# TABLE OF CONTENTS

- Defining the Life Sciences Industry .................................................. 5
- Life Science Industry Segmentation ............................................... 6
- The Global Life Sciences Market ................................................... 10
- Global Trends in The Life Sciences Industry .................................. 12
- The Life Sciences Industry in Israel .............................................. 14
  - Pharmaceuticals ................................................................. 20
  - Medical devices .............................................................. 22
  - Digital healthcare ............................................................ 24
- Selected Israeli Companies .......................................................... 26
- Footnotes ..................................................................................... 28
A broad definition of the life sciences industry usually includes all biotechnology companies, 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. 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. 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); or type of drug (either generic drugs or patent drugs, or both).

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.

According to the CMR Pharmaceutical Factbook Report for 2016, sales in the pharmaceuticals segment in 2015 were $1.1 trillion, and continued rapid growth is likely until 2019. 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 monitoring5, imaging, non-imaging, implants, rehabilitation equipment and other services.

Market trends
After several years of relative stability in this market, profits in the medical devices segment are expected to increase and to maintain a static growth rate. The market is expected to grow at an average rate of 4.1% per year, to $454 billion in revenue by 2019.10

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. Deloitte predicts that it will maintain a 50% annual growth rate until 2018, when it will reach a record market value of $21.5 billion.\(^\text{12}\)

Further evidence of this growth rate can be seen in the number of healthcare applications that have been developed and distributed by pharmaceutical companies, which grew by 63% between 2013 and 2014, and in the number of healthcare applications that have been downloaded by users (a 197% increase between 2013 and 2014).\(^\text{13}\)

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.\(^\text{14}\)
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 $11,038 per capita on healthcare each year, while Pakistan spends only $58 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 a growth rate of 4.3% in global government spending on healthcare from 2016 onwards and overall growth of various sectors of the life sciences industry.

Illustration 1 – Expected increases in government spending on healthcare throughout the world by 2019

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1. Illustration 1 – Expected increases in government spending on healthcare throughout the world by 2019.
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. 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.

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.

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.

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. This trend began to emerge several years ago for oncology therapy, and today, personalized healthcare is available for many types of cancer. 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 Trastuzmab, 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.
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).

Segmentation of the industry shows that the medical device segment is the largest, and pharmaceuticals, biotechnology and digital healthcare are large-scale segments as well. 317 biotechnology and pharmaceutical companies (23%); 725 medical device companies (53%); 285 digital healthcare and information and health technology companies (20%); and 53 companies in other fields included in the broad definition of the life sciences industry (4%).
Between 2005 and 2014, the number of life science companies in Israel grew significantly. Most life science companies (66%) were founded during that decade. Approximately 36% of the companies founded between 2011 and 2014 develop digital healthcare products.26

**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 has one of the world’s highest concentrations of scientists per capita (145 for every 10,000 citizens), and one in three Israeli scientists specialize in some aspect of life sciences.

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, 58,210 scientific articles were published in Israel between 2007 and 2011, 45% of which were related to life sciences. Specifically, 23% of the scientific publications were on clinical medicine.
Funding

Between 2005 and 2014, capital raised for the life sciences industry averaged 22.4% of total capital raised for Israel’s hi-tech industry each year. The life sciences industry drew record investments in 2014, totaling $801 million, which is approximately 24% of the capital invested in hi-tech during that year. Investments totaled $516 million in 2013, and $489 million in 2012.26

The number of deals in the life sciences industry increased consistently between 2005 and 2014. Of all transactions in 2014, 55% were conducted at the research and development stage, 22% during the initial revenue stage, 16% during the seed stage, and 7% during the revenue growth stage.28 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 2005 and 2014.

The number of large-scale investments ($10 million and more) increased as well. 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, 2005-2014

Illustration 4 – Capital raised by Israeli life science companies by deal size, 2005-2014
Government funding

The Israeli government created a support network for R&D activities in the life sciences industry. Between 2005 and 2014, the Israel Innovation Authority channeled approximately 25% of its facilitation budgets to life sciences. In numbers, the Israel Innovation Authority contributed over NIS 250 million to the industry each year between 2000 and 2014 through its various facilitation programs.

Illustration 5 – Scope of support from the Israel Innovation Authority for life sciences (NIS million)
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 2014. About 14,700 people were employed in the segment, annual revenue was NIS 26.8 billion, and exports constituted 9.4% of total Israeli exports.31,32

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.33 For example, the Hebrew University is active in this field, partially via Yissum, a university knowledge-commercialization company. Yissum is responsible for marketing inventions and knowledge produced by researchers and students at the university, and grants licenses to apply and commercialize relevant knowledge.34 Intec Pharma was founded in 2000, in conjunction with Yissum, based on developments by Hebrew University School of Pharmacology Prof. Micha Friedman that improve patients’ responses to orally-administered medications.35
Production

Generics
As of 2014 approximately half of the pharmaceutical companies in Israel develop generic drugs. There are several Israeli companies in the field, such as Dexcel and Unipharm.36

Teva Pharmaceutical Industries is the largest life sciences company in Israel and the largest generics company in the world.37 Teva develops, manufactures and markets its products worldwide.38 The company’s business includes a wide range of chemical, biological, generic and biogeneric compounds. Company sales in 2015 totaled $19.5 billion and the company employed 42,888 people.39 In addition to Teva, many multinational companies are active in the generic drug industry in Israel, including Perrigo Corporation and others.40

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.41

Enzymotec specializes in research, development and manufacturing 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 $50 million and it employs 158 people, as of 2015.43 Enzymotec has a factory and R&D labs in Israel44, and sells its products worldwide.

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.45

Neopharm Israel markets and sells medications and other health products.46 The company is an exclusive representative or partner of various multinational life science companies, including Abbott, Pfizer, Johnson & Johnson, and more.47 The company is private, and as of 2014 it employs 160 people.48

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 160 people in Israel. The company markets and sells various types of drugs, and is responsible for advancing many studies.49
Medical Devices

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. In 2014, the risk index of companies in the medical devices segment was lower than the overall risk index in the Israeli economy.

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.52

Medical devices development

Israel is considered a leader in the development of medical devices. The number of Israeli patents in this field that were approved in the US has grown consistently from 135 in 2007 to 413 in 2013.53

In addition, an average of approximately 51 Israeli patents per million residents were approved in the US in this field in 2013. This is a higher rate than other leading countries such as the US, Switzerland, Sweden, Denmark, Ireland, and Japan.

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 2014 compared to the previous year, and reached nearly $2 billion (compared with $1.8 billion in 2013). Exports in this field are expected to continue to increase in the coming years.54 The majority of Israeli medical device exports are to the US (34%), European Union (30%) and China (11%).
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 300 companies to date.

As usual for a rapidly growing industry, it is still in its early stages of development. Most of the digital healthcare companies in Israel (56%) are in the seed investment or research & development stages. The majority of existing companies (66%) are small, employing less than 10 people, and one-quarter of the companies have 10-15 employees.55

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. 54% 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).56

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.57
## SELECTED ISRAELI COMPANIES

### Medical Devices

<table>
<thead>
<tr>
<th>Name</th>
<th>Website</th>
<th>Field</th>
<th>Brief description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syneron Candela</td>
<td><a href="https://www.syneron-candela.com/int">https://www.syneron-candela.com/int</a></td>
<td>Therapeutic equipment</td>
<td>The company develops and manufactures therapeutic equipment for diverse cosmetic and medical problems (hair removal, scar treatment, varicose vein treatment, etc.).</td>
</tr>
<tr>
<td>ReWalk Robotics</td>
<td><a href="http://rewalk.com">http://rewalk.com</a></td>
<td>Therapeutic equipment</td>
<td>The company develops and manufactures robotic walking aids for people suffering from paralysis or myasthenia.</td>
</tr>
<tr>
<td>MediWound Ltd.</td>
<td><a href="http://www.mediwound.com">http://www.mediwound.com</a></td>
<td>Therapeutic equipment</td>
<td>The company develops and manufactures absorbent bandages for optimal healing of wounds and tissue renewal after burns.</td>
</tr>
<tr>
<td>Itamar Medical Ltd.</td>
<td><a href="http://www.itamar-medical.com">http://www.itamar-medical.com</a></td>
<td>Diagnostics and monitoring</td>
<td>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.</td>
</tr>
</tbody>
</table>

### Digital Healthcare

<table>
<thead>
<tr>
<th>Name</th>
<th>Website</th>
<th>Field</th>
<th>Brief description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CliniWorks</td>
<td><a href="http://www.cliniworks.com">http://www.cliniworks.com</a></td>
<td>Analytics and big data</td>
<td>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.</td>
</tr>
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</table>
## Digital Healthcare

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<th>Name</th>
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<tbody>
<tr>
<td>Hello Heart</td>
<td><a href="http://helloheartapp.com">http://helloheartapp.com</a></td>
<td>Personalized medicine</td>
<td>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.</td>
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## Pharmaceuticals

<table>
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<tr>
<th>Name</th>
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<th>Field</th>
<th>Brief description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teva Pharmaceuticals</td>
<td><a href="http://www.tevapharm.com/">http://www.tevapharm.com/</a></td>
<td>Pharmaceuticals</td>
<td>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.</td>
</tr>
<tr>
<td>Intec Pharma</td>
<td><a href="http://intecpharma.com/">http://intecpharma.com/</a></td>
<td>Pharmaceuticals – R&amp;D</td>
<td>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.</td>
</tr>
<tr>
<td>Enzymotec Ltd.</td>
<td><a href="http://www.enzymotec.com/">http://www.enzymotec.com/</a></td>
<td>Pharmaceuticals – original drugs</td>
<td>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.</td>
</tr>
<tr>
<td>Neopharm Israel</td>
<td><a href="http://neopharmgroup.com/?page_id=214">http://neopharmgroup.com/?page_id=214</a></td>
<td>Pharmaceuticals – marketing</td>
<td>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 &amp; Johnson, and more.</td>
</tr>
</tbody>
</table>
6. Ibid.
9. While certain segmentations place MRI machines and scintigraphy equipment in the imaging category, we chose to use the existing classification in which only x-ray machines are included in the imaging category.
13. Ibid.
14. Ibid.
24. IATI 2015 report.
25. Ibid.
26. Ibid.
27. Ibid.
28. Ibid.
29. Ibid.
30. Ibid.
39 Company profile on the Factiva information base.
43 Company profile on the Factiva information base.
47 Ibid.
48 Company profile on the Factiva information base.
50 This index evaluates the following parameters, among others: revenue, seniority, number of employees, business feedback from clients and suppliers, payment ethics and more.
57 Innovation in Israel – Office of the Chief Scientist, 2015, page 42.
The information included in this guide is relevant for December 2016. 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.