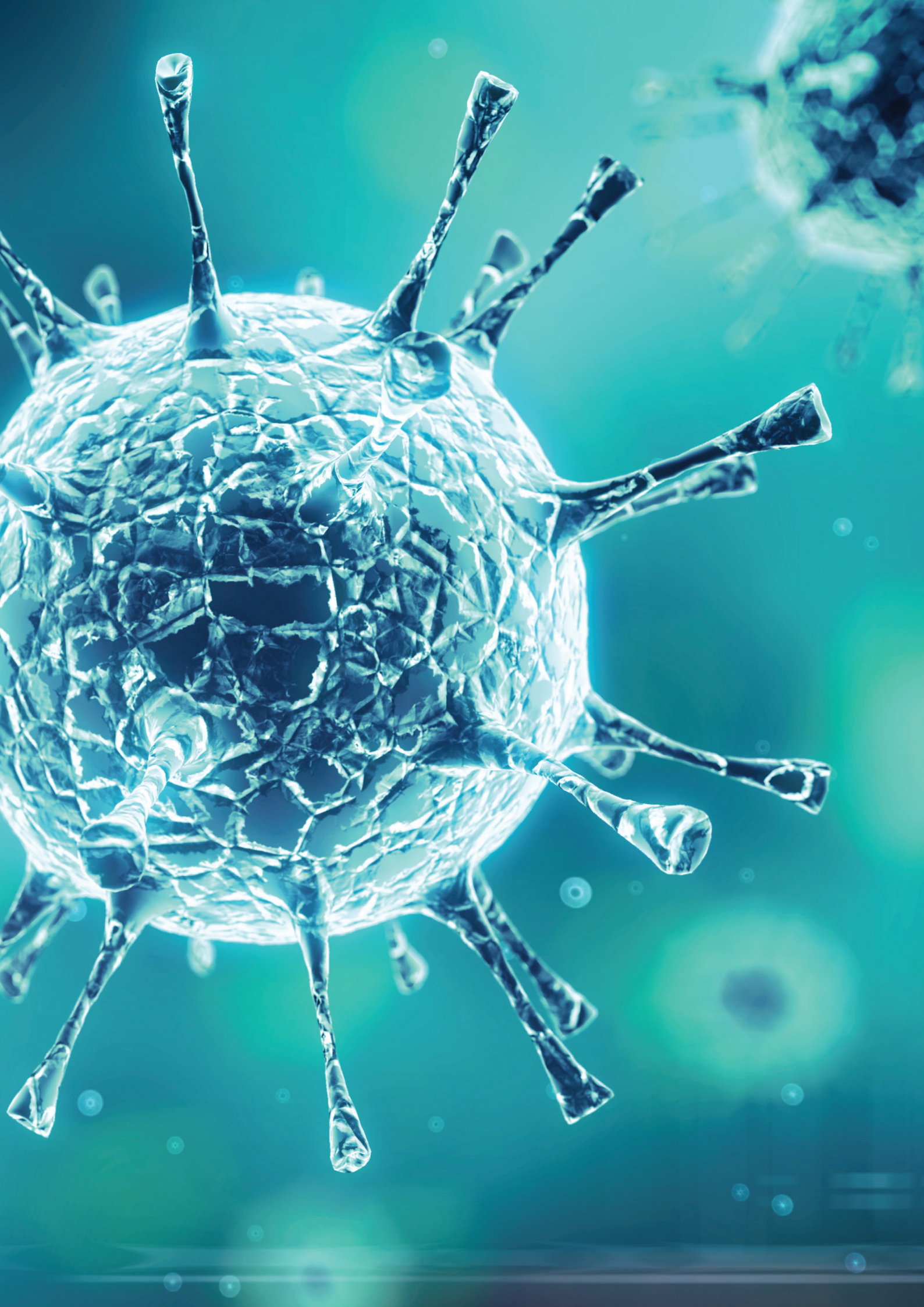
WHERE COMPANIES COME TO SHINE

THE LIFE SCIENCES INDUSTRY IN ISRAEL



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DEFINING THE LIFE SCIENCES INDUSTRY

A broad definition of the **life sciences industry** usually includes all biotechnology companies¹, namely companies that use biotechnology to make commercial products, provide related services, and support the commercialization chain of these products in any way. This general definition includes agriculture and raw materials, for example.² Nevertheless, many commercial and government organizations prefer to use a concise definition of the life sciences industry instead of the general definition that covers the entire field of biotechnology. The narrow definition generally includes companies in fields that are directly related to human healthcare, especially pharmaceuticals and biotech; medical device technology, manufacturing and distribution; and digital healthcare.



Pharmaceuticals

Companies that research, develop, manufacture, market and distribute drugs used for treatment or analysis, including developing new and generic chemical compounds and original and bio-similar biological products.³ The pharmaceuticals segment also includes areas in which biotech companies specialize.



Sub-segments

Pharmaceutical products can be segmented based on the type of science used to develop them (chemical drugs or biological products); position on the global value chain (research and development, manufacturing or distribution)⁴; or type of drug (either generic drugs or patent drugs, or both).⁵

Market trends

The global pharmaceuticals market is comprised of various enterprises and organizations in the healthcare industry that engage in a wide range of fields including producing, marketing and distributing drugs, as well as drug research and development.⁶

According to the EvaluatePharma World Preview 2018, prescription drug sales in 2017 were \$789 billion, and are expected to reach \$1.2 trillion by 2024.⁷

Government spending on healthcare worldwide is expected to rise due to the aging world population, continued increase in the prevalence of chronic illnesses, and advancements in costly treatments (such as the innovative treatment for hepatitis C).

Medical devices

Companies that develop, manufacture and research medical technologies used to treat, monitor and diagnose medical conditions.⁸

Sub-segments

The medical devices market can be segmented in various ways, though it typically includes therapeutic equipment, reusable and disposable medical equipment, diagnostics and monitoring⁹, imaging, non-imaging, implants, rehabilitation equipment and other services.

Market trends

The global medical device market is expected to reach an estimated \$409.5 billion by 2023, and it is forecast to grow at a CAGR of 4.5% from 2018 to 2023. The major drivers for the growth of this market are healthcare expenditure, technological development, aging population,



and chronic diseases.¹⁰

Digital healthcare

Companies that develop and research applications and technologies for healthcare automation, and develop and distribute computer technologies that enable monitoring, diagnosis and treatment of different medical conditions.

Sub-segments

The digital healthcare segment includes several main sub-segments¹¹:

Medical management tools – This category includes companies that develop tools to improve and facilitate new medical management capabilities (electronic medical documentation, medical information analysis, etc.). It includes sub-fields such as medical administration, which are tools designed to streamline, improve or computerize medical management systems; analytics / big data, which are tools that analyze medical information, with an emphasis on deriving information and insights from large quantities of medical information; client-supplier correspondence, which are systems that computerize and improve healthcare supplier-client relations; and digital information records, which are tools that computerize medical records and medical information (e.g. electronic medical records).



Treatment enhancement tools – This category includes companies that develop tools that enable healthcare service providers to offer better quality medical services, to ease the process of receiving medical treatments, or facilitate provision of medical treatments that are customized for the patient. It includes sub-fields such as clinical decision support tools, which are digital tools that help make medical decisions and prevent mistakes during treatment and diagnosis; wireless healthcare, which includes tools that enable remote assessment, treatment and diagnosis using various digital technologies; and personalized healthcare, which includes digital tools that improve diagnosis and treatment capabilities

by designing them to accommodate the patient to the greatest degree possible.

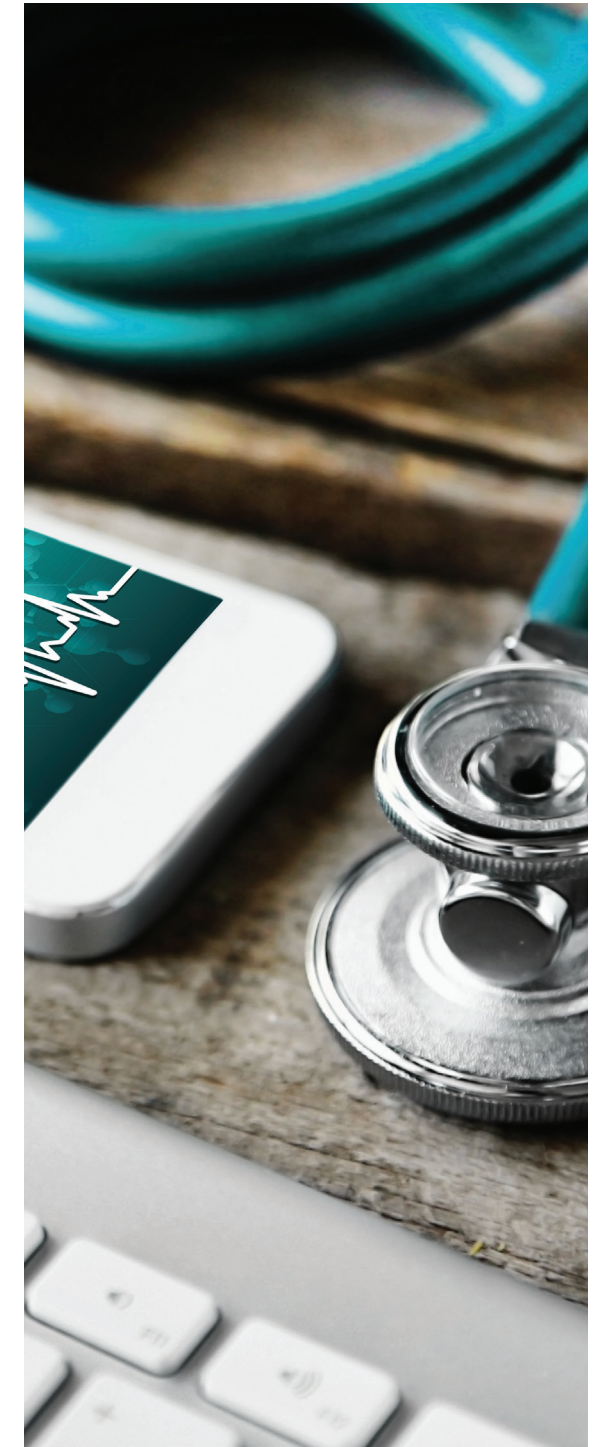
Patient empowerment tools – This category includes companies that develop tools that enable patients to improve their quality of life and the healthcare that they receive. It includes sub-fields such as aging populations, which constitutes digital tools designed for aging populations; mental health / behavioral medicine, which includes digital tools for diagnosis and treatment of mental health and behavioral conditions; wearables, which are digital wearable devices that monitor, diagnose and treat various medical conditions; physical fitness, which includes digital technologies for patient fitness improvement; and

rehabilitation, which includes technologies that provide complementary healthcare services for rehab patients.

Market trends

The digital healthcare segment is expected to grow significantly in the coming years. According to Transparency Market Research (TMR), it will maintain 13.40% annual growth rate between 2017 and 2025 and increase to \$536.6 billion by the end of 2025.¹²

Further evidence of this growth rate can be seen in the number of healthcare applications available today. The global mobile health (mHealth) application market is projected to be valued at \$28.32 billion in the year 2018 and is expected to reach \$102.35 billion by 2023.¹³ Growing government support for digital health solutions, innovative and advanced applications of mHealth technologies, and increasing use of smart phones and tablets are the major factors responsible for notable growth of the market.¹⁴ Many research centers predict that the digital healthcare segment will change the entire life sciences industry, from the manner in which medical data is collected (via applications that monitor medical conditions and wearable devices that track vital signs), to how healthcare service providers correspond with their patients.¹⁵



The life sciences market has been significantly affected in recent years by two conflicting trends. On the one hand, many countries worldwide are forced to increase government expenditure on healthcare for various reasons, while on the other hand, many countries are attempting to manage these expenses through regulation, which inhibits the profitability of the life sciences companies in these countries. Despite the two conflicting trends, the life sciences industry is expected to continue to grow in the coming years.

The expected growth in the industry coincides with both the state of the economy and

government spending on healthcare. These two factors differ greatly between countries around the world. For example, the US government spends an average of approximately \$11,356 per capita on healthcare each year, while Pakistan spends only \$53 per capita, on average, per year. Analysts predict that despite reduced future government spending on healthcare in Europe and North America, a significant increase is expected in developing countries, resulting in an annual growth rate of 4.1% in global government spending on healthcare in 2017-2021.¹⁶

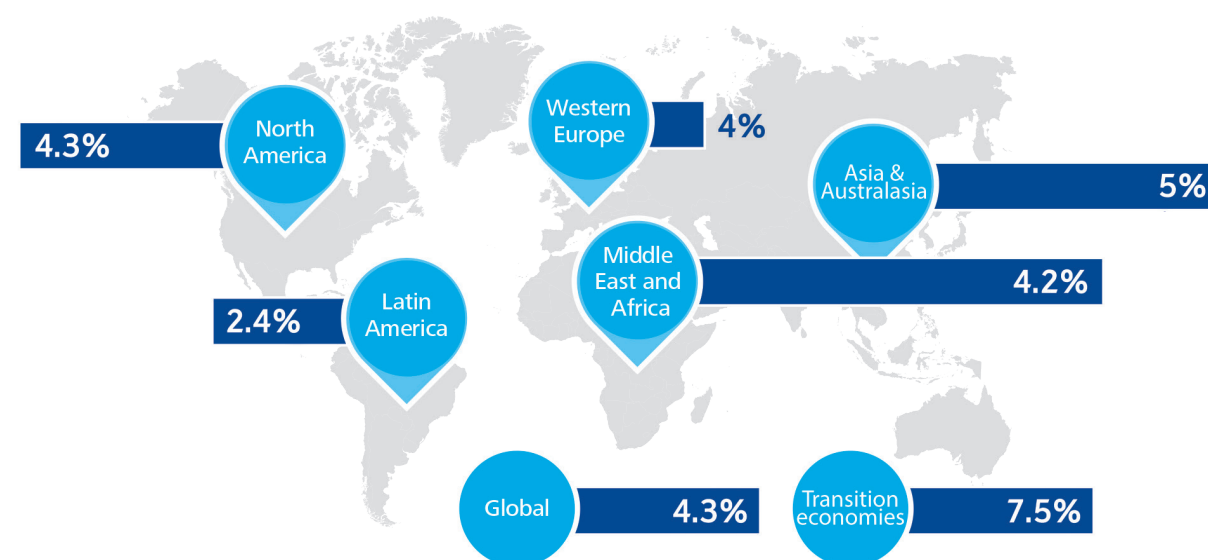


Illustration 1 – Expected increases in government spending on healthcare throughout the world, CAGR (2015-2020).¹⁷





Continued mergers and acquisitions among companies in the industry

There is a significant wave of mergers and acquisitions among companies in the life sciences industry that is shaping the industry and is expected to continue to do so in the future.^{18,19} These mergers and acquisitions serve several purposes, including the expansion of geographical distribution, enhancing specific fields, and developing new fields of business. Mergers and acquisitions are not limited to entire companies, and in recent years, leading companies in the field have purchased divisions within other companies.²⁰



Changes in pricing mechanisms

Governments and insurance companies are striving to reduce healthcare costs and transition to value-based payment systems. This puts pressure on life sciences companies to reduce prices, prove the efficiency of their products compared to other companies, and modify their pricing mechanisms.²¹

Increasingly rigid regulatory environment

The regulatory environment in the life sciences industry has become increasingly rigid in recent years. This presents challenges for new and existing companies in the industry. Regulatory policies are constantly changing and tend to place strict restrictions on companies, thus increasing product development costs.²²

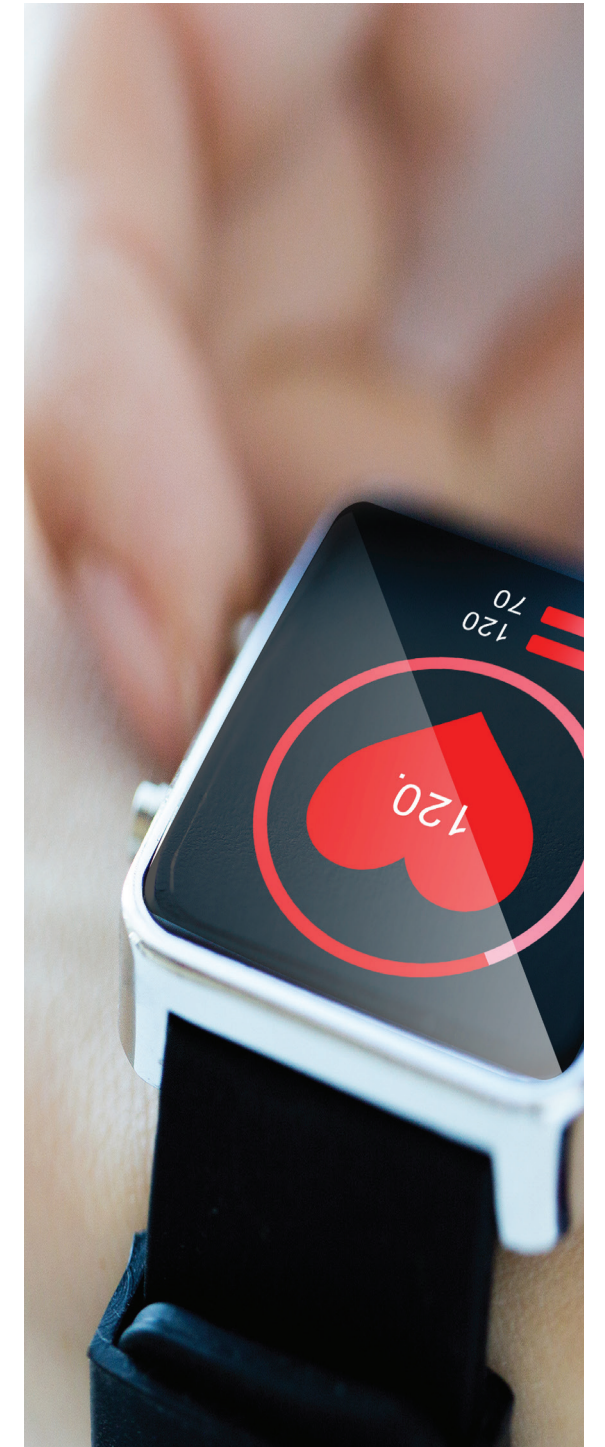
Developments in personalized medicine

As genetic sequencing technologies develop and knowledge on human genome function expands, companies are likely to develop products and drugs that are customized to the patient's specific illness or to the patient's

individual genome.²³ This trend began to emerge several years ago for oncology therapy, and today, personalized healthcare is available for many types of cancer.²⁴ The companion diagnostics trend refers to the growing industry of treatments that require tests to assess compatibility between the disease and the type of treatment before it is administered. An example is the biologic Trastuzumab, a drug for treatment of breast cancer, which entered the market along with a genetic test that confirms whether the cancer will respond to the treatment.

Transitioning to digital healthcare

Transitioning to digital healthcare solutions reduces costs for healthcare providers, improves health-related objectives among patients, and increases the revenue of companies in the life sciences industry. The digital healthcare segment is expected to lead a revolution in life sciences in the coming years, especially due to the many possibilities that this segment presents for the industry. These include smart monitoring devices, remote healthcare technology (TeleHealth), electronic health records, and more. These technologies are expected to be adopted widely by healthcare providers and patients alike.²⁵





The Israeli life sciences industry is highly vibrant and dynamic. This is evident in the number of companies that have been founded in the last decade, capital raised by companies in the industry, changes in the sizes of deals, and the diverse company development stages in which investments are made. The industry engages in diverse and professional research, as is evident from the extent of academic publications in the field. It benefits from commercialization companies that operate in Israel, as can be seen by the number of patent applications that they submit. Also, companies in the industry that engage in research and development

receive government support through the Israel Innovation Authority (formerly the Office of the Chief Scientist).

As of 2017, there are 1,450 active life science companies in Israel, employing more than 85,000 people. Segmentation shows that medical device segment is the largest, and therapeutics and healthcare IT are large-scale segments as well: 582 medical device companies (41%); 225 healthcare IT companies (16%); 202 therapeutics companies (14%); 124 Diagnostics companies (9%); 106 industrial companies (7%) and other companies (13%).²⁶ Between 2008 and

2017, the number of life science companies in Israel grew significantly. Most life science companies (90%) were founded during that decade.²⁸ Approximately 38% of the companies founded between 2014 and 2016 develop digital healthcare products.²⁹

12,077 scientific articles were published in Israel between 2012 and 2016.³⁰

Academia-industry relations

Much of Israel's financial success can be attributed to its ability to realize its technological and scientific potential. The activities in the various segments of the life sciences industry represent some 50% of the civilian research conducted at Israel's seven universities, ten research centers, and five schools of medicine. Israel was ranked third in university/industry research collaboration by the Global Innovation Index of 2018.

Much of Israel's financial success can be attributed to its ability to realize its technological and scientific potential.

The number of publications in the life sciences industry is one of the parameters for academic excellence in the field. According to a study conducted by the Samuel Neaman Institute,

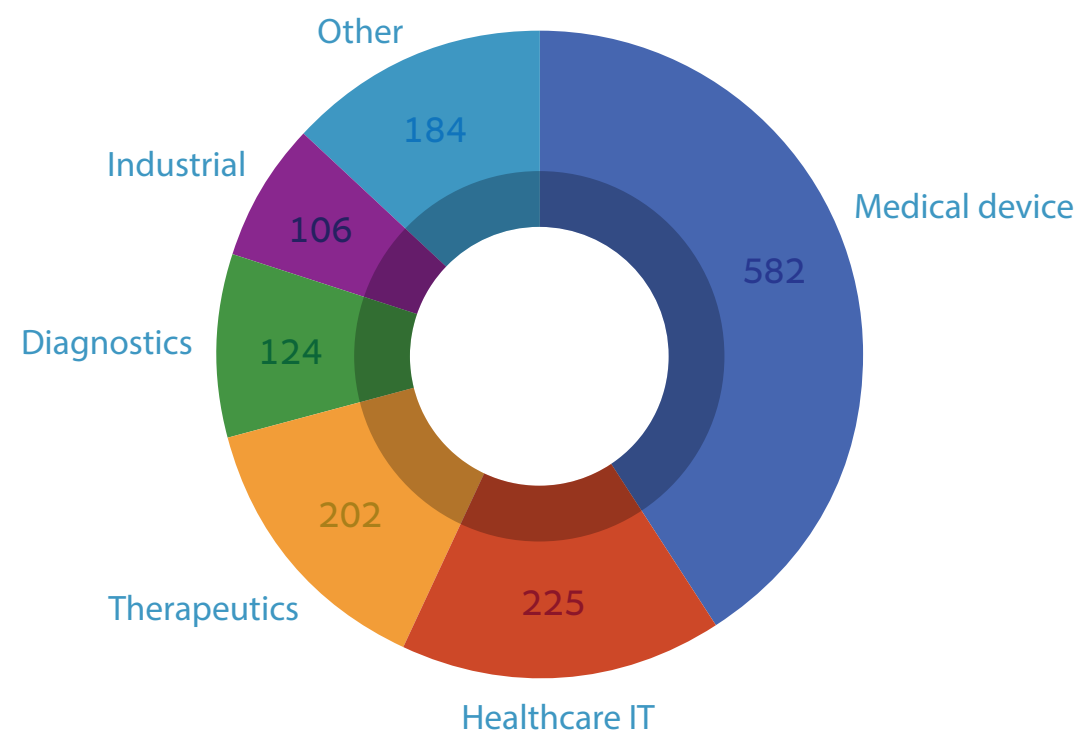


Illustration 2 – Segmentation of the Israeli life sciences industry²⁷



Funding

The life sciences sector funding continues to grow, attracting funding of \$1.2 billion in 2017, which represents 25% of the total investments in Israeli high-tech. Over the last decade, the life sciences sector got an average of 26% of the total investments in Israel high-tech.³¹

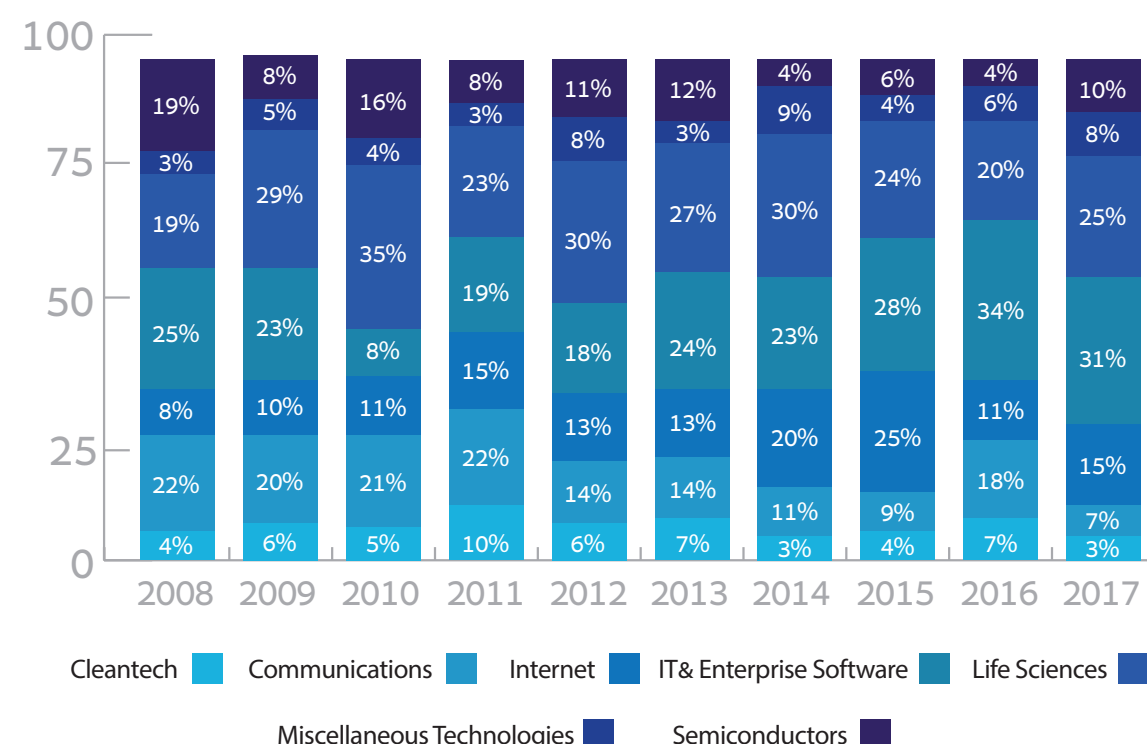


Illustration 3 – Segmentation of capital invested in the Israeli hi-tech industry by field, 2008-2017³²

The funding of \$1.2 billion was invested in 135 life science companies, a minor drop of 1.5% in the number of companies compared to 2016. The average funding per company increased significantly in 2017 compared to 2016, and is approximately \$8.86 million, which is more than double than the average for 2008-2016. Of all transactions in 2017, 48% were conducted at the research and development stage, 32% during the initial revenue stage, 17% during the revenue growth stage and 3% during the seed stage. In addition to being the most popular field in the life sciences industry, medical devices is also the segment that raised the most capital between 2008 and 2017.

The number of large-scale investments (\$10 million and more) had an overall increase between 2008-2017. The graph below shows total capital raised and the number and size of deals.

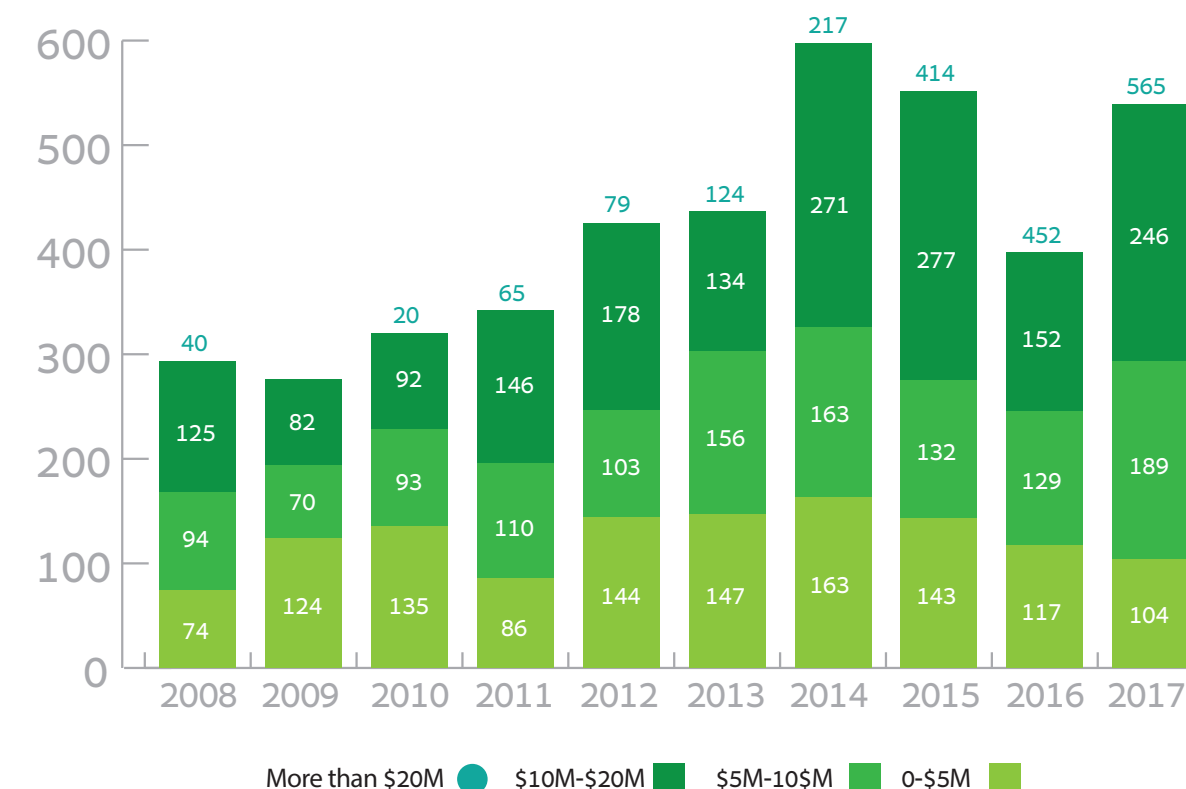
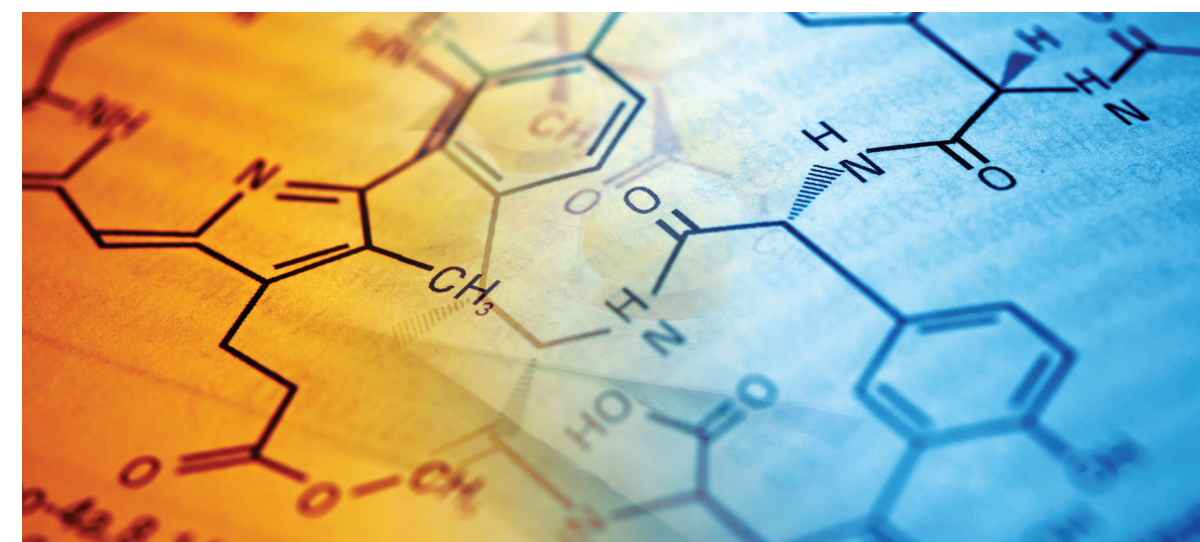


Illustration 4 – Capital raised by Israeli life science companies by deal size, 2008-2017





Government funding

The Israeli government created a support network for R&D activities in the life sciences industry. In the last decade, the Israel Innovation Authority's invested more than \$100 million annually in the life sciences sector via its different programs. Between 2011 and 2017, the Israel Innovation Authority channeled approximately 25% - 35% of its facilitation budgets to life sciences.

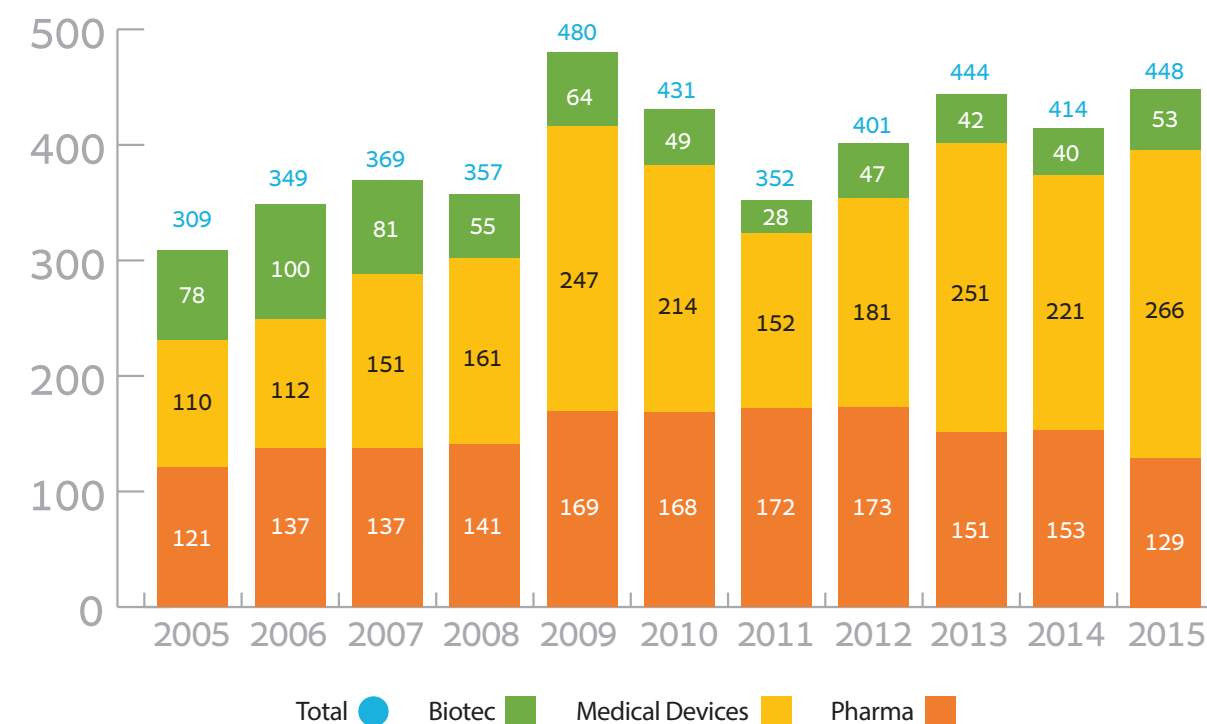
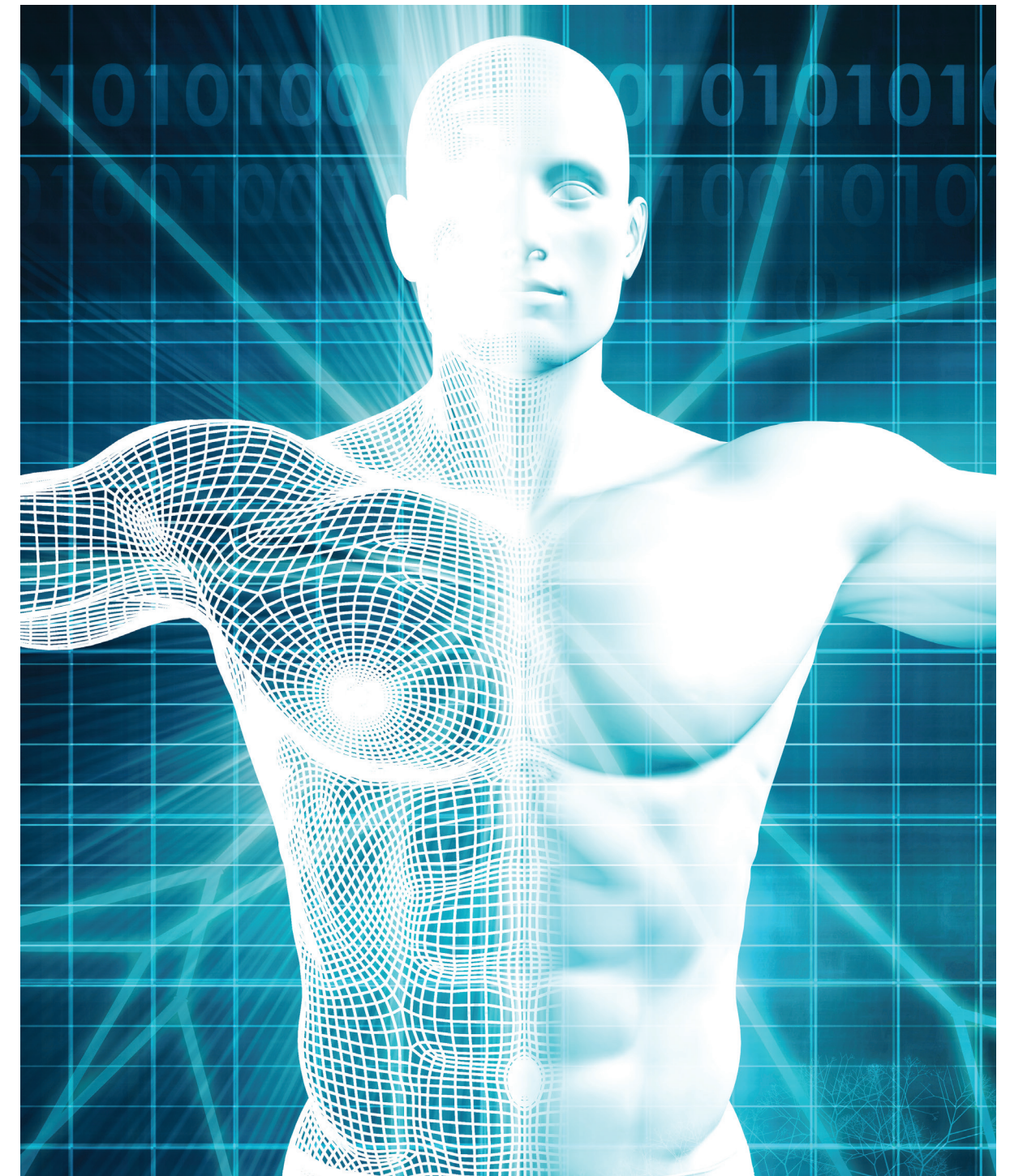


Illustration 5 – Scope of support from the Israel Innovation Authority for life sciences (NIS million)³³



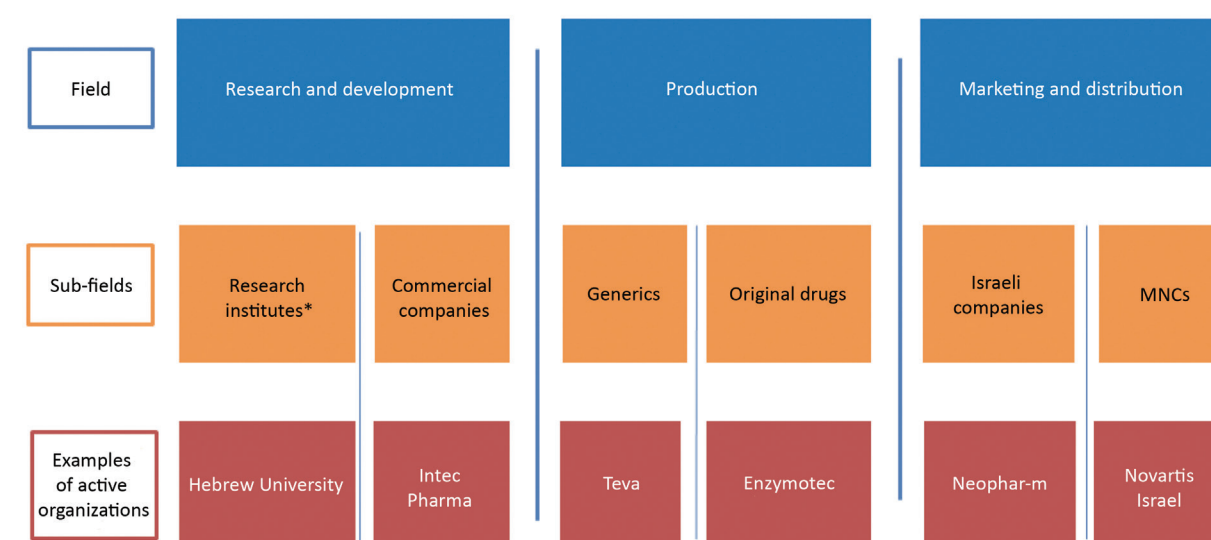


THE LIFE SCIENCES INDUSTRY IN ISRAEL

Pharmaceuticals

Israel is home to companies and commercialization organizations throughout the entire medical value chain – from development to manufacturing.

According to Israel's Central Bureau of Statistics there were 49 active pharmaceutical manufacturers in Israel in 2016. About 13,700 people were employed in the segment, annual revenue was NIS 29.4 billion, and pharmaceutical product exports reached \$6.9 billion, an increase of 1.5% compared to 2015.^{34,35}



* Including knowledge commercialization companies

Research and Development

Israeli academia is heavily involved in the life sciences industry and the pharmaceuticals segment, and commercialization companies play an important role in this process.³⁶ For example, the Hebrew University is active in this field, partially via Yisum, a university knowledge-commercialization company. Yisum is responsible for marketing inventions

and knowledge produced by researchers and students at the university, and grants licenses to apply and commercialize relevant knowledge.³⁷ Intec Pharma was founded in 2000, in conjunction with Yisum, based on developments by Hebrew University School of Pharmacology Prof. Micha Friedman that improve patients' responses to orally-administered medications.³⁸

Production

Generics

As of 2016 approximately half of the pharmaceutical companies in Israel develop generic drugs. There are several Israeli companies in the field, such as Dexcel and Unipharm.³⁹

Teva Pharmaceutical Industries is the largest life sciences company in Israel and the largest generics company in the world.⁴⁰ Teva develops, manufactures and markets its products worldwide.⁴¹ The company's business includes a wide range of chemical, biological, generic and biogeneric compounds. Company sales in 2017 totaled \$22.4 billion and the company employed 51,782 people.⁴² In addition to Teva, many multinational companies are active in the generic drug industry in Israel, including Perrigo Corporation and others.⁴³

Original drugs

There are several original drug manufacturers in Israel, including Enzymotec, which develops and manufactures therapeutic compounds, and Protalix, which develops and markets biological compounds.⁴⁴

Enzymotec specializes in research, development and manufacturing⁴⁵ of lipid-based therapeutic compounds. The company has an additional division that manufactures lipid-based food products. The company was founded in 1998

and is traded on NASDAQ. Its sales volume is \$47.969 million and it employs 238 people, as of 2016.^{46 47} Enzymotec has a factory and R&D labs in Israel⁴⁸, and sells its products worldwide. In 2018, Enzymotec was acquired by Frutarom, which was then acquired for \$6.37 billion by International Flavors and Fragrances.⁴⁹

Marketing and distribution

Drugs in Israel are imported, marketed and distributed by Israeli companies and by international ones that have established branches in Israel for this purpose.

There are several Israeli pharmaceutical companies such as Neopharm Israel and Lapidot Medical of the Lapidot Group.⁵⁰

Neopharm Israel markets and sells medications and other health products.⁵¹ The company is an exclusive representative or partner of various multinational life science companies, including Abbott, Pfizer, Johnson & Johnson, and more.⁵² The company is private, and as of 2017 it employs 175 people.⁵³

There are several MNCs in Israel that engage in various fields of business, including marketing and distribution. Novartis Israel is a part of the giant global pharmaceutical corporation and employs approximately 180 people in Israel. The company markets and sells



Medical Devices

various types of drugs, and is responsible for advancing many studies.⁵⁴

Medical devices is a leading segment in the Israeli life sciences industry, and is especially known for its diverse development activity and exports. Approximately 68% of the companies in this segment are startups, and the majority of the companies in this category are currently in the early (seed and R&D) stages of their lifecycles.

The success of the medical devices segment is an outcome of Israel's success as a hi-tech superpower and as an incubator for daring ideas, innovation, and advanced development capabilities. In addition, it enjoys the support

of external contributors such as government and private organizations that provide monetary support and consulting for various companies in the field. Furthermore, this segment typically has a lower-than-average business risk index.⁵⁵ In 2014, the risk index of companies in the medical devices segment was lower than the overall risk index in the Israeli economy.⁵⁶

In 2014, the number of companies in the Israeli medical devices segment was estimated at 730 Israeli and international companies, over 50% of the companies in the life sciences industry in Israel. Divided into sub-segments, the therapeutic devices, reusable and disposable medical equipment,

and diagnostics and monitoring fields comprise over 70% of all business activity in Israel's medical device companies.

In 2014, approximately 15,700 people were employed in medical device companies in Israel. 60% of the workforce in this segment is employed in two significant fields: the therapeutic equipment field and the reusable and disposable medical equipment field.

Consistent with the geographic trend in Israel, 48% of the companies in the segment are concentrated in central Israel. However, approximately 36% of the companies in this field are located in northern Israel, which is rapidly becoming a vibrant hub for life sciences, while 16% of the companies are located in southern Israel and in Jerusalem.

Venture capital funds contribute significantly to this segment by investing in many companies and helping promote their success. Likewise, Between 1996 and 2010, 32 companies in the medical devices segment in Israel were acquired by international companies, for a total of over \$3.5 billion.⁵⁷

Medical devices development

Israel is considered a leader in the development of medical devices. According to the Israel Patent Office 2017 Annual report, there is a steady increase in the number of patent applications in the life sciences field, due to a dramatic increase in the number of applications in medical devices.⁵⁸

In the past eighteen years Israel has been one of the leading countries in terms of number



of international patents filed via the Patent Cooperation Treaty (PCT) in relation to population size. In 2017, Israel was ranked fifth in the world for patents filed per capita according to the country of the inventor. Israel has above average expertise in almost all of the fields examined, mainly in medical devices, followed by drugs, communications, and software.⁵⁹

Medical devices exports

Israel is not only a leader in medical devices development, but also in manufacturing and exporting these devices, and shows consistent growth in revenue each year. The value of medical device exports grew by approximately 10% in 2017 compared to the previous year, and reached nearly \$1.9 billion. Exports in this field are expected to continue to increase in the coming years.⁶⁰ In 2017, the majority of Israeli medical device exports were to the US (40%), European Union (26%) and Asia (24%).⁶¹





Digital Healthcare

The digital healthcare and information and health technology segment in Israel (digital healthcare) is a rapidly growing part of the Israeli life sciences industry, and the number of companies in this segment has been growing consistently for several years, reaching approximately 400 companies to date.

As usual for a rapidly growing industry, it is still in its early stages of development. Although 78% of Personal Health Tools companies are in early stages of funding (40% pre-seed, 38% seed), the products of almost 80% of companies in this subsector are fully developed (50%) or in alpha/beta stages (27%).⁶² More than half of Israeli health IT and digital health companies were established in the last six years. Seventy percent of them employing less than 10 employees, and about 5% employing more than 50 employees.⁶³

The Israeli industry includes companies that engage in nearly all areas of digital healthcare. The largest number of companies in this industry specialize in analytics/big data, personalized medicine and administration.

In addition, when segmenting the industry by field in medicine, it is apparent that the largest medical categories in the digital healthcare industry are neurology, psychology, cardiology, genetics, geriatrics, gynecology, obstetrics and diabetes.

While the majority of companies in the traditional life sciences industry in Israel develop products for service providers (e.g. drugs for pharmaceutical companies; medical equipment

for medical device companies), a large number of Israeli companies in this segment develop products that target consumers directly. 65.4% of the companies in the field develop products geared directly to customers (B2C – Business to Customer), or directly to customers via an additional service provider (B2B2C – Business to Business to Consumer).⁶⁴

For many years, Israel has been implementing policies that include government investments in the digital healthcare segment. Israel was one of the first countries in the world to integrate electronic medical records into its systems and to introduce connectivity between its various nationwide healthcare systems. Collaboration with government organizations is one of the main strengths of the local industry. The Ministry of Health leads a digital-health-based program that aims to improve processes and quality of treatment while reducing expenses. The program includes a digital licensing process for physicians (so that physicians will receive their licenses faster and many wasted “physician years” will be saved); computerized immunization records; remote medicine services designed to improve the quality of healthcare in peripheral areas; and more. The program is based on the digital healthcare startup industry in Israel and is expected to significantly change the Israeli healthcare system.⁶⁵





Medical Devices

Name	Website	Field	Brief description
Syneron Candela	https://www.syneron-candela.com/int	Therapeutic equipment	The company develops and manufactures therapeutic equipment for diverse cosmetic and medical problems (hair removal, scar treatment, varicose vein treatment, etc.).
Mazor Robotics	http://www.mazorrobotics.com/	International	The company develops a robotic device that performs precise surgical procedures for spinal surgery.
ReWalk Robotics	http://rewalk.com	Therapeutic equipment	The company develops and manufactures robotic walking aids for people suffering from paralysis or myasthenia.
MediWound Ltd.	http://www.mediwound.com	Therapeutic equipment	The company develops and manufactures absorbent bandages for optimal healing of wounds and tissue renewal after burns.
Itamar Medical Ltd.	http://www.itamar-medical.com	Diagnostics and monitoring	The company markets and sells medical devices used for cardiologic diagnostics and monitoring, as well as for sleep apnea. The company has recently received a huge government grant in order to establish a marketing division in China.

Digital Healthcare

Name	Website	Field	Brief description
CliniWorks	http://www.cliniworks.com	Analytics and big data	The company develops software solutions that enable users to derive and manipulate information from multiple and diverse sources (aggregating large quantities of data from various sources, extracting medical data from many information sources, etc.). The company signed a collaboration agreement with the global company Pfizer in 2014.
Starlims	https://www.abbottinformatics.com/us/products/lims	Administration	The company developed software solutions for administrative management of medical labs. The company was acquired in 2010 by Abbott, a global company, for \$123 million.

Digital Healthcare

Name	Website	Field	Brief description
Hello Heart	http://helloheartapp.com	Personalized medicine	The company developed an application that tracks indices related to cardiac health (cholesterol levels, blood pressure, etc.) and provides information to patients that is customized to the specific needs of each one, in order to improve their health.

Pharmaceuticals

Name	Website	Field	Brief description
Teva Pharmaceuticals	http://www.tevapharm.com/	Pharmaceuticals	The company specializes primarily in generic drugs, but other business interests include active pharmaceutical ingredients and to a lesser extent proprietary pharmaceuticals. It is the largest generic drug manufacturer in the world and one of the 15 largest pharmaceutical companies worldwide.
Intec Pharma	http://intecpharma.com/	Pharmaceuticals R&D	Intec Pharma develops a unique capsule to distribute medications in the digestive system. The company is traded on NASDAQ and as of 2015 had no revenues.
Enzymotec Ltd.	http://www.enzymotec.com/	Pharmaceuticals – original drugs	Enzymotec Ltd. specializes in research, development and manufacturing of lipid-based therapeutic compounds. The company has an additional division that manufactures lipid-based food products.
Neopharm Israel	http://neopharmgroup.com/?page_id=214	Pharmaceuticals – marketing	Neopharm Israel markets and sells medications and other health products. The company is an exclusive representative or partner of various multinational life sciences companies, including Abbott, Pfizer, Johnson & Johnson, and more.



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The information included in this guide is relevant for September 2019. The content included is intended to provide only a general outline of the subjects covered and it is necessary that specific professional advice be sought before any action is taken.

