Israel’s Life Sciences Industry
IATI Report 2017

Connecting Israel’s Tech Ecosystem
Connecting the tech ecosystem

ISRAEL’S UMBRELLA ORGANIZATION for the High-Tech and Life Science Industries

IATI.CO.IL

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Dear Friends,

The IATI 2017 Report: Israel's Life Sciences Industry offers a sweeping panorama of the country's flourishing life sciences industry, which is growing in prominence in the global healthcare market. The report provides a snapshot of various aspects of the industry, from current trends and influences to systematic elements including continued government support and academic excellence.

The Israeli Life Sciences Industry has accelerated rapidly, with a growing pipeline in a variety of industry segments. This growth is aided by consistent government support and a strong academic base, which is a leading source for companies and technologies within the ecosystem.

We at IATI, Israel’s Umbrella Organization of the High-Tech & Life Science industries, believe that the combination of the country’s experienced and highly-educated professionals, an outstanding academic community, innovative spirit and technological prowess will only propel Israel’s life sciences industry even further in the coming years. We expect more cooperation between multinational and local players to bring revolutionary treatments and solutions to people around the world.

This unique report provides an in-depth view of the local industry, highlighting the sustained growth and progress that was made and help give readers an idea of where the industry is headed. We hope that you will find it informative and helpful, and encourage you to share it with others.

We would warmly like to thank Claudio Yarza, Partner, Pharmaceuticals & Life Sciences Leader and Omer Gavish, Senior Manager from PwC Israel, for all the support in the preparation of this report. In addition, we would like to thank Gil Gurfinkel, leader of Medison Biomed, for his contribution on putting together the Incubators chapter; Greenberg Traurig law firm; Rodman & Renshaw; and ZAG-S&W law firm.

We are at your service and happy to hear your voice – send us your feedback, opinions and advice, so we can learn and improve towards the next Life Science Report.

Here’s to another year of innovation and growth!

Warm Greetings
IATI Team

Karin Mayer Rubinstein
IATI
CEO

Yaky Yanay
IATI Co-Chairman
Pluristem Therapeutics President

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Following a decade of significant growth, the Israeli Life Science Industry continues to go strong, and improve its position in the global healthcare market. The industry is demonstrating encouraging signs of maturity, with more companies reaching the revenue stages. This is an innovative industry, which takes advantage of Israel’s excellence in academic research as well as deep government support. Beyond that, its commercial success lays with a combination of highly educated professionals entrepreneurial culture, innovative spirit and great technologies.

In the two years since our last report, the Healthcare IT and Digital Health sub sectors have surged both in terms of the sheer number of companies and the funding they raised. For other sub-sectors, it’s a mixed story. The amounts raised by Israeli life sciences companies, both in the public and private markets, have declined in step with global trends. However, the average dollar amount per deal went up, mainly thanks to the higher maturity level of many companies.

Global healthcare service providers worldwide are facing many challenges. Shrinking budgets force a shift to value-based care, forcing organizations to adapt, and prompting a wave of fine-tuning across the industry to allow doing more with less. Meanwhile, the demand for healthcare is ever-increasing, mainly from growing populations in emerging markets and ageing populations in the developed world. Innovative technologies are ranked high among the solutions to address those challenges, which is an opportunity for the Israeli life science industry.

Additionally, governments try to streamline regulatory environment to nurture innovation, and bring more technologies earlier to market, by accelerating approval processes. A notable example is the 21st Century Cures Act that was enacted in late, giving US patients early access to regenerative medicine technologies (under certain circumstances). This can also be supportive for the innovative Israeli life science industry and will allow medium size companies to move quicker to regulatory approval.

Substantial demand is coming from China, where authorities are reforming public health services to better care for the massive number of elderly people and booming urban populations. Chinese authorities are spending more, and particularly look for innovative technology solutions. In turn, Israeli life science companies are attracting larger investments from China.

We are confident that in this changing world, Israeli life sciences companies can play a leading role in the global healthcare industry, and help solve the major challenges it is facing.
According to multiple different databases and our own estimates, about 1,350 life science companies are active in Israel (Figure 1). As many as 1,234 life sciences companies were established in Israel in the last decade (2007–2016), or 123 companies every year in average (Figure 2), and 612 of them are still active.

**Figure 1** - Cumulative number of active life science companies

![Cumulative number of active life science companies](image)

Source: IATI, IVC

**Figure 2** - Number of Israeli life sciences companies established (2007–2016)

![Number of Israeli life sciences companies established](image)

Source: IATI, IVC-ZAG High-Tech Capital Raising Survey
In the same decade, 622 life sciences companies ceased to operate for various reasons, or 62 companies a year on average. The number of companies that ceased operating in 2016 fell dramatically and is 20% lower than this average (Figure 3).

Figure 3 - Number of Israeli Life Science Companies Discontinuing Operations (2007-2016)

Thirty eight percent of the active life science companies are in advanced stages and generate revenue. Of these companies, 33% are in the Initial Revenues stage and 5% are in the Revenue Growth stage (Figure 4).

Figure 4 - Number of Active Israeli Life Science Companies by Stage
Although the Israeli Life Sciences Industry is still heavily biased towards medical devices, their share of the overall life sciences industry is trending lower, with 42% in 2016 compared to 53% in 2014. Therapeutics and Healthcare IT are the next largest sub-sectors with 222 and 215 companies, respectively, representing approximately 16% of all life science companies (Figure 5).

**Figure 5 - Israel Life Sciences Industry Sub-Sectors**

![Source: IVC-ZAG High-Tech Capital Raising Survey](image-url)
Funding

Israel High-Tech Funding

There are several sources of funding for the Israeli Life Sciences Industry, among them are the Israel Innovation Authority (see below), the U.S National Institute of Health (NIH), Binational Government supported Foundations, angels, venture capital funds (Israeli and foreign), micro-funds, corporate investors and IPOs (mainly the TASE and NASDAQ). Exact figures are hard to come by, as the definitions used by various industry reports are different. We based our funding data on information from the IVC-ZAG High-Tech Survey, which captures capital raised by Israeli High-Tech companies from local and foreign venture capital funds as well as other investors such as foreign or Israeli investment companies, corporate investors, incubators, accelerators and private investors like angels and angels clubs. Capital raised on public stock exchanges is reported separately in this report.

According to the IVC-ZAG Survey Q4/2016, Israeli high-tech companies raised an all-time annual high of $4.8 billion in 2016, a $0.5 million, or 11%, increase compared to the amount raised in 2015, even though the number of companies in 2016 was lower than in prior years. As a result, the average financing round, which has been constantly growing over the past five years, reached $7.2 million in 2016, which is $2.1, or 19%, higher than the five-year average (Figure 6).

Figure 6 - Capital Raised by Israeli High-Tech Companies
According to the IATI 2017 Israel Venture Capital Report, although Israeli technology deal flow is rising each year, investments from Israeli VCs has remained fairly constant over the past 10 years and is not keeping pace with market growth (figures 17).

Figure 17 - Israeli VC amounts are stagnant while the market is growing

In a global perspective, we see a similar trend in the US. According to the MoneyTree Report by PricewaterhouseCoopers LLP (PwC), based on data from Thomson Reuters, venture capital investments grew between 2012 and 2015, reaching their highest level in 2015 – $60 billion in 4,561 deals. According to the Q1-Q3 2016 trend, 2016 is expected to reach a new peak. This is already an 8% increase relative to the first three quarters of 2015 (Figure 18).

Figure 18 - PwC- MoneyTree Report – Total equity investments into venture-backed companies
According to the IATI 2017 Israel Venture Capital Report, although investment trends are similar in Israel and other markets, the Israeli market is unique in the level of expenditure of VC investments. According to the report, Israel’s level of expenditure by VC investments in 2014 was higher than all other OECD members (Figure 19).

Figure 19 – Expenditure by VC as a % of GDP (2014)
According to the IVC-ZAG High-Tech Capital Raising Survey, the life sciences sector attracted in 2016 funding of $823 million, which represents 20% 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 (Figure 20).

Figure 20 - Capital raised by Israeli High-Tech Companies, by Sector (2007-2016)
The funding of $823 million was invested in 132 life science companies, a 17% drop in the number of companies compared to 2015. Although the trend of funding fewer life sciences companies continued in 2016, the average funding per company slightly increased in 2016 compared to 2015, and is above the average for 2007-2015. Total investments in life sciences companies in 2016 is also above the average in the last decade (Figure 21).

**Figure 21 - Capital Raised by Israeli Life Sciences Companies (2007-2016) – $ millions**

This trend of investments in the life sciences sector is in line with the investment trend in the US. According to the MoneyTree™ Report by PricewaterhouseCoopers LLP (PwC) and the National Venture Capital Association (NVCA), based on data from Thomson Reuters, US investors contributed $11 billion to the healthcare sector in 577 deals in 2016 (Figure 22).

**Figure 22 – PwC-NVCA MoneyTree Report – Top five US investments by sector, 2016**

According to the MoneyTree™ Report, over the last 20 years, healthcare is the second largest high-tech sector by dollar amount in the US.
As mentioned above, total investments in life science companies in Israel in 2016 was $823 million. Of that amount, $106 million was invested by Israeli venture capital funds, which represents 13% of the total investments in Israeli life sciences companies. The amount invested by VCs in Israeli life sciences companies in 2016, as well as the percentage of total investments, is similar to average investment in the last 3 years. It is interesting to see that unlike overall life sciences investments that are relatively volatile, VC investments trend to be more stable over time. (Figure 23).

Figure 23 – Capital Invested by Israeli VC Funds vs. Other Investors in Life Sciences (2007–2016) - $ millions

Source: IVC-ZAG High-Tech Capital Raising Survey
Looking at the total amount invested by Israeli investors compared to foreign ones in 2012–2016, we see a continued increase in the amounts invested in Israeli life sciences companies by Israeli investors. In 2016, Israeli investors contributed $312 million, representing 38% of total investments in Israeli life sciences companies, and up from $265 million and $193 million, or 28% and 24% of the investments in Israeli life sciences companies, in 2015 and 2014, respectively. Interest in the Israeli life sciences sector by local investors continued to grow in 2016, while, for the first time in the last five years we have seen a decrease in foreign investments in those companies (Figure 24).

**Figure 24 - Capital Invested in Israeli Life Science Companies by Investor type: Israeli vs. Foreign Investors (2012–2016) – $ millions**

Source: IVC-ZAG High-Tech Capital Raising Survey
According to the IVC-ZAG High-Tech Capital Raising Survey, the trend we have seen in the decade ended 2014, of increase non-VC-backed life sciences investments continued in 2016. Last year, $354 million, or 43% of total investments in Israeli life sciences companies, were non-VC backed investments, compared to $299 million, or 31%, of total investments in Israeli life sciences companies in 2015. On the other hand, VC-backed investments in Israeli life sciences companies declined in 2016 for the first time in a decade, after a record high in 2015. It is important to notice that VC-backed investments in Israeli life sciences companies of $470 million in 2016 is still significantly higher than the 10 years average of $321 million (Figure 25).

Figure 25 - VC-Backed vs. Non-VC-Backed Life Science Financing Rounds (2007-2016) - $ millions

Source: IVC-ZAG High-Tech Capital Raising Survey
As the Israeli life sciences industry matures, we see that a relative larger share of investments is going to later stage companies (initial revenues and revenue growth) in the last three years. A significant increase can also be seen in the amounts invested in deals of more than $20 million, which now represent 55% of total investments in Israeli life sciences companies in 2016, compared to a 10-year average of 24% (Figures 26 & 27).

Figure 26 - Capital Raised by Israeli Life Sciences Companies by Stage (2007–2016) - $ millions

![Figure 26](source.png)

Source: IVC-ZAG High-Tech Capital Raising Survey

Figure 27 - Capital Raised by Israeli Life Sciences Companies by Deal Size (2007–2016) - $ millions

![Figure 27](source.png)

Source: IVC-ZAG High-Tech Capital Raising Survey
The number of deals in Israeli life science financing is still much higher in companies in seed and R&D stage compared to companies in later stages. We can see that although there were fewer deals in 2016 compared to 2015 (Figure 28), the number of deals for each stage in 2016 is still similar or above the 10-year average.

Figure 28 - Number of Israeli Life Science Financing Deals by Stage (2007–2016)

Source: IVC-ZAG High-Tech Capital Raising Survey
identified in the life sciences industry are medical devices, biotech/pharma (including agrobiotech), diagnostics, healthcare IT (including telemedicine and bioinformatics) and the "others" sub-sector.

As can be seen in Figure 30 and Figure 31, the medical device sub-sector keeps attracting the majority of the life sciences investment in 2016, both in terms of amounts invested and the number of deals, although the percentage of investments in this sub-sector has declined over the last decade. Biotech/pharma remained the second largest sub-sector in 2016, in both amounts invested and number of deals, although the latter metric fell dramatically in 2015 and 2016, and is now back to its level in 2007.
The third largest sub-sector is healthcare IT, which is the most growing in terms of both value and deals, and almost reached the same number of deals as biotech/pharma in 2016. The actual number invested in digital health companies in 2016 is most probably higher than $110 million (as demonstrated in Figure 30), as some of the medical device companies can also be included in this report definition of digital health because they are developing products like biosensors, etc. This assumption can be supported by a recent report published by Start-Up Nation Central, according to which the total amount invested in Israel Digital Health companies in 2016 was $183 million.

Figure 30 - Israeli Life Sciences Capital Raised by Sub-Sector - $ million

Source: IVC-ZAG High-Tech Capital Raising Survey
Figure 31 - Israeli Life Sciences Capital Raised by Sub-Sector (# of companies)

Source: IVC-ZAG High-Tech Capital Raising Survey
According to the IVC Research Center and publically available data, the most active life sciences investors in Israel in the last three years (excluding investments by incubators) were OrbiMed Israel Partners (22 investments in that period), Pontifax (16) and OurCrowd, an equity-based crowdfunding platform (14), see Table 1.

Table 1 - Top Life Science Investors by Year, # of First Investments & Total # of Investments

<table>
<thead>
<tr>
<th>Year</th>
<th>Plc.</th>
<th>Investor Name</th>
<th>Investor Type</th>
<th># of First Investments</th>
<th># of Deals in Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1</td>
<td>OrbiMed Israel Partners LP</td>
<td>VC Fund</td>
<td>6</td>
<td>9</td>
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<tr>
<td></td>
<td>2</td>
<td>Trendlines Medical Misgav Ltd.</td>
<td>Incubator</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yelin Lapidot Investment House Ltd.</td>
<td>Holding Company</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Zaitoun Ventures</td>
<td>Investment Company</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>OurCrowd Management Ltd.</td>
<td>Angel Club/ Group</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pontifax III LP</td>
<td>VC Fund</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>2015</td>
<td>1</td>
<td>OrbiMed Israel Partners LP</td>
<td>VC Fund</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Pontifax III LP</td>
<td>VC Fund</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>FutuRx Ltd.</td>
<td>Incubator</td>
<td>5</td>
<td>5</td>
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<tr>
<td></td>
<td>4</td>
<td>OurCrowd Management Ltd.</td>
<td>Angel Club/ Group</td>
<td>4</td>
<td>7</td>
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<tr>
<td></td>
<td>5</td>
<td>Zaitoun Ventures</td>
<td>Investment Company</td>
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<tr>
<td></td>
<td></td>
<td>NGT3</td>
<td>Incubator</td>
<td>4</td>
<td>4</td>
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<tr>
<td>2016</td>
<td>1</td>
<td>Trendlines Medical Misgav Ltd.</td>
<td>Incubator</td>
<td>6</td>
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<td></td>
<td>2</td>
<td>Pontifax IV LP</td>
<td>VC Fund</td>
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<td>6</td>
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<td>Alon MedTech Ventures Ltd.</td>
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<td>4</td>
<td>Arkin Bio Ventures LP</td>
<td>VC Fund</td>
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<td>Investment Company</td>
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<td></td>
<td>Johnson &amp; Johnson Innovation - JJDC Inc.</td>
<td>Corporate VC</td>
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<td></td>
<td>TriVentures III</td>
<td>VC Fund</td>
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<td>VC Fund</td>
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<td></td>
<td>Sanara Ventures Ltd.</td>
<td>Incubator</td>
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<td></td>
<td>5</td>
<td>OurCrowd Management Ltd.</td>
<td>Angel Club/ Group</td>
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<td>4</td>
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</table>

Source: IVC-Onlne Database
In the last decade, Israeli life sciences companies raised more than $6.7 billion on NASDAQ. The majority of this amount (over $5 billion) was raised after 2013, when some companies took advantage of a window of opportunity for life sciences IPOs. According to the IVC Research Center, 21 Israeli life sciences companies were listed on NASDAQ, 12 of them raised $366 million (IPOs and follow-on offerings). See Figure 32.

*Including IPOs and follow on offerings on NASDAQ.

The drop in the number of Israeli life sciences public offerings and the amounts raised on NASDAQ is not unique to Israeli life sciences companies and is part of a global plunge in public offerings across the industry in 2016. Although the number of Israeli life sciences public offerings on NASDAQ was cut in 2016 by more than 55% and the amounts raised plummeted by more than 78%, NASDAQ remained the main source for public offerings for Israeli life sciences companies, with more public offerings and more money raised than on all other exchanges combined (including TASE).
Tel Aviv Stock Exchange (TASE)

Sixty life science stocks are listed on Tel Aviv Stock Exchange (TASE), with 21 dually listed on foreign markets¹. We see that investors on TASE are still cautious due to overall underperformance of life sciences companies, general lack of industry expertise by institutional investors, and insufficient analyst reporting and understanding of this industry. On the other hand, TASE played a significant role in providing life sciences companies with a platform for fund raising, and a stepping stone on the way to NASDAQ or another international stock exchange at a later stage. According to the IVC Research Center, five life sciences companies raised $108 million on TASE in 2016, via initial and follow-on offerings (Figures 33 and 34).

Figure 33 - Number of Public Life Science Companies on TASE by sector

¹ According to the TASE website – www.tase.co.il
In March 2010, TASE launched the Biomed Index, which currently includes 34 life sciences companies with the highest market cap. The Biomed Index performance in the last few years is presented in Figure 35.
Other Stock Exchanges

Israeli life sciences companies are traded on other stock markets like AIM, Frankfurt SE, LSE, NYSE, SGX, TSX, Xetra, and small cap markets such as OTCQB and Pink Sheets. According to the IVC Research Center, 5 Israeli life sciences companies raised $177 million in 2016 compared to 7 companies that raised $8,305 million in 2015 (IPOs and follow-on offerings). See Figure 36.

Figure 36 – Public Offerings* by Israeli Life Science Companies on Other Stock Exchanges 2007–2016 ($ million, # of offerings)

*Including IPOs and follow on offerings

In 2016, 45 global biotech companies listed on western stock exchanges had an IPO, raising $51 million on average. The 6 biotech IPOs in Q4 2016, raising $464 million, were the lowest total number of floats seen since 2013; the total amount raised and average IPO size were the lowest since 2012 and 2011 respectively (Figures 37 and 38).
Figure 37 - IPO Annual Totals (Western Stock Exchanges)

Table: Biotech IPO Market by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of IPOs</th>
<th>Amount raised ($bn)</th>
<th>Avg. amount raised ($m)</th>
<th>No. raising &gt;$100m</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>45</td>
<td>2.3</td>
<td>51</td>
<td>3</td>
</tr>
<tr>
<td>2015</td>
<td>61</td>
<td>4.7</td>
<td>77</td>
<td>17</td>
</tr>
<tr>
<td>2014</td>
<td>87</td>
<td>6.3</td>
<td>72</td>
<td>18</td>
</tr>
<tr>
<td>2013</td>
<td>44</td>
<td>3.0</td>
<td>67</td>
<td>7</td>
</tr>
<tr>
<td>2012</td>
<td>16</td>
<td>0.9</td>
<td>58</td>
<td>2</td>
</tr>
<tr>
<td>2011</td>
<td>17</td>
<td>0.7</td>
<td>40</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: PHARMA & BIOTECH 2016 IN REVIEW, EvaluatePharma, March 2017

Figure 37 - IPO Annual Totals (Western Stock Exchanges)

Source: PHARMA & BIOTECH 2016 IN REVIEW, EvaluatePharma, March 2017
As in prior years, the government of Israel is still strongly focused on creating an R&D support network through various grants and incentive programs. The Israel Innovation Authority (IIA) (formerly the Office of the Chief Scientist, or the "OCS") at the Ministry of Economy, is responsible for the funding of industrial R&D programs in Israel and contributes 30% to 85% of the approved R&D expenses of Tech companies including that of life sciences companies. In the last decade, the IIA invested more than $100 million annually in the life sciences sector via its different programs (Figure 39), including the Incubators program (see below), General Industrial R&D Grants, The Magnet Program (Consortium of academia and industry), Nofar and Kamin Programs (applied academic research), that aim at bridging the gap between applied research and the industry, and the TNUFA Program which focuses on linking individual inventors and investors.

Figure 39 - IIA R&D Support of the Life Sciences Sector (Million NIS)

Source: The Israel Innovation Authority
The IIA’s support to the life sciences sector is between 25%-30% of its yearly budget (Figure 40), and increased by 3.3% in 2015 compared to 2014.

Figure 40 – IIA Budget (grants by sectors)

Source: The Israel Innovation Authority
The Technological Incubators Program was launched in 1991 and is administrated by the Israel Innovation Authority, Ministry of Economy. The primary goal of the program is to transform innovative technological ideas that are too risky for private investments into viable startup companies that are able to raise money from the private sector. The incubators program positioned itself as the primary sponsor of startups in Israel today, supporting 70-80 new startups every year.

In 2006 to 2015, over 600 companies were accepted into the incubators program. A third were medical device companies and 10% were biotech/pharma companies. At the beginning of 2016, 30% of the companies operating under the incubators program were medical device companies and 10% were biotech/pharma companies (Figure 41).

Especially in the life sciences sector, with its relatively high-risk level for entrepreneurs, the incubator program allows initial proof-of-concept that, if successful, can later attract private investments. Without government risk-taking and making the initial investments in these initiatives, those companies would probably never go beyond the idea phase, and definitely not get to the point that they can raise private investments.

Figure 41 - Percentage of Life Science Companies in the Incubators program (2015)

Source: Incubator Program. Office of the Chief Scientists Ministry of Economy
**Financial Support**

A company can operate within an incubator up to 3 years and the total budget for that three-year term is up to $2 million, depending on the field of activity of the project. As much as 85% of the total budget is financed by the government as a grant that is paid back only upon success and the remaining 15% is financed by the incubator. A company that matures into a revenue-generating business has to pay the government royalties at 3%-3.5% of revenue until the full amount of grant (plus interest) is paid back.

From 1991 to the end of 2015, the government sponsored over 2,000 incubated companies with a total cumulative government investment of over $750 million.

Over 1,800 companies have matured and left the incubators. Of these alumni, 60% have successfully raised private investments. By the end of 2015, 35% of incubators alumni were still up and running. The total cumulative private investment in incubator alumni surpassed $5 billion.

This means that for every dollar the government invests in an incubator company, that company raises additional 5-6 dollars from the private sector (Figure 42).

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**Figure 42 - Incubator Program—Government Funding VS Private Investments (1991-2015)**

![Graph showing government funding and private investments from 1991 to 2015](chart.png)

Source: Incubator Program. Office of the Chief Scientists Ministry of Economy
Several successful life sciences companies started in the incubators program and many of them also received additional funding from various programs of the IIA. Among them are: ReWalk, Compugen, Simbionix, Protalix, Prolor, Mazor Robotics, Enzymotec, Collplant, Valtech, Dune Medical and others. Most of these companies are now public, either in Israel or in the US.

The most active life sciences incubators:

According to Medison Biomed1, 14 incubators are highly involved in life sciences companies (in alphabetic order):

- Alon-MedTech Ventures Ltd: medical devices and digital health - founded in 2013 and located in Yokneam Illit. The leading investor in the incubator is the renowned Israeli entrepreneur Dr. Shimon Eckhouse (founder NASDAQ-traded Lumenis and Syneron). Alon-MedTech’s portfolio includes nine medical device, health and cosmetic technology companies, amongst which are: ClipTip Medical and Anchora Medical (laparoscopic devices), EVA Visual (hand held high resolution 3D scanner for cosmetic uses), ArchimedUS Medical (device for esthetic applications) and BrainMARC (wearable EEG-based tools).

  In March 2016, Alon Medtech signed a unique agreement with Tsinghua University (considered one of China’s leading universities) to select several projects from among the portfolio of XIN Research Center (a joint center of Tsinghua and Tel Aviv University) for further development in the incubator.

- eHealth Ventures - Founded in mid-2016 and located in Modi’in Illit. Investors in the incubator include Medison Biomed (leading Israeli pharma company and life science investor), Maccabi Healthcare Services (Israel’s 2nd largest HMO), Cleveland Clinic Innovations (commercialization arm for Cleveland Clinic – US top 2 Medical Center), Amgen (a global biopharmaceutical leader) and SCI (Shanghai Creation Investment, a major Chinese VC).

  The incubator expects to take in 40 startups over the next eight years and is currently recruiting companies in the fields of IT management for hospitals and clinics, apps for changing behavior, gaming systems for improving health. The portfolio currently includes AllerGuard (device for detecting allergens in food) and Insulog (tracking insulin injection for diabetes patients).

  As of November 2016, eHealth Ventures has raised $12 million from its stakeholders for investment in early stage companies and plans to raise more capital for follow-up investments in companies that will graduate from the incubator after two to three years.

- FutuRX biotech accelerator - Founded in 2014 in Ness Ziona. The accelerator is a joint venture of JJDC (Johnson & Johnson Innovation), OrbiMed Israel Partners (part of Orbimed Healthcare Fund Management, global life science VC), and Takeda Ventures (corporate VC arm of Takeda Pharmaceutical Company).

  FutuRX portfolio is made up of nine early stage biopharma companies. Notable companies on the incubator’s portfolio are HepaRx (clinical stage, developing a proprietary small molecule

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1 Based on publicly available information.
cancer drug), XoNovo (preclinical-stage, developing a proprietary small molecule for the
treatment of neurodegenerative diseases) and Ice Therapeutics (preclinical-stage, developing
proprietary small molecules for treating lower urinary tract disorders).

- Incubit Technology Ventures - Founded in 2014 and located in Be’er Sheva. The incubator
  is fully owned and backed by Elbit Systems, the largest publicly traded Israeli high-tech defense
  company.

  Incubit’s portfolio includes 8 companies, of which 2 are in the life sciences space - EchoCare
  (developing a non-wearable, self-learning, elderly-care home monitoring device) and Collage
  Medical Imaging (developing Optical biopsy for revolutionary microscopic diagnostics of local
cancerous tumors inside organs).

- Incentive Incubator - Founded in 2012 and located in Ariel University of Samaria. Peregrine Ventures (a life science and digital health VC) is the sole shareholder of the incubator. Incentive’s portfolio includes 19 life science companies with a focus on single-patient-use-devices as well as 15 software companies. Notable members of the life science portfolio are Otic Pharma (developing a device for foam delivery for treatment of ear disorders), Valtech Cardio (transcatheter repair of the mitral and tricuspid valves) and NLT spine (expandable products and technologies for minimally invasive spine surgery).

  To date, Incentive’s portfolio companies have raised more than $160 million. In 2016, two of
  Incentive’s portfolio companies were the target of acquisitions: NLT Spine was acquired by
  US-based SeaSpine Holdings Corp. for $43 million (announced August 2016) and Valtech Cardio
  was acquired by US-based Edwards Lifesciences for $340 million (announced November 2016). In
  addition, Otic Pharma announced its merger with NASDAQ shell Tokai Pharmaceuticals
  (December 2016).

- MEDX Xelerator - Founded in late-2016 and located in Or Yehuda. Investors in the
  incubator include MEDX Ventures Group (a med-tech investment and management firm),
  Boston Scientific (global developer, manufacturer and marketer of medical devices), Invention
  Science Fund (intellectual ventures-led fund, investors include Bill Gates) and Sheba Medical
  Center (largest hospital in Israel).

  MEDX Xelerator aims at investing in 40 ventures over an eight year period with initial focus on
  non-invasive medical devices which target substantial markets with a considerable growth
  potential. Since the incubator’s official launch in September 2016, 4–6 companies were evaluated
  for funding. The incubator plans to expand its focus to digital health companies as well.

- MindUp - Founded in early 2016 and located in Haifa. MindUp is a joint venture of
  Medtronic (multinational medical device company), IBM (multinational computing giant),
  Pitango Venture Capital (a leading Israeli VC) and Rambam Medical Center (an academic
  hospital and leading medical center for northern Israel).

  MindUP focuses its investments in the areas of big data, predictive analytics, telemedicine,
  cloud computing, wearable and implantable sensors, advanced point of care diagnostics,
personalized medicine, genomic analysis and hospital IT systems.
In February 2017, MindUp added Hemonitor Medical as the first company on its portfolio. Hemonitor develops autonomous, continuous and non-invasive ultrasound-based system for patient monitoring.

° NGT3, Next Generation Technologies – Founded in 2013 and located in Nazareth, the largest Arab city in Israel’s Galilee region. The incubator originated from NGT, which operates as technological incubator since 2002. Funds to the incubator are raised from European, American and Israeli investors with track records in the healthcare space. NGT3’s portfolio of companies includes nine early stage companies, primarily in innovative medical devices and life sciences. Notable investments were made into PamBio (drug therapy for acute bleeding conditions), Parasonic (home-use device for removing head lice), Aqueduct and Guide In Medical (guided intubation systems). The incubator expects three exits via M&As during 2018.

° RAD BioMed Accelerator - A private accelerator founded in 1992 and located in Tel Aviv. The Accelerator was founded by Mr. Yehuda Zisapel and Prof. Nava Zisapel (previously founders of Neurim Pharmaceutical).
RAD Biomed Accelerator was launched by the RAD Group, a world leaders in voice and data communications technologies. The accelerator’s portfolio includes 20 companies ranging in focus from medical devices, ophthalmology, biopharma and diagnostics. Notable companies are Moebius Medical (clinical stage biotech) which licensed its novel pain relief treatment for osteoarthritis to Indian Pharmaceutical giant Sun Pharma, Laminate Medical (device for improving vascular access patency rates) which recently announced an $8 million series-B financing round and SteadyMed (developing a drug administration platform) which raised $30 million in a private placement in early 2017. In 2013, Rad Biomed Accelerator sold its portfolio company EON Surgical, which developed a minimally invasive microlaparoscopy surgical platform technology to NYSE publically-traded Teleflex Inc.

° Sanara Ventures – Founded in early 2015 and located in Ra’anana. This early stage investment platform that includes an incubator is a joint venture of Teva Pharmaceutical Industries and Philips Healthcare. Sanara ventures began its operations in early 2015 and currently holds a selection of nine companies covering a range of medical devices and digital health technologies, to kick off its portfolio. Notable companies include: MeWay (a hand-held nebulizer for pulmonary drug administration), Myhomedoc (smartphone-based remote checkups and diagnosis), Purecare (innovative gum treatment), Lensfree (device lowering CT radiation), Breatheme (spirometer and app-based asthma management), SpirCare (innovative lung residual capacity measurement).

° Terralab Ventures – Founded in 2013 and located in Yokneam Ililit. The incubator was launched by Terra Venture Partners, a VC with investors coming from American and European
funds as well as from a number of family offices. The fund is a joint venture of Terra Ventures, Veolia Environmental Trust, Energias de Portugal, The Cleanweb Initiative and General Electric.

Terralab Ventures has a broad focus, covering companies engaged with wearable solutions, water purification, environmental solutions, energy and cleantech. In addition, the incubator includes 5 life science oriented companies: Sphinx (head lice treatment), Epitech (dry eye treatment), Augmedics (augmented reality guided surgery), Neurolief (non-invasive brain neuromodulation technology) and Kyterta (contextual activity analysis home system for seniors).

° Trendlines Medical (previously named Misgav Technology Center) - Founded in 1996, with locations in Misgav Business Park and Ramat Gan. Trendlines Medical is part of Trendlines, a public company, dually traded in Singapore (SGX) and in in the US (OTCQX). Apart from Trendlines Medical, Trendlines runs an agriculture incubator (Trendlines Agtech), a Singapore-based medical incubator and Trendlines Labs (in-house innovation center). Trendlines Medical portfolio includes thirty-three companies from formation stage all the way to revenue-generating phase. Notable companies are Venisca Medical (needle-free Botox® delivery for overactive bladder), Acruo Medical (innovative meniscus repair system) and Gordian Surgical (a safe solution to open and close the abdominal wall during laparoscopic procedures).

Trendlines Medical has five exits under its belt to date - E.T. View Medical (Sold to Ambu A/S, September 2016), FlowSense (sold to Baxter, September 2013), InnoLap Surgical (sold to Teleflex, September 2013), Inspiro Medical (sold to OPKO Health, April 2014) and PolyTouch (sold to Covidien, April 2012).

° Van Leer Xenia Incubator - Founded in 2012 in Jerusalem. The incubator is the fruit of a merger between an incubator owned by the TAS-traded Xenia Venture Capital and an incubator owned by the Van Leer Fund.

Van Leer Xenia Incubator’s portfolio companies focus on high-tech as well as on medical device, pharma and digital health companies. Notable companies include EyeYon Medical (medical ophthalmic devices), Camereyes (high-quality retinal screening), Eximore (ophthalmic drug delivery), Ninox (device for the treatment of obstructive sleep apnea) and Omnix Medical (novel antibiotic agents against resistant pathogenic bacterial strains).

° Youdim Pharmaceuticals Incubator - founded in 1997 and located in Yokneam Illit. The incubator is wholly owned, and operates as integral part of Youdim Pharmaceuticals.

Youdim’s portfolio includes 4 companies involved in the development of therapeutic and diagnostic solutions in the areas of neurological disorders and cancer: N2B (intranasal delivery formulation for a Parkinson’s drug), Curewize (personalized diagnostics and outcome for cancer patients), BioShai (blood test for diagnosing Parkinson’s disease) and Glaucopharm (novel topical treatment for glaucoma).
According to IVC Research Center, 55 Israeli life sciences companies have been acquired since 2012, for a total of over $4 billion (Figures 43 and 44, and Table 2). In the same period, only $3.6 billion was invested in Israeli life sciences companies (as seen in Figure 21), but in most of the individual years within that period the amount invested in Israeli life sciences companies was higher than the amount paid for acquisitions.

Figure 43 - Acquisitions of Israeli Life Sciences Companies Subsectors - $ millions, # of Companies (2012-2016)

Source: IVC-Meitar High-Tech Exits Report

Figure 44 - Acquisitions of Israeli Life Sciences Companies by Subsector (# of companies)

Source: IVC-Meitar High-Tech Exits Report
When it comes to global medtech industry consolidation, 2016 is the new 2014. The two years saw the same number of M&A deals closed - 217 - and a very similar total value - $41.7 billion in 2016, compared to $40.8 billion two years earlier. The global medtech industry total value of mergers in 2016 reflects a decrease from $78 billion in merger value in 2015. This figure does not include the $49.9 billion Medtronic-Covidien megamerger - the largest deal in the device sector ever (Figure 45).

The consolidation of the big medtech groups is driven largely by their need to cut costs in the face of continued pressure on pricing from their customers, competitive pressures, as well as a desire to diversify their portfolios, making these the strongest motivators for companies embarking on mergers or acquisitions. Their focus on large buys means they are turning away from the smaller acquisitions. This, in turn, might discourage VC funds to take the risk of investing in early-stage companies with innovative products. There is a concern that start-ups might be unable to find cash, potentially choking life changing inventions before their development even truly begins.

Table 2 - Acquisitions of Israeli Life Sciences Companies with Values Exceeding $10 million (2012-2016)

<table>
<thead>
<tr>
<th>Company name</th>
<th>Deal Amount ($)</th>
<th>Acquired By</th>
<th>Year</th>
<th>Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oridion Systems Ltd.</td>
<td>310</td>
<td>Covidien</td>
<td>2012</td>
<td>Medical device</td>
</tr>
<tr>
<td>superDimension Ltd.</td>
<td>300</td>
<td>Covidien</td>
<td>2012</td>
<td>Medical device</td>
</tr>
<tr>
<td>Surpass Medical Ltd.</td>
<td>135</td>
<td>Stryker</td>
<td>2012</td>
<td>Medical device</td>
</tr>
<tr>
<td>Thrombotech Ltd.</td>
<td>56.5</td>
<td>D-Pharm</td>
<td>2012</td>
<td>Biotechnology</td>
</tr>
<tr>
<td>Sync-Rx Ltd.</td>
<td>17.3</td>
<td>Volcano</td>
<td>2012</td>
<td>Medical device</td>
</tr>
<tr>
<td>UltraShape Medical Inc.</td>
<td>12</td>
<td>Syneron Candela</td>
<td>2012</td>
<td>Medical device</td>
</tr>
<tr>
<td>Given Imaging Ltd.</td>
<td>970</td>
<td>Covidien</td>
<td>2013</td>
<td>Medical device</td>
</tr>
<tr>
<td>PROLR Biotech Inc.</td>
<td>480</td>
<td>OPKO Health</td>
<td>2013</td>
<td>Biotechnology</td>
</tr>
<tr>
<td>dbMotion Ltd.</td>
<td>235</td>
<td>Allscripts</td>
<td>2013</td>
<td>Health IT</td>
</tr>
<tr>
<td>Alma Lasers Ltd.</td>
<td>221</td>
<td>Fosun Pharma</td>
<td>2013</td>
<td>Medical device</td>
</tr>
<tr>
<td>Caesarea Medical Electronics (CME)</td>
<td>100</td>
<td>CareFusion</td>
<td>2013</td>
<td>Medical device</td>
</tr>
<tr>
<td>ConTipi Ltd.</td>
<td>85</td>
<td>Kimberly-Clark</td>
<td>2013</td>
<td>Medical device</td>
</tr>
<tr>
<td>Spectrum Dynamics Ltd.</td>
<td>51</td>
<td>Biosensors International</td>
<td>2013</td>
<td>Medical device</td>
</tr>
<tr>
<td>Eon Surgical Ltd.</td>
<td>40</td>
<td>Teleflex</td>
<td>2013</td>
<td>Medical device</td>
</tr>
<tr>
<td>Upstream Peripheral Technologies Ltd.</td>
<td>35.5</td>
<td>Spectranetics</td>
<td>2013</td>
<td>Medical device</td>
</tr>
<tr>
<td>ActiViews Ltd.</td>
<td>20</td>
<td>Stryker</td>
<td>2013</td>
<td>Medical device</td>
</tr>
<tr>
<td>ColoRight Ltd.</td>
<td>175</td>
<td>L’Oreal</td>
<td>2014</td>
<td>Medical device</td>
</tr>
<tr>
<td>Simbionix Corp.</td>
<td>120</td>
<td>3D Systems</td>
<td>2014</td>
<td>Health IT</td>
</tr>
<tr>
<td>Kyma Medical Technologies Ltd.</td>
<td>35</td>
<td>ZOLL Medical</td>
<td>2015</td>
<td>Medical device</td>
</tr>
<tr>
<td>V-Gen Ltd.</td>
<td>35</td>
<td>Newport</td>
<td>2014</td>
<td>Medical device</td>
</tr>
<tr>
<td>Stimatix GI Ltd.</td>
<td>15</td>
<td>Undisclosed German company</td>
<td>2014</td>
<td>Medical device</td>
</tr>
<tr>
<td>cCAM Biotherapeutics Ltd.</td>
<td>95</td>
<td>Merck</td>
<td>2015</td>
<td>biotechnology</td>
</tr>
<tr>
<td>MIS Implants Technologies Ltd.</td>
<td>375</td>
<td>Dentsply Sirona</td>
<td>2016</td>
<td>Medical device</td>
</tr>
<tr>
<td>Galil Medical Ltd.</td>
<td>110</td>
<td>BTG</td>
<td>2016</td>
<td>Medical device</td>
</tr>
<tr>
<td>Roshtov Software Industries Ltd.</td>
<td>21</td>
<td>Magic Software</td>
<td>2016</td>
<td>Health IT</td>
</tr>
<tr>
<td>ETView Ltd.</td>
<td>16</td>
<td>Ambu</td>
<td>2016</td>
<td>Medical device</td>
</tr>
</tbody>
</table>

Source: IVC-Online Database
According to Pharma & Biotech 2016 In Review, published by Evaluate Pharma, Pharma/Biotech M&A acquisitions in 2016 totaled $99 billion. Before the IPO boom, $99 billion would have been seen as a good year, particularly as 2016 only featured one megamerger - the acquisition of Baxter’s Baxalta spinoff by Shire. The boom years were marked by multiple megamergers each year: three in 2014 and two in 2015 (Figure 46).

* This analysis only includes acquisitions by pharma and biotech companies - it excludes medtech and diagnostic players, for example.
According to Israel Export and International Cooperation Institute (IEICI), pharmaceutical product exports from Israel in 2016 reached $6.9 billion (out of $44 billion of industrial export from Israel), an increase of 1.5% compared to 2015. According to the IEICI report, industrial high-tech exports fell by 5% in dollar terms, to $22 billion. As seen in Figure 42 below, pharmaceuticals provided a significant part (about 30%) of overall industrial high-tech exports.

Exports to the US, Israel’s biggest market, rose 3% in 2016 to a total of $11.6 billion, mainly thanks to growth in high-tech product exports, led by medical equipment and pharmaceuticals. Exports to the UK, Israel’s second-ranking export market and the biggest in Europe, rose 3% as well (in dollar terms). Pharmaceutical exports, which account for more than two thirds of total exports to the UK, remained unchanged, in contrast to the accelerated growth in the last few years. It should be noted that the pharmaceutical industry is significantly influenced by Teva’s production and export activities, which account for a large percentage of industrial exports.

**Figure 47 - Industrial High-tech Exports from Israel**
More than half of Israeli health IT and digital health companies were established in the last five years, with an average of 38 per year (Figures 48). Sixty nine percent of the companies are relatively small, with less than 10 employees, about 26% have 10-50 employees and very few, about 5%, are relatively large companies with more than 50 employees.

Figure 48 – Number of Israeli Health IT and Digital health Companies per Year Established
Subsectors

According to the Startup Nation Central Digital Health Report 2016, the number of companies in the Israeli Digital Health sector has risen substantially in recent years, reaching 384 companies in 2016. Personal health tools has skyrocketed, becoming the most prominent subsector, with 174 companies (45% of the sector). With 85 companies, health analytics is the second largest. Clinical workflow, which had the greatest share in 2010, exhibited the slowest growth rate (Figure 49).

Figure 49 - Number of active Israeli Health IT and Digital Health Companies (2016)

Source: IATI, Startup Nation Central Digital Health Report 2016

1 http://lp.startupnationcentral.org/digitalhealthreport/?utm_source=IATI&utm_medium=general&utm_campaign=iatish arings&utm_content=digitalhealth
The subsector that attracted the most significant cut of total investments in the US in 2016 is patient/consumer experience, with total investments of almost $4.8 billion ($2.8 billion excluding “mega deals”). The leading sub-sector in Israel, personal health, is ranked #3 in the US (Figure 50).

Figure 50 - Top Most 10 Active Digital Health Sub-sectors in US

<table>
<thead>
<tr>
<th>Subsector</th>
<th>Total Raised YTD</th>
<th>Deal Count</th>
<th>Avg. Deal Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Patient/Consumer Experience</td>
<td>$2.8B</td>
<td>163</td>
<td>$17M</td>
</tr>
<tr>
<td>2 Wellness</td>
<td>$1.0B</td>
<td>45</td>
<td>$23M</td>
</tr>
<tr>
<td>3 Personalized Health/Quantified-Self</td>
<td>$785M</td>
<td>47</td>
<td>$16M</td>
</tr>
<tr>
<td>4 Medical Device</td>
<td>$713M</td>
<td>53</td>
<td>$13M</td>
</tr>
<tr>
<td>5 Workflow</td>
<td>$593M</td>
<td>89</td>
<td>$7M</td>
</tr>
<tr>
<td>6 Big Data/Analytics</td>
<td>$562M</td>
<td>54</td>
<td>$10M</td>
</tr>
<tr>
<td>7 Population Health</td>
<td>$436M</td>
<td>52</td>
<td>$8M</td>
</tr>
<tr>
<td>8 Clinical Decision Support</td>
<td>$332M</td>
<td>22</td>
<td>$15M</td>
</tr>
<tr>
<td>9 Research</td>
<td>$280M</td>
<td>28</td>
<td>$10M</td>
</tr>
<tr>
<td>10 E-commerce</td>
<td>$277M</td>
<td>17</td>
<td>$16M</td>
</tr>
</tbody>
</table>

Source: StartUp Health Insights - A StartUp Health Insights Report 2016 Digital Health Funding Rankings
The digital health ecosystem is shifting towards a user-centric business model, and the Israel industry is no exception. According to the Startup Nation Central Digital Health Report 2016, strictly-B2B companies were more prevalent in 2010 than B2C/B2B2C companies. In the years that followed, however, the number of B2C/B2B2C companies has increased significantly, far outnumbering strictly-B2B companies (Figure 51).

Figure 51 - Israeli Health IT and Digital Health – Business Models

Source: Startup Nation Central Digital Health Report 2016

1 http://lp.startupnationcentral.org/digitalhealthreport/?utm_source=IATI&utm_medium=general&utm_campaign=iatisharings&utm_content=digitalhealth
Funding of the Healthcare IT and Digital Health Sub-Sector

In the last two years, Israeli and foreign venture capital funds became more active in this sector. Among them are Tri-Ventures, OrbiMed, Lion-Bird, Fuerst Technology Innovations, LongTec China Venture and Horizons, as well as angel investors, accelerators and incubators.

In a recent report published by Start-Up Nation Central, the total amount invested in Israel Digital Health companies reached $183 million in 2016, compared to $144 million in 2015. According to Rock Health annual report, 2016 was a strong year for digital health in the US as well (Figure 52). Venture funding for digital health companies reached $4.2B in 2016, down 8% from 2015. This represents compounded annual growth of 30% in 2011–2016. There were 304 deals across 296 companies in this sub-sector, with average deal size of $13.8 million.

Figure 52 – Global Investments in Digital Health
The number of scientific publications is one of the metrics for academic excellence, because it demonstrates a link between basic research, applied research and industrial development. Israel’s well established research activities in life sciences is a fertile platform for scientific publications and academic excellence. According to the Samuel Neaman Institute at the Technion, an independent multi-disciplinary national policy research institute for the National Committee for Civilian Research and Development at the Ministry of Science, Technology and Space, more than 50% of scientific publications that came out of Israel during 2016 were related to the various life sciences sub-sectors, an increase of more than 5% compared to 2012, while more than 30% came from the leading sub-sector, medicine, up from less than 30% in 2012 (Figure 53).

Figure 53 – Percentage of Scientific Publications from Israel

Source: Samuel Neaman Institute Analysis of Scopus Data
As mentioned above, the increase in the number of scientific publications that came out of Israel is mainly attributed to life science, and primarily to medicine. This growth was higher than the increase in those publications worldwide. As a result, the contribution of Israeli scientific publications in life sciences to the global scientific knowledge base has increased in 2016 compared to prior years. We can also see that although Israel's population is only 0.1% of the world’s population, Israeli scientists are responsible for 0.5–0.8% of publications worldwide (Figure 54).

Figure 54 - The contribution of Israeli Scientific Publications
According to a study performed by The Samuel Neaman Institute at the Technion regarding the pursuit of academic degrees in life sciences, advance degrees students account for a higher percentage of Life Sciences students compared to lower degrees. The study included 228,602 students who attended Israeli universities and colleges in the 2014/2015 academic year, out of which 30% majored in disciplines related to science and technology. While only 9.4% of science and technology-oriented undergraduate students majored in biology science, 24.2% of graduate students and 45.7% of the students at the doctoral degree-level majored in biology science (Figure 55).

Figure 55 - Science and Technology Students Enrolled in Institutions of Higher Education, According to Degree and Area of Study

Source: Illustration of The Samuel Neaman Institute at the Technion to data received from the Central Bureau of Statistics
Doctoral degree graduates are a major force in conducting academic research and have a great impact on applied research. Therefore, data on new degree recipients can give an indication on the future of research in Israel. While the total number of doctoral degree graduates did not change significantly since 2009/2010, the percentage of biology science graduates has increased from 21% in 2009/2010 to 25% in 2012/2013 (Figure 56).

Figure 56 - Distribution of Doctoral degree Recipients in Israel, by Field of Study (2001/2002 – 2012/2013)

Source: Illustration of The Samuel Neaman Institute at the Technion to data received from the Central Bureau of Statistics
The Central Bureau of Statistics of the State of Israel published a survey (June 22, 2016) regarding commercialization companies in Israel in 2014-2015 and their activities relating to inventions, patents, license agreements, revenues and startup companies, which were originally run by the TTOs. The survey was initiated and supported by the Israel National Council for Research and Development, in the Ministry of Science, Technology and Space.

The role of commercialization companies (TTOs) is to seek out, develop, and market the knowhow accumulated in public institutions such as hospitals, colleges and universities, in order to turn patents into commercial products, as well as assisting in creating startup companies. Commercialization companies with these activities substantially contribute to the growth of the economy by increasing the income of the institutions they represent.

TTOs play a major role in the life sciences industry in Israel, as many patents, new start-ups and licensing agreements in the field originated from the eight research universities and eleven research institute and hospitals located across the country.

According to the survey, commercialization companies filed 509 original patent applications in 2015, and were involved in setting up 53 startup companies. The dominant fields of original patent applications were biotechnology (25%), medicine (15%) and physics, electronics and electro-optics (14%).

Figure 57 - Commercialization Companies in Israel - New Patent Applications, by Field (2014 & 2015)
In the years in which commercialization companies have been active under the auspices of the institutions included in the survey, they accumulated a large inventory of current patents. This inventory is comprised of the invention portfolio of each company, and are represented here by patent families. As can be seen in Figure 58, the life sciences sub-sectors represent a major part of these patent families. The dominant field of the active portfolio in 2015 was biotechnology, with 30% of the patent families. In 2013, the dominant field was medicine, representing 23% of the patent families.

Figure 58 - Commercialization Companies in Israel – Patent Families in the Active Portfolio, by Field (2015)

The conventional way for TTOs to commercialize inventions is through license agreements. The number of license agreements that were either valid, active or producing royalties in 2015 was 1,966. Most of the agreements were signed with commercialization companies from Israel (71%) and less so with companies from the US (17%). Most new agreements were signed with companies located in the vicinity of universities (80%).

In 2015, 162 new license agreements were signed. Of these license agreements, 319 produced royalties in 2015. Of these active agreements, 201 were signed with companies in Israel, while the other 118 were signed with companies from abroad. The dominant fields of active license agreements in 2015 were in life sciences: biotechnology (22%), agriculture and plant genetics (21%) and medicine (15%) (Figure 59).
Revenue from sales of intellectual property (IP) and gross royalties amounted to NIS 1,702 million in 2014, compared to NIS 1,746 million in 2013, a 2% decline. The majority of revenue from sales of intellectual property (IP) and gross royalties in 2014 originated in Israel - 81%. The medicine industry accounted for 95% of all revenue generated in 2014 (Table 3).

Table 3 - Commercialization Companies Israel - Revenues from Sales of Intellectual Property, by Field (2014), NIS millions

<table>
<thead>
<tr>
<th>Companies associated with:</th>
<th>Total</th>
<th>Agriculture and Plants Genetics</th>
<th>Biotechnology</th>
<th>Medicines</th>
<th>Medical Equipment</th>
<th>Mathematics and Computer Science</th>
<th>Physics and Electro-Optics</th>
<th>Chemistry and Nano Technology</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1,702</td>
<td>17</td>
<td>5</td>
<td>1,617</td>
<td>4</td>
<td>43</td>
<td>1</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>Universities</td>
<td>1,661</td>
<td>10</td>
<td>5</td>
<td>1,591</td>
<td>3</td>
<td>43</td>
<td>1</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Hospitals</td>
<td>22</td>
<td></td>
<td></td>
<td>21</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research institutions and colleges</td>
<td>19</td>
<td>7</td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

In 2015, commercialization companies were involved in the establishment of 53 start-up companies, compared to 42 start-up companies in 2014, an increase of 26%. Eighty five percent of these companies are located in the vicinity of universities (Table 4).
International Comparison - For this comparison, commercialization companies from the following countries were included: Israel, Australia, United Kingdom, United States and Canada. All data used in the comparison was standardized according to the R&D expenditure in each country, according to an international benchmark that was published in Australia. From the standardized international comparison, it appears that Israel generates more revenue from IP sales than almost any other country included in the comparison. Only the US has generated more revenue from IP sales and has also received more patent approvals. Canada is one of the countries with the highest number of startup companies founded. The UK ranks relatively high in most categories.

Israeli scientists and engineers have combined advanced technologies in electronics, communications, electro-optics, lasers, IT as well as other technologies to develop cutting-edge medical devices and commercialized defense R&D technologies. Israeli entrepreneurs continually overcome technological barriers and solve development problems quicker and in a more capital efficiency way compared to their larger and more affluent competitors overseas. All Israeli entrepreneurs “go global” from day one. With a go-getter attitude embedded in the culture, risk-taking and creativity are encouraged, while failures are tolerated.

Table 4 - Commercialization Companies in Israel - New Startup Companies (2014-2015)

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total- Israel and Abroad</td>
<td>42</td>
<td>53</td>
</tr>
<tr>
<td>Universities</td>
<td>31</td>
<td>45</td>
</tr>
<tr>
<td>Hospitals</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Research institutions and colleges</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: The Central Bureau of Statistics of the State of Israel

Australia, National Survey of Research and Commercialization, 2016
According to PwC’s report “From Vision to Decision - Pharma 2020”, major scientific and technological advances, coupled with sociodemographic changes, will increase demand for medicines, and trade liberalization will revive pharma’s fortunes in another 10 years and deliver dramatic improvements in patient care. But, if the industry is to prosper in the future, it must first make sure it has a future. According to the report, the industry faces three fundamental challenges:

- Rising customer expectations: The commercial environment is getting harsher, as healthcare payers impose new cost constraints on healthcare providers and scrutinize the value medicines offer much more carefully. They want new therapies that are clinically and economically better than the existing alternatives, together with hard, real-world outcomes data to back any claims about a medicine’s superiority.

- Poor scientific productivity: Pharma’s output has remained at a stable level for the past decade. Using the same discovering and developing processes, there is little reason to think its productivity will suddenly soar.

- Cultural sclerosis: The prevailing management culture, mental models and strategies on which the industry relies are the same ones it has traditionally relied on, even though they’ve been eclipsed by new ways of doing business.

The paramount challenge is to create more value for patients, providers and payers – and thus for shareholders.

PwC Global Healthcare website also mentions mobile as an accelerating trend in healthcare. Mobile is positioned to have a huge impact on how healthcare is delivered. It offers opportunities to address one of the most pressing global challenges: making healthcare more accessible, faster, better and cheaper.

Three major trends already happening in healthcare lend themselves to the revolution in mobile technology:

- Ageing population: Ageing populations and chronic illness are driving regulatory reform. Public sector healthcare is seeking better access and quality, and it is looking to the private sector for innovation and efficiency. mHealth improves access and quality, and offers dramatic innovation and cost reduction.

2 https://www.pwc.com/gx/en/industries/healthcare/emerging-trends-pwc-healthcare.html
- Foundations already in place: The foundations of industrialization of healthcare are already in place - electronic medical records, remote monitoring and communications. ‘Care anywhere’ is already emerging. The platform for mHealth is set.

- Personalization: Healthcare, like other industries, is getting personal. mHealth can offer personal toolkits for predictive, participatory and preventative care.

We believe that the innovative environment in Israel and the growing focus of Israeli life science companies on digital health, puts the local life science industry in a strong position to take a leading role in these trends.
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M&A and Securities shareholder Bob Grossman has broad experience representing a wide range of clients in the life sciences realm. Taking companies public, handling private offerings, acquiring and selling companies, and serving as a business advisor – he has led transactions ranging from under $1 million to $10 billion.

Barry Schindler has wide-ranging patent experience in biochemistry, working with start-ups as well as Fortune 500 companies. He has sophisticated research and engineering technical experience in various disciplines in life sciences.

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<th>Name</th>
<th>Amount</th>
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<td>HCW/Rodman</td>
<td>$4.04 Billion</td>
<td>155</td>
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* Source: Informa Business Intelligence, Inc. and Company Filings. Total Deals represents transactions between 1/1/16 and 4/28/17. This communication is for informational purposes only. It is not intended as an offer or solicitation for the purchase or sale of any financial instrument or as an official confirmation of any transaction. Since Rodman & Renshaw, a part of H.C. Wainwright & Co., is not a tax advisor, transactions requiring tax consideration should be reviewed carefully with your tax advisor. All market prices, data and other information are not guaranteed as to completeness or accuracy and are subject to change without notice.
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